Beta Unit Complex

(Platforms Elly, Ellen & Eureka, Beta Pipeline and Beta Pump Station)

Oil Spill Prevention
and
Response Plan

Revision 8, August 2020

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OSPRP QUICK GUIDE

BETA OFFSHORE

BSEE ID #3126

BETA UNIT COMPLEX

- **Platform Eureka**
- **Platform Ellen**
- **Platform Elly**
- **Beta San Pedro Bay Pipeline**
- **Beta Onshore Pump Station**

Prepared for:

Beta Offshore
111 W. Ocean Boulevard, Suite 1240
Long Beach, California 90802

Prepared by:

Witt O'Brien's
818 Town & Country Blvd., Suite 200
Houston, TX 77024
Phone (281) 320-9796 ● (281) 320-9700 FAX
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(985) 781-0804
Spill Response Hotline

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OSPRP QUICK GUIDE

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Beta Unit: Ellen/Elly OCS-P300	Emergency Incident Placard	Beta Unit: Eureka OCS-P301
Latitude 33˚34'56"N Longitude 118˚07'39"W	**Beta Offshore - BETA Unit Complex** Including Beta Pump Station, San Pedro Bay Pipeline **Immediate Response and Notifications**	Latitude 33˚33'50"N Longitude 118˚07'00"W

(985) 781-0804 (24 Hr. Number)
To Activate
The O'Brien's Response Management
(All or Partial Activation)

Thomas Haug	(562) 217-3511
Dan Sobieski	(714) 342-6358

INCIDENT OBSERVER

↓

PRODUCTION MANAGER
and/or On-Duty
Supervisors (PIC)

Activate the following (24 hr availability)
1. **SoCal Ship Services (310) 519-8411**
2. **MSRC 800-259-6772 / (800) 645-7745**
3. **O'Brien's Agency Notification**
   (985) 781-0804 Confirm 1st call is NRC!
4. **BSEE if spill is >1 bbl (805) 384-6370**

Potential for Media Attention Contact

Below MUST be activated by Dan Steward or Diana Lang:

Sam Sacco	Cell:	(510) 541-6449
Strategy & Communications	Hm:	(510) 547-1713

Please notify the Qualified Individuals (QIs) below, in the event of an emergency

Dan Steward	Ofc:	(562) 628-1539
	Cell:	(936) 647-6737
Alternate QI		
Diana Lang	Ofc:	(562) 628-1529
	Cell:	(562) 522-5095
Alternate QI		
Rick Armstrong	Ofc:	(562) 628-1534
	Cell:	(310) 560-5281

- PIC to call Elly Control Room (562) 606-5711
- Courtesy call to BSEE (805) 384-6370

Incident Management Team Health, Safety & Environmental

Diana Lang	Ofc:	(562) 628-1529
	Cell:	(562) 522-5095
Jazmin Tostado	Ofc:	(562) 628-1538
	Cell:	(562) 519-9178

Notify Agencies

Use appropriage report form. Agencies to be notified are specific to the type and location of the event.

NRC (Nat'l Res. Center)		**(800) 424-8802**
Cal Office of Emer. Svcs		**(800) 852-7550**
BSEE		(805) 384-6370
BSEE # for pipeline		(805) 384-6370
USCG dispatch		(310) 521-3800
DFW (same as Cal-OES)		(800) 852-7550
DOGGR		(714) 816-6847
DOT/OPS		(202) 366-4595
FAA (24 hr)		(310) 725-3300
L.A. City Fire (in port)		(310) 548-7540
L.A. County Fire Dept.		(562) 697-6731
Long Beach Fire Dept.		(562) 218-8179
Long Beach NMFS (National Marine Fisheries Svcs.)		(562) 980-4017
Huntington Bch Fire Hazmat		(714) 536-5469
Huntington Bch Fire Dispatch		(714) 536-2501
Huntington City Bch Lifegrd HQ		(714) 536-5281
Huntington State Bch Lifegrd HQ		(714) 536-1454
Orange Co. Sanitation		(714) 962-2411
Orange Co Fire Auth. Dispatch		(714) 538-3501
RWQCB		(213) 576-6600
SCAQMD		(800) 288-7664
State Lands Comm. (LB)	24 hr.	(562) 590-5201
State Fire Marshall		(562) 497-9100

Co-Op / Contractors (Call within 30 Min.)

MSRC - spill/drill call-out		(800) 259-6772
OR (800) OIL-SPILL =		(800) 645-7745
MSRC LB Office		(562) 981-7600
Mgr. Rick Tamayo		(562) 981-7640
MSRC FAX		(562) 981-7601
Patriot Environmental		(562) 436-2614
Clean Harbors		(800) 645-8265
SoCal Ship Services	24 hr.	(310) 519-8411

MSRC Command Post

(562) 981-7600

3300 East Spring Street
Long Beach, CA 90806

Beta Ellen Forward Command Post

IC / Ops	(562) 606-5705
Logistics / Sit-Stat	(562) 606-5704
Fax	(562) 606-5701

Offshore Adjacent Platform Operators

Federal OCS Waters:		
Edith (DCOR)		(714) 960-6342
	Fax:	(714) 960-6343
State Waters:		
Emmy (CRC-Hunt Bch)		(714) 969-3206
	Fax:	(714) 969-3287
Eva (DCOR)		(714) 960-6592
	Fax:	(714) 960-6593
Esther (DCOR)		(714) 960-6289
	Fax:	(714) 960-6299

Beta Emergency Numbers

Elly Control Room	(562) 606-5711
Elly Fax	(562) 606-5727
Production Supervisor	(562) 606-5705
Maintenance Supervisor	(562) 606-5704
Compliance Office	(562) 606-5742
Ellen Fax	(562) 606-5701
Eureka Production Off.	(562) 606-5783
Eureka Control Room	(562) 606-5732
Eureka Fax	(562) 606-5719

Contract Wildlife Assistance NRDA/SCAT

MBC Applied Environmental Services in Costa Mesa	(714) 850-4830
Cardno (formerly Entrix)	(805) 477-5003
	(925) 935-9920

San Pedro Bay Pipeline & Beta Onshore Pump Station

170 N. Pico Ave. Long Beach, CA 90802

Rick Armstrong	Cell:	(310) 560-5281
Beta Station		(562) 436-0521
Mike Smith		(562) 755-3387

Animal Assistance

SPCA LA	(888) 772-2521
LA Animal Services	(888) 452-7381
Pacific Marine Mammal Ctr LA	(310) 548-5677
Pacific Marine Mammal Center in Laguna Beach	(949) 494-3050
Internat'l Bird Rescue-San Pedro	(310) 514-2573
Wetlands Wildlife Care Ctr-HB	(714) 374-5587

Oiled Wildlife Care Network

Oiled Wildlife Care Network		(877) 823-6926
owcn@ucdavis.edu		24 hr.
Dr. Mike Ziccardi	Offc:	(530) 754-5701
	Cell:	(530) 979-7561
Volunteer Coordinator Rep at OSPR-Cindy Murphy		(800) 228-4544
		(916) 324-6250

Other Resources in Long Beach Port Area

CRC (THUMS)	(562) 624-3452
CRC (Tidelands)	(562) 436-9918
Crimson PL Control Ctr	(562) 528-8950
	(866) 351-7473

CEO Notification

Any accident on incident requiring company member notification likely to be recorded as lost time, injury or illness involving unconsciousness, requiring transportation by ambulance or helicopter, requiring overnight hospitalization, involving Beta Offshore or Contractor Property, Loss and damage >$25K or other's property >$10K, involving the spill or release of a hazardous substance in a reportable quantity, involving spill 1 bbl or more of crude oil into waters of U.S. or State, any explosion, fires caused by or involving process equipment, human exposure to H_2S or other gas requiring medical treatment.

Additional Resources

Mercy Air Ambulance	**(800) 222-3456**
LA County Sheriff (Carson)	(310) 830-1123
LA County Sheriff Aero Unit	(562) 421-2701
Orange County Sheriff	(714) 647-7000
Long Beach Police Dept.	(562) 435-6711
Long Beach Port Security	(562) 590-4185
American Red Cross	(562) 595-6341

Updated 7-22-20

1.a COMPANY CONTACT INFORMATION

QUALIFIED INDIVIDUALS			
NAME	EMAIL	OFFICE	MOBILE
Dan Steward	dan.steward@amplifyenergy.com	(562) 628-1539	(936) 647-6737
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281

IMT MEMBERS			
NAME	EMAIL	OFFICE	MOBILE
Incident Commander			
Dan Steward	dan.steward@amplifyenergy.com	(562) 628-1539	(936) 647-6737
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Safety Officer			
Rob Hurley, CSP	hurleyr@pacbell.net	Call Mobile	(805) 340-4048
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Manuel Maldonado	mmaldonado@wittobriens.com	(985) 781-0804	(832) 808-9247
Information Officer			
Sam Sacco (Strategy & Communications Consl.)	sjsacco87@gmail.com	(510) 541-6449	(510) 541-6449
Kate Conrad	kate.conrad@amplifyenergy.com	(562) 685-9909	(310) 683-3817
Sean Fitzgerald	sfitzgerald@wittobriens.com	(985) 781-0804	(310) 384-5643
Liaison Officer			
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Pete Gardner-Cox	pgardnercox@wittobriens.com	(985) 781-0804	(206) 914-5131
Christian Zumaran	christian.zumaran@amplifyenergy.com	(562) 685-9903	(909) 374-2009

1.a COMPANY CONTACT INFORMATION (Cont'd)

IMT MEMBERS (Cont'd)			
NAME	**EMAIL**	**OFFICE**	**MOBILE**
Operations Section Chief			
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281
Aaron Holton	aholton@wittobriens.com	(985) 781-0804	(985) 290-6634
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Christian Zumaran	christian.zumaran@amplifyenergy.com	(562) 685-9903	(909) 374-2009
Planning Section Chief			
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Marielle Lomax	marielle.lomax@amplifyenergy.com	(562) 628-1544	(714) 300-9286
Logistics Section Chief			
Lorraine Lopez	lorraine.lopez@amplifyenergy.com	(562) 628-1528 Ext 225	(310) 753-4179
Drew White	drew.white@amplifyenergy.com	(562) 628-1530 Ext 224	(562) 833-3617
Leo Renteria	leo.renteria@amplifyenergy.com	(562) 685-9906 Ext 266	(714) 580-4934
Keith Towler	ktowler@wittobriens.com	(985) 781-0804	(985) 502-0030
Gill Berkins	gberkins@wittobriens.com	(985) 781-0804	(985) 285-8646
Finance Section Chief			
Veronica Banuelos	veronica.banuelos@amplifyenergy.com	(562) 628-1532 Ext 365	
Keith Towler	ktowler@wittobriens.com	(985) 781-0804	(985) 502-0030

1.b SROT CONTACT INFORMATION

SPILL RESPONSE OPERATING TEAM (SROT)				
CONTRACTOR	**ADDRESS**	**24 HOURS**	**OFFICE**	**FAX**
O'Brien's Response Management	818 Town & Country Blvd., Suite 200 Houston, TX 77024	(985) 781-0804	(281) 320-9796	(281) 320-9700
MSRC	3300 East Spring Street Long Beach, CA 90806	(800) 259-6772 (800) 645-7745	(562) 981-7600	(562) 981-7601

1.c OSRO CONTACT INFORMATION

OIL SPILL RESPONSE ORGANIZATION (OSRO)				
CONTRACTOR	**ADDRESS**	**24 HOURS**	**OFFICE**	**FAX**
MSRC	3300 East Spring Street Long Beach, CA 90806	(800) 259-6772 (800) 645-7745	(562) 981-7600	(562) 981-7601
Patriot Environmental Services	508 East E Street, Wilmington, CA 90744	(800) 624-9136	(562) 436-2614	(562) 436-2688
Clean Harbors Environmental Services	2500 East Victoria Street, Compton, CA 90220	(800) 645-8265	(310) 764-5851	

Refer to Appendix F, "Support Services and Supplies", for a directory of additional personnel, materials, and supplies, equipment, and services.

1.d INTERNAL SPILL REPORTING FORMS

For spill reporting forms, see Appendix G, "Notification and Reporting Forms", for copies of appropriate Company Spill Incident Reporting forms.

1.e SPILL / DRILL CHECKLIST

Assumption

- The Platform Superintendent and Maintenance Supervisor are the only supervisory staff on board.

(The IC will modify if others are on board or as they arrive)

Other

- If this is a drill and you are being observed, think out loud to make your intentions clear and to demonstrate control of the situation.

Platform Superintendent or Maintenance Supervisor Roles

- Initial I.C.
- Safety
- Planning

Step	Action	Check when done
begin	• If this is a drill, understand and/or set the expectations of the drill. Seek clarifications from BSEE where not fully understood. All announcements and calls must specify that "**THIS IS A DRILL**". • Announce the incident over the paging system. The method of response expected should be determined during the kick-off meeting. If not a drill, provide instructions to platform personnel as needed.	
1	• **Have the Control Room Operator contact the crew boat and Ship Services at 1-310-519-8411** and: • Notify the crew boat of the drill and that MSRC will also be responding to the area if there is a real event. • Remind Control Room Operator to use ICS Form 214 (Section 1 and 21). The Production Supervisor should log information on the Form 214. If a Drill, remember to write **"THIS IS A DRILL"** at the top.	
2	• Call **MSRC at 1-800-259-6772** and pass on the scenario. • <u>Stay on the line</u> until you get a local "first call" in California. This could be from the Southern or Northern District. If from the Northern District, get their name and a call back number. They will call someone from the Southern District. • Log information on the 214 (Blank copies available in Section 1 and 21) • If the "first call" is from the Southern District or when you get the call back from the Southern District pass on the scenario. Log information on the 214. • Request information on the boats deployed, ETA for those boats, the name and cell phone number of the MSRC Supervisor that will be responding. • Log information on the Form 214.	

Step	Action - continued	Check when done
3	• Contact **O'Brien's Response Mgmt. at 1-985-781-0804**. Give them incident information they request and advise them that we have contacted Ship Services, MSRC and **that they need to contact NRC without delay and obtain a case number** and also contact local USCG. Request that they do the spill trajectory and tracking for us. O'Brien's will fill out Spill Report Form and have it available at the end of the incident.	
4	• Contact **BSEE at 1-805-384-6370** to inform them that we have an incident in progress. Log on Form 214. If spill is > 1 bbl, the Regional Supervisor at the number above **must** be notified without delay. If < 1 bbl, a courtesy call should be made to the number above. • Determine the need to contact state and local agencies and make the appropriate notifications.	
5	• Verify that Operations has notified Beta Qualified Individuals who will determine the need to activate the IMT as necessary. **Contact Tab Answer Service at 562-493-9020** to activate Beta QI's or Beta IMT if after hours.	
6	• If needed call the MSRC Supervisor and request his response to Platform Ellen. Consider heli-flight. Confirm boats deployed and their ETA. • Establish radio contact with MSRC vessel(s) ASAP on channel 6. • Document all notifications and activities on Form 214	
7	• Expand the response as necessary. Prepare Site Safety Plan. • Log information on the Form 214.	
8	• Develop a Form 201 for overall on-scene spill and response activities and developments. Continue to update (Blank forms in Section 1 and 21).	
9	• When the MSRC Supervisor arrives on Platform Ellen review the current status with him. • Log information on the 214.	
10	• **Hand off the on-water response to the MSRC Supervisor (assigned in org chart as on-water response branch chief)**. • Notify boats of the hand off. • Log information on the 214.	
11	• Request Job Site Safety Assessment and site characterization from MSRC for the 201 form. • Log information on the 214.	
12	• If not already in hand, request the spill report form from the Production Supervisor for the 201. • Log information on the 214.	
13	• If not already done, complete the 201 and log information on the 214.	
14	• After the drill has been called, facilitate & document drill critique.	

Step	Action - continued	Check when done
15	**Additional steps as needed.** • Call for over flight for spill tracking and or wildlife observation. • Activate Emergency Operations Center (EOC) at MSRC offices if ICP is needed. • Follow up with O'Brien's Response Management to confirm calls to NRC, CA OES, and BSEE have been made.	

Maintenance Supervisor or Compliance Specialist Role

- Operations
- Logistics
- Sit Stat/Trajectory

Step	Action	Check when done
1	• Assure a minimum of **3 tracker buoys** are deployed. 1 every 15 minutes. • Log information on the 214.	
2	• Contact the **Beta Offshore Long Beach Office at 1-562-628-1526**. Notify them that we have a drill/spill in progress and make it clear as to whether they need to activate the "Incident Response Team" to MSRC office or not. Make sure that the HS&E Advisor (Diana Lang or designee) and the Vice President of Operations (Dan Steward or designee) get first notification. • Log information on the 214. • **Contact Tab Answer Service at 562-493-9020** to activate Beta QI's or Beta IMT if after hours. • Log information on the 214.	
3	• Assure MSRC is enroute to perform boom deployment and onwater oil recovery as needed to contain the source of the spill. • Log information on the 214.	
4	• Keep the Production Supervisor or PIC for informed of activities related to the spill or drill.	
5	**Additional steps as needed.** • Stop the source (e.g. lower tank level, isolate and shut in a line, shut the platform in)	

The steps outlined in Table 1.e are the initial response actions to take to respond to a spill or drill and to initiate control of the source. Additional steps will be required for a sustained response and recovery of spill.

1.f RESPONSE OBJECTIVES

The Company is committed to the use of equipment and systems that comply with government rules and regulations and/or meet industry standards, and to follow sound operational and maintenance procedures. In addition to ensure response preparedness, employees associated with operations at its facilities are required to be familiar with this plan and must participate in specified training and simulation exercises, as appropriate.

The primary objectives in responding to any emergency are:

1. **To save lives and prevent injuries to personnel and the public.**
2. **To assess the situation and make appropriate notifications to stakeholders, company, clean-up contractors, and agencies as required.**
3. **To secure the source of discharge and make repairs necessary to regain operational readiness.**
4. **To minimize damage to environmentally sensitive sites and economically sensitive sites.**
5. **To establish control of the emergency situation with a Unified Response.**

1.g CRITICAL INFORMATION REQUIREMENTS FOR BETA OFFSHORE

It is important to understand there are several conditions which require immediate notification up through our internal leadership to the CEO. If any of the following conditions have occurred immediately notify the Beta Person In-Charge, Incident Commander, and/or the Qualified Individual. They will in turn make the appropriate internal notifications:

- Any accident or incident requiring company member notification likely to be recorded as lost time, injury or illness involving unconsciousness.
- Any event requiring transportation by ambulance or helicopter and requiring hospitalization involving Beta Offshore, Contractor, or Agency personnel.
- Property loss and damage in potential excess of $25K or other’s property estimated to be in excess of $10K.
- Incident involving the spill or release of hazardous substance above the reportable quantity.
- Oil spill estimated to be in excess of 1 barrel of oil into the waters of the US.
- Any explosion or fire caused by or involving process equipment.
- Any human exposure to H2S or other gas requiring medical treatment.

These items should be considered part of the initial expectations and responsibility for all Beta Offshore, Contractors, and Agency personnel on Beta Offshore facilities.

1.h RAPID RESPONSE

Early detection of spilled oil or other substances, and rapid response after the discovery, are critical to ensure the health and safety of personnel and in minimize the effects on the environment. The table below shows available onsite and nearby response equipment.

Table 1.h Company Onsite or Nearby Response Equipment and Locations

PLATFORM	EQUIPMENT	
Eureka (in Dry Storage Bldg)	15 bales sorbent pad 6 bales sorbent boom (4 per bale) 1 sorbent roll (36") 8 tracking buoys	1 or more handheld radios
Ellen (Pipe Rack & Dry Storage	8 tracking buoys (Dry Storage)	1 or more handheld radios
Elly (in Spill Equipment Locker)	15 bales sorbent pad 6 bales sorbent boom (4 per bale) 1 sorbent roll (36") 8 tracking buoys	1 or more handheld radios to communicate with response team
Vessel Support – SoCal Ship Services	Crewboat *Nicholas L* (24/7) Supply Boat *Kenneth Carl* available on flexible schedule	*Timberwolf* support vessel (and/or other vessels) available as alternates (24/7)

1.j.i EXTERNAL CONTACT INFORMATION

U. S. COAST GUARD		
NRC - NATIONAL RESPONSE CENTER		
(CG-5335) - Stop 7581 2100 2nd Street, SW Washington, DC 20593-0001	(800) 424-8802 (202) 267-2675 (202) 267-1322 (Fax)	
REPORTING REQUIREMENTS: TYPE: Any oil discharge that has impacted or threatens to impact navigable waters or release of a hazardous substance in an amount equal to or greater than the reportable quantity. VERBAL: Immediately. WRITTEN: Not Required.		
SECTOR OFFICES / MARINE SAFETY UNITS		
REPORTING REQUIREMENTS: Not Required. Numbers are provided for courtesy notification or to request immediate assistance.		
Sector Los Angeles - Long Beach 1001 S. Seaside Ave., Bldg. 20 San Pedro, CA 90731	(800) 221-8724 (25 Hr) (310) 521-3600	(310) 521-3813 (Fax)

STATE OF CALIFORNIA	
California Office of Emergency Services	
3650 Schriever Ave. Mather, California 95655	(800) 852-7550 (24 Hr)
REPORTING REQUIREMENTS: TYPE: Notify if the spill 1) was greater than 1 barrel OR 2) was greater than 5 gallons if State Fire Marshal jurisdictional OR 3) entered or threatened to enter waters of the state. Notify if the spill involves an extremely hazardous material or CERCLA-listed material over reportable quantities. VERBAL: Initial notification should take place as soon as practicable. According to applicable California laws and regulations (aboveground Petroleum Storage Act, Porter-Cologne Act, and CCR Title 22 - Section 67145) a petroleum spill of 42 gallons (one barrel) or more must be reported immediately. WRITTEN: As may be requested by the agency.	

1.j.i EXTERNAL CONTACT INFORMATION

BSEE – BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT			
DISTRICT OFFICES			
REPORTING REQUIREMENTS: TYPE: For spill of 1 bbl or more VERBAL: Immediately. WRITTEN: Written report must be submitted to the Pacific Oil Spill Preparedness Division Regional Branch Supervisor within 15 days after spill is stopped or has ceased			
PACIFIC REGION	760 Paseo Camarillo Suite 102 Camarillo, CA 93101	(805) 384-6370 (24 Hr)	(805) 383-6309 (Fax)
PIPELINE SECTION			
REPORTING REQUIREMENTS: TYPE: Any spill or leak involving an OCS pipeline. VERBAL: Immediately. WRITTEN: Written report must be submitted to the Pacific Oil Spill Preparedness Division Regional Branch Supervisor within 15 days after spill is stopped or has ceased			
PACIFIC REGION	Mail Stop 5232 1201 Elmwood Park Blvd. New Orleans, LA 70123-2394	(504) 736-2814	(504) 452-3562 (Cell) (504) 736-2408 (Fax)

1.j.ii EXTERNAL CONTACT INFORMATION

OTHER POTENTIAL REQUIRED NOTIFICATION	
PHMSA – PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION	
Office of Pipeline Safety PHP-30 1200 New Jersey Ave, SE Washington, DC 20590	(202) 366-4595 http://www.pipelineonlinereporting.phmsa.dot.gov
REPORTING REQUIREMENTS: TYPE: Any discharge from a DOT regulated line. VERBAL: Report to NRC within one (1) hour of confirmed discovery. Update report to NRC within 48 hours to include volume released. WRITTEN: Within 30 days submit electronically	
ENVIRONMENTAL PROTECTION AGENCY REGION IX	
75 Hawthorne Street San Francisco, California 94105	(800) 300-2193 (24 Hr) (415) 947-4400 (24 Hr)
REPORTING REQUIREMENTS: TYPE: Immediately for all spills that impact or threaten navigable water or adjoining shoreline. VERBAL: Notification to the EPA is typically accomplished by the call to the NRC. WRITTEN: As the agency may request depending on circumstances.	

1.j.ii EXTERNAL CONTACT INFORMATION (Cont'd)

OTHER POTENTIAL REQUIRED NOTIFICATION (Cont'd)			
STATE OF CALIFORNIA			
AGENCY	LOCATION	OFFICE	ALTERNATE
Department of Fish and Wildlife Office of Spill Prevention and Response	4665 Lampson Ave., Suite C Los Alamitos, CA 90720	(562) 342-7212	
CalOSHA	10350 Heritage Park Dr., Suite 20 Santa Fe Springs, CA 90670	(800) 963-9424 (24 Hr)	
California Coastal Commission (CCC)	45 Fremont Street, Suite 2000 San Francisco, CA 94105-2291	(800) 262-7848 (24 Hr)	(415) 904-5200 Office (415) 904-5216 FAX
CCC South Coast District Office	200 Oceanside Blvd., 10th floor Long Beach, Ca 90802	(562) 590-5071	(562) 590-5084 FAX
Cal-EPA Department of Toxic Substance Control	5796 Corporate Avenue Cypress, CA 90630	(800) 852-7550 (CalOES)	(714) 484-5300
California Highway Patrol Southern Division Communications Center	2901 West Broadway Los Angeles, CA 90041	(323) 259-2000	911
CalTrans	1120 "N" Street, Room 3200 Sacramento, CA 95814	(800) 963-9424 (24 Hr)	
CalTrans District 7 - Los Angeles County	100 S. Main Street Los Angeles, CA 90012	(213) 897-3656	
CalTrans District 12 - Orange County	3337 Michelson, Suite CN-380 Irvine, CA 93612	(949) 724-2000	
Department of Conservation, Division of Oil and Gas and Geothermal Resources	5816 Corporate Avenue Cypress, CA 90630-4731	(714) 816-6847	(714) 816-6853 FAX
Regional Water Quality Board Los Angeles County (Region 4)	320 W 4th Street Los Angeles, CA 90013	(213) 576-6600	
Regional Water Quality Board Orange County (Region 8)	3737 Main, Suite 500 Riverside, CA 92501	(951) 782-4130	
State Fire Marshall Pipeline Safety Division	3950 Paramount Blvd., Suite 210 Lakewood, CA 90712	(562) 497-9103	(562) 497-9104 FAX
State Lands Commission Minerals Resource Management	ARCO Towers 200 Oceangate, 12th Floor Long Beach, CA 90802-4471	(562) 590-5201 (24 Hr)	
State Lands Commission Minerals Resource Management	1700 Pacific Coast Highway Huntington Beach, CA 92648	(714) 536-3018	
State Lands Commission Marine Inspection Division	200 Oceangate, Suite 900 Long Beach, CA 90802	(562) 499-6348	
California State Parks Angeles District	1925 Las Virgenes Road Calabasas, CA 91302	(818) 880-0350	

1.j.ii EXTERNAL CONTACT INFORMATION (Cont'd)

OTHER POTENTIAL REQUIRED NOTIFICATION (Cont'd)			
STATE OF CALIFORNIA			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
California State Parks North Sector	18331 Enterprise Lane Huntington Beach, CA 92648	(800) 444-7275	
Huntington State Beach		(714) 536-1454	
Bolsa Chica State Beach		(714) 377-2481	
Huntington City Beach		(714) 536-5280	
California State Parks Orange Coast District	8471 Pacific Coast Highway Laguna Beach, CA 92651	(949) 366-4895	
Crystal Cove State Park		(949) 494-3539	
California State Parks Pendleton Coast District	3030 Avenida Del Presidente San Clemente, CA 92672	(714) 492-0802	
Doheny State Park		(949) 496-6171	
San Clemente State Beach		(949) 492-3156	
San Onofre Beach		(949) 492-4872	
ORANGE COUNTY			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
Public Works	300 N. Flower Street Santa Anna, CA 92703	(714) 667-8800	
Flood Control District	300 N. Flower Street Santa Anna, CA 92703	(714) 834-6192	
Fire Authority	1 Fire Authority Road Irvine, CA 92602	(714) 573-6000	(714) 538-3501 (Emergency) 911
Waste & Recycling	300 N. Flower Street, Suite 400 Santa Anna, CA 92703	(714) 834-4000	(714) 834-4001 FAX
Sanitation District	10844 Ellis Avenue Fountain Valley, CA 92708	(714) 962-2411 (24 Hr)	
Sheriff's Department Emergency Communications Bureau	2644 Santiago Canyon Road Silverado, CA 92676	(714) 647-7000	(949) 770-6011
South Coast Air Quality Management District	21865 Copley Drive Diamond Bar, CA 91765	(800) 288-7664 (24 hr)	(909) 396-2000
City of Huntington Beach Emergency Services	2000 Main Street Huntington Beach, CA 92648	(714) 536-5980	
Huntington Beach Fire Department	18311 Gothard Street Huntington Beach, CA 92648	(714) 536-5411	
Huntington Beach - Beach Operations Supervisor	103 Pacific Coast Highway Huntington Beach, CA 92648	(714) 536-5287	(714) 298-1661 Cell Scott Smith

1.j.ii EXTERNAL CONTACT INFORMATION (Cont'd)

OTHER POTENTIAL REQUIRED NOTIFICATION (Cont'd)			
LOS ANGELES COUNTY			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
Long Beach Emergency Communications and Operations Center	2990 Redondo Avenue long Beach, CA 90806	(562) 570-9250	(562) 570-9254 FAX
Long Beach Public Works environmental Services	2929 E Willow Street Long Beach, CA 90806	(562) 570-2876	(562) 570-2875 FAX
Long Beach Fire Department		(562) 591-7631 (Dispatch)	(562) 570-1286 (Marine Safety Division)
Long Beach Police Department		(562) 435-6711	911
Port of Long Beach Harbor Patrol Dispatch		(562) 590-4185	

PROPERTY OWNERS AND ADJACENT OPERATORS	
OWNER/OPERATOR	**TELEPHONE**
CRC Long Beach Platform Emmy (State Waters)	(714) 969-3206 (714) 969-3287 FAX
CRC Long Beach Company (former OXY,THUMS &Tidelands facilities) 111 W. Ocean Blvd., Suite 800 Long Beach, CA 90802	(562) 624-3452 (Dispatcher, Port of Long Beach area)
Dos Cuadras Offshore Resources, LLC (DCOR) 290 Maple Ct., Suite 290 Ventura, CA 93003	(805) 739-9111
DCOR Spill Coordinator	(805) 535-22072
DCOR Platform Edith	(714) 960-6342 (714) 960-6343 FAX
DCOR Platform Eva (State Waters)	(714) 960-6592 (714) 960-6593 FAX

1.k EXTERNAL SPILL REPORTING FORMS

Refer to Appendix G, Notification and Reporting Forms, for copies of Spill Incident Reporting forms for BSEE, USCG and PHMSA/DOT.

1.l AVAILABLE TECHNICAL EXPERTISE

AGENCY RESOURCES			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
PHMSA – Pipeline and Hazardous Materials Safety Administrations	Office of Pipeline Safety PHP30 1200 New Jersey Ave, SE Washington, DC 20590	(202) 366-4595	(202) 493-2311 (Fax)
Federal Aviation Administration	15000 Aviation Blvd. Lawndale, CA. 90261	(310) 725-3300 (24 Hr)	(310) 725-6849 (FAX)
Flight Service Station (Weather)	Long Beach, CA Hawthorne, CA Orange County, CA	(800) 992-7433 (24 Hr)	(562) 424-0572 (310) 973-8930 (714) 424-0590
National Marine Fisheries Service (NMFS) Marine Mammals	501 West Ocean Blvd., Suite 4200 Long Beach, CA 90802-4213	(562) 980-4000	(562) 980-4081
National Oceanic and Atmospheric Administration (NOAA): Channel Islands National Marine Sanctuary	113 Harbor Way Santa Barbara, CA 93109	(805) 966-7107	
NOAA Injury Assessment Coordinator (Miki Hirano)	501 West Ocean Blvd., Suite 4470 Long Beach, CA 90802	(562) 980-4081	(562) 980-4005
NOAA Scientific Support Coordinator	Alameda, CA	(510) 437-5344	(510) 437-5345 FAX
NOAA Trajectory Analysis	7600 Sandpoint Way NE Bin C15700 Seattle, WA 98115	(206) 526-4911 Emergency	(206) 526-6317 Office (206) 526-6329 FAX (800) 759-8888 PGR PIN 579-8808
National Weather Service	Oxnard, CA	(805) 988-6620	
U.S. Fish and Wildlife Service Endangered Species Recovery	2730 Loker Avenue West Carlsbad, CA 92008	(760) 431-9440	
U.S. Fish and Wildlife Service OCS Coordinator (Steve Schwarzbach)	2800 Cottage Way, Room W-2605 Sacramento, CA 95825-6430	(916) 414-6600	
California Department of Fish and Wildlife – OSPR	4665 Lampson Ave. Suite C Los Alamitos, CA 90720	(562) 342-7212	
California Coastal Commission	45 Fremont Street, Suite 2000 San Francisco, CA 94105-2291	(800) 262-7848	(415) 904-5200 Office (415) 904-5216 FAX
California Coastal Commission South Coast District Office	200 Oceangate Blvd., 10th floor Long Beach, CA 90802	(562) 590-5071	(562) 590-5084 FAX
Cal-EPA Dept. Toxic Substance Control	5796 Corporate Ave. Cypress, CA 90630	(714) 484-5300	
CalOSHA	10350 Heritage Park Drive Suite 201 Santa Fe Springs, CA 90670	(800) 963-9424	
CalTrans	1120 "N" Street, Room 3200 Sacramento, CA 95814	(916) 653-3442 (24 Hr)	
CalTrans District 7 Los Angeles County	100 S. Main Street Los Angeles, CA 90012	(213) 897-3656	

AGENCY RESOURCES (Cont'd)			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
CalTrans District 12 Orange County	3337 Michelson, Suite CN-380 Irvine, CA 93612	(949) 724-2000	
California division of Oil and Gas and Geothermal Resources	5816 Corporate Avenue Cypress, CA 90630-4731	(714) 816-6847	(714) 816-6853 FAX
LEPC Region 1 Southern Region	4671 Liberty Avenue, Bldg. 283 Los Alamitos, CA 90720	(562) 795-2900	(562) 795-2877 FAX
California Highway Patrol		911	
Los Angeles County: (Region 4) Regional Water Quality Control Board	320 W. 4th Street Los Angeles, CA 90013	(213) 576-6600	
Orange County: (Region 8) Regional Water Quality Control Board	3737 Main, Suite 500 Riverside, CA 92501	(951) 782-4130	
California State Fire Marshall Pipeline Safety Division	3950 Paramount Blvd., Suite 210 Lakewood, CA 90712	(562) 497-9103	(562) 497-9104 FAX
California State Lands Commission Minerals Resource Management	ARCO Towers 200 Oceangate, 12th Floor Long Beach, CA 90802-4471	(562) 590-5201 (24 Hr)	
California State Lands Commission Minerals Resource Management	1700 Pacific Coast Highway Huntington Beach, CA 92648	(714) 536-3018	
California State Lands Commission Marine Inspection Division	200 Oceangate, Suite 900 Long Beach, CA 90802	(562) 499-6348	

1.m SUPPORT SERVICES

DISPERSANT APPLICATION			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
EADC Ed Rosenberg		(888) 323-2148 (24 Hr)	
ENVIRONMENTAL SERVICES			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
MBC - Applied Environmental Science	Costa Mesa, CA	(714) 850-4830	(714) 850-4840 FAX
Cardno	Walnut Creek, CA	(805) 477-5003 (800) 476-5886 (925) 935-9920	
WILDLIFE & MARINE LIFE SPECIALISTS			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Oiled Wildlife Care Network (OWCN) Dr. Mike Ziccardi	Davis, CA	(530) 752-4167 (530) 754-5701 (877) 823-6926 (24 Hr)	(916) 556-7509 Cell (530) 979-7509 Cell www.owcn.org
Wildlife Emergency Services	Moss Landing, CA	(866) 945-3911 (24 Hr)	
Statewide Whale Rescue Team (distressed whales and dolphins)		(877) 767-9425 (24 Hr)	
Fort MacArthur Marine Mammal Care Center (Los Angeles County Marine Wildlife Rescue)	San Pedro, CA	(310) 548-5677	
Pacific Marine Mammal Center (Orange County Marine Wildlife Rescue)	Laguna Beach, CA	(949) 494-3050	
International Bird Rescue Los Angeles Center	San Pedro, CA	(310) 514-2573	
National Marine Fisheries Service (Dead seals, sea lions and sea turtles)	Long Beach, CA	(562) 980-4017	
Los Angeles County Museum of Natural History (Dead whales and dolphins)	Los Angeles, CA	(323) 585-5015	

1.n SPILL INFORMATION NEEDED FOR OIL SPILL TRAJECTORY

Please provide all or part of the following information to ccenter@wittobriens.com as it becomes available.

INCIDENT INFORMATION			
Contact Name:		Company:	
Phone #:		Fax #:	
Alternate #:		E-mail Address:	
Source (*Circle One*): Platform Pipeline Rig Facility Vessel			
Date/Time of Spill (to closest hour):			
Location of Source (Latitude/Longitude):			
Last known location of spill (Latitude/Longitude):			
Appearance of Slick (if known):		Estimated Length and Width:	
Type of Oil (API, if known):		Estimated volume of initial release:	
If continuing release - How much (BPH):		For how long:	
ON-SCENE WEATHER CONDITIONS			
Time:		Air Temperature:	
Wind Direction:		Wind Speed:	
Wave Height:		Water Temperature:	
Current Direction:		Current Speed:	
Cloud Ceiling (feet):		Water Depth (feet):	
Forecast (if known):			
Additional Information:			

NOTIFICATION DATA SHEET

Date: ____________ *Time:* ____________

INCIDENT DESCRIPTION

Reporter's Full Name: ____________ *Position:* ____________
Day Phone Number: ____________ *Evening Phone Number:* ____________
Company: Beta Offshore *Organization Type:* ____________
Facility Address: OCS P-300/P-301 *Owner's Address:* 111 W. Ocean Boulevard
Suite 1240
Long Beach, CA 90802

Facility Latitude: ____________ *Facility Longitude:* ____________
Spill Location (if not at Facility): ____________
Responsible Party's Name: ____________ *Phone Number:* ____________
Responsible Party's Address: ____________
Source and/or cause of discharge (Description): ____________
Nearest City: ____________ *Distance from City:* ____________ *Unit of Measure:* ____________
County: ____________ *State:* ____________ *Zip code:* ____________
Section: ____________ *Township:* ____________ *Range:* ____________ *Borough:* ____________
Distance from City: ____________ *Direction from City:* ____________
Container Type: ____________ *Container Storage Capacity:* ____________
Facility Oil Storage Capacity: ____________ *Unit of Measure:* ____________
Were Materials Discharged? ____________ *(Y/N) Confidential?* ____________ *(Y/N) Material:* ____________

CHRIS Code	Total Quantity Released	Unit of Measure	Water Impact (*YES or NO*)	Quantity into Water	Unit of Measure

RESPONSE ACTION(S)

Action(s) taken to Correct, Control, or Mitigate Incident: ____________

Number of Injuries: ____________ *Number of Deaths:* ____________
Evacuation(s): ____________ *Number Evacuated:* ____________
Damage in Dollars (approximate): ____________
Medium Affected: ____________
Description: ____________
More Information about Medium: ____________

CALLER NOTIFICATIONS

National Response Center (NRC): 1-800-424-8802
Additional Notifications (Circle all applicable): *USCG* *EPA* *State* *Other*
Describe: ____________
NRC Incident Assigned No: ____________

ADDITIONAL INFORMATION

Any information about the incident not recorded elsewhere in this report: ____________

Meeting Federal Obligations to Report? ____________ *(Y/N) Date Called:* ____________
Calling for Responsible Party? ____________ *(Y/N) Time Called:* ____________

NOTE: DO NOT DELAY NOTIFICATION PENDING COLLECTION OF ALL INFORMATION.

RESPONDER LOG

INCIDENT: ____________________ **PAGE:** ____________

NAME: ____________________ **POSITION:** ____________

LOCATION: ____________________ **DATE:** ____________

Time	Contact/Subject	NOTES/ACTIONS PENDING

ICS FORMS

The following are examples of forms that may be used during an event however Beta Offshore reserves the right to use other versions of the forms when the plan is being activated/used.

NRC Incident No. #____

1. Incident Name	**2. Prepared by: (name)** Date: Time:	INCIDENT BRIEFING ICS 201-CG

3. Map/Sketch (include sketch, showing the total area of operations, the incident site/area, overflight results, trajectories, impacted shorelines, or other graphics depicting situational and response status)

4. Current Situation:

NRC Incident No. #____________________

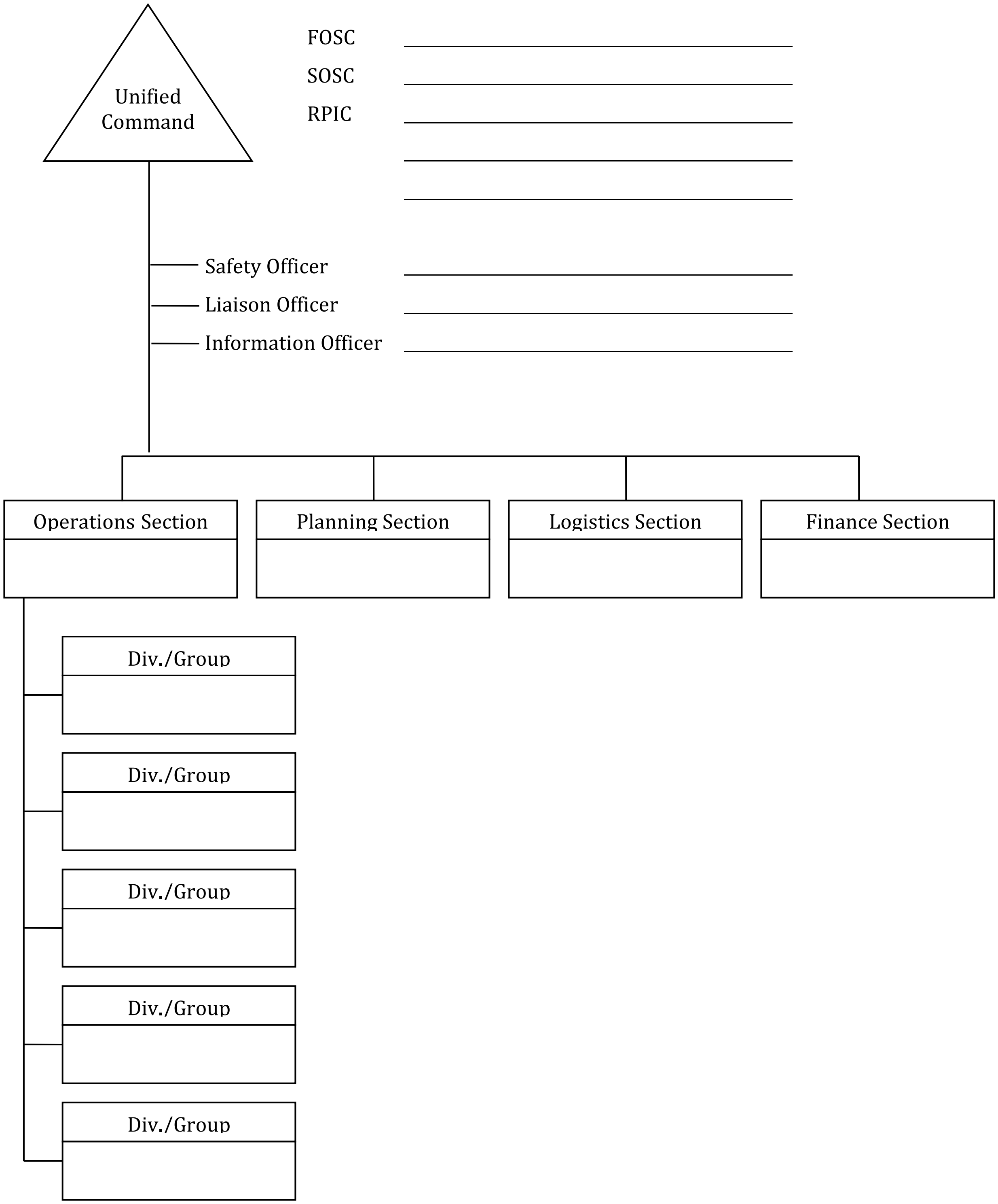
1. Incident Name	2. Prepared by: (name) Date: Time:	INCIDENT BRIEFING ICS 201-CG

5. Initial Response Objectives, Current Actions, Planned Actions

NRC Incident No. #______________________

1. Incident Name	2. Prepared by: (name) Date: Time:	INCIDENT BRIEFING ICS 201-CG

6. Current Organization



NRC Incident No. #______________________________

1. Incident Name	**2. Prepared by: (name)** Date: Time:	INCIDENT BRIEFING ICS 201-CG

7. Resources Summary

Resource	Resource Identifier	Date Time Ordered	ETA	On-Scene (X)	NOTES: (Location/Assignment/Status)

NRC Incident No. #____

1. Incident Name	**2. Operational Period (Date/Time)** From: To:	**INCIDENT OBJECTIVES** **ICS 202-CG**
3. Objective(s)		
4. Operational Period Command Emphasis (Safety Message, Priorities, Key Decisions/Directions) **Approved Site Safety Plan Located at:**		
5. Prepared by: (Planning Section Chief)	**Date/Time**	

NRC Incident No. #___________________

ORGANIZATION ASSIGNMENT LIST ICS 203-CG

1. Incident Name

2. Operational Period (Date/Time)

From: To:

3. Incident Commander(s) and Staff

Agency	IC	Deputy

Safety Officer:	
Information Officer:	
Liaison Officer:	

4. Agency Representatives

Agency	Name

5. PLANNING/INTEL SECTION

Chief	
Deputy	
Resources Unit	
Situation Unit	
Environmental Unit	
Documentation Unit	
Demobilization Unit	
Technical Specialists	

6. LOGISTICS SECTION

Chief	
Deputy	

a. Support Branch

Director	
Supply Unit	
Facilities Unit	
Vessel Support Unit	
Ground Support Unit	

b. Service Branch

Director	
Communications Unit	
Medical Unit	
Food Unit	

7. OPERATION SECTION

Chief	
Deputy	
Deputy	
Staging Area Manager	
Staging Area Manager	
Staging Area Manager	

a. Branch – Division Groups

Branch Director		
Deputy		
Division Group		
Division Group		
Division Group		
Division/Group		
Division/Group		

b. Branch – Division/Groups

Branch Director		
Deputy		
Division/Group		
Division/Group		
Division/Group		
Division/Group		
Division/Group		

c. Branch – Division/Groups

Branch Director		
Deputy		
Division/Group		
Division/Group		
Division/Group		
Division/Group		
Division/Group		

d. Air Operations Branch

Air Operations Br. Dir	
Helicopter Coordinator	

8. FINANCE/ADMINISTRATION SECTION

Chief	
Deputy	
Time Unit	
Procurement Unit	
Compensation/Claims Unit	
Cost Unit	

9. Prepared By: (Resources Unit) **Date/Time**

NRC Incident No. #____________________________

1. Incident Name	**2. Operational Period (Date/Time)** From: To:	**Assignment List** **ICS 204-CG**
3. Branch	**4. Division/Group/Staging**	

5. Operations Personnel Name Affiliation Contact # (s)

Operations Section Chief: ____________________________

Branch Director: ____________________________

Division/Group Supervisor/STAM: ____________________________

6. Resources Assigned "X" indicates 204a attachment with additional instructions

Strike Team/Task Force/Resource Identifier	Leader	Contact Info. #	# Of Persons	Reporting Info/Notes/Remarks	
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐

7. Work Assignments

8. Special Instructions

9. Communications (radio and/or phone contact numbers needed for this assignment)

Name/Function	Radio: Freq./System/Channel	Phone	Cell/Pager

Emergency Communications

Medical ________________ Evacuation ________________ Other ________________

10. Prepared by: **Date/Time**	**11. Reviewed by (PSC):** **Date/Time**	**12. Reviewed by (OSC):** **Date/Time**

NRC Incident No. #______________________

1. Incident Name	2. Operational Period (Date/Time) From: To:	ASSIGNMENT LIST ATTACHMENT ICS 204a-CG

3. Branch	4. Division/Group

5. Strike Team/Task Force/Resource (Identifier)	6. Leader	7. Assignment Location

8. Work Assignment Special Instructions, Special Equipment/Supplies Needed for Assignment, Special Environmental Considerations, Special Site Specific Safety Considerations

Approved Site Safety Plan Located at:

9. Other Attachments (as needed)

☐ Map/Chart ☐ Weather Forecast/Tides/Currents ☐ ______________________
☐ ______________________ ☐ ______________________ ☐ ______________________

10. Prepared by: Date/Time	11. Reviewed by (PSC): Date/Time	12. Reviewed by (OSC): Date/Time

NRC Incident No. #___________________________

1. Incident Name	2. Operational Period (Date / Time) From: To:	INCIDENT RADIO COMMUNICATIONS PLAN ICS 205-CG

3. BASIC RADIO CHANNEL USE

SYSTEM / CACHE	CHANNEL	FUNCTION	FREQUENCY	ASSIGNMENT	REMARKS

4. Prepared by: (Communications Unit)	Date / Time

NRC Incident No. #______________________________

1. Incident Name	2. Operational Period (Date / Time) From: To:	COMMUNICATIONS LIST ICS 205A-CG

3. Basic Local Communications Information

Assignment	Name	Method(s) of contact (radio frequency, phone, pager, cell #(s), etc.)

4. Prepared by: (Communications Unit)	Date / Time

NRC Incident No. #______________________________

1. Incident Name	2. Operational Period (Date / Time) From: To:	MEDICAL PLAN ICS 206-CG

3. Medical Aid Stations

Name	Location	Contact #	Paramedics On site (Y/N)

4. Transportation

Ambulance Service	Address	Contact #	Paramedics On board (Y/N)

5. Hospitals

Hospital Name	Address	Contact #	Travel Time		Burn Ctr?	Heli-Pad?
			Air	Ground		

6. Special Medical Emergency Procedures

7. Prepared by: (Medical Unit Leader) Date/Time	8. Reviewed by: (Safety Officer) Date/Time

NRC Incident No. #____________________

INCIDENT STATUS SUMMARY

1. Incident Name	2. Period Covered by Report From: To:	Time of Report	INCIDENT STATUS SUMMARY ICS 209-OS

3. Spill Status (Estimated, In Barrels) [Ops & EUL/SSC]

Source Status: Remaining Potential (bbl): ______

Rate of Spillage (bbl/hr): ______

Secured ☐

Unsecured ☐

	Since Last Report	Total
Volume Spilled		
Mass Balance / Oil Budget		
Recovered Oil		
Evaporation		
Natural Dispersion		
Chemical Dispersion		
Burned		
Floating, Contained		
Floating, Uncontained		
Onshore		
Total spilled oil accounted for:		

4. Waste Management (Estimated) [Ops / Disposal]

	Recoverd	Stored	Disposed
Oil (bbl)			
Oily Liquids (bbl)			
Liquids (bbl)			
Oily Solids (tons)			
Solids (tons)			

5. Shoreline Impacts (Estimated, in miles) [PSC/EUL/SSC]

Degree of Oiling	Affected	Cleaned	To be Cleaned
Light			
Medium			
Heavy			
Total			

6. Wildlife Impacts [Ops / Wildlife Br.]

Numbers in ( ) indicate subtotal that are threatened / endangered species.

					Died in Facility	
	Captured	Cleaned	Released	DOA	Euth.	Other
Birds						
Mammals						
Reptiles						
Fish						
Total						

7. Safety Status [Safety Officer]

	Since Last Report	Total
Responder Injury		
Public Injury		

8. Equipment Resources [RUL]

Description	Ordered	Available/ Staged	Assigned	Out of Service
Spill Resp. Vsls				
Fishing Vessels				
Tugs				
Barges				
Other Vessels				
Skimmers				
Boom (ft.)				
Sbnt/Snr Bm. (ft.)				
Vacuum Trucks				
Helicopters				
Fixed Wing				

9. Personnel Resources [RUL]

Organization	People in Cmd. Post	People in the Field	Total People On Scene
Federal			
State			
Local			
RP			
Contract Personnel			
Volunteers			
Total Response Personnel from all Organizations:			

10. Special Notes

11. Prepared by (Situation Unit Leader)

NRC Incident No. #____________________________________

1. Incident Name	**2. Date and Time of Message**	**GENERAL MESSAGE ICS 213-CG**
3. TO:	ICS Position	
4. FROM:	ICS Position	
5. Subject:		
6. Message		
7 Reply		
8. Signature/Position (person replying)	**Date/Time of reply**	
GENERAL MESSAGE		ICS 213-CG (04/04)

NRC Incident No. #____________________

1. Incident Name	2. Operational Period (Date / Time) From: To:	UNIT LOG ICS 214-OS

3. Unit Name / Designators	4. Unit Leader (Name and ICS Position)

5. Personnel Assigned

NAME	ICS POSITION	HOME BASE

6. Activity Log (Continue on Reverse)

TIME	MAJOR EVENTS

7. Prepared by:	Date / Time

NRC Incident No. #______________________

1. Incident Name	2. Operational Period (Date / Time) From: To:	INDIVIDUAL LOG ICS 214a-OS

3. Individual Name	4. ICS Section	5. Assignment / Location

6. Activity Log — Page of

Time	Major Events

7. Prepared by:	Date / Time

NRC Incident No. #______________________________

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
OFFICE OF SPILL PREVENTION AND RESPONSE

INITIAL SITE SAFETY PLAN

SECTION A: SITE INFORMATION

SITE NAME		DATA COLLECTOR	DATE	TIME
SOSC	PHONE NUMBER	SAFETY OFFICER		PHONE NUMBER
☐ Inland Response ☐ Marine Response ☐ Drill/Training ☐ Other			PCA	INDEX

WEATHER

☐ Calm ☐ Breezy ☐ Windy Temp. Range ______________ ☐ Clear ☐ Fog ☐ Snow ☐ Rain

SECTION B: CHEMICAL INFORMATION

CHEMICAL NAME	CHEMICAL STATE	APPROX. VOLUME RELEASED
	☐ Solid ☐ Liquid ☐ Gas/Vapor	

CHEMICAL PROPERTIES

☐ Flammable LEL ________ % UEL ________ % Flashpoint______ Current Level _______ %

☐Toxic PEL _____ ppm – mg/m^3 STEL/Ceiling: _______ ppm – mg/m^3 Current Level _____ ppm – mg/m^3

☐ Reactive Incompatible(s):

☐ Corrosive pH ________ (If known) ☐ Acid ☐ Base ☐ Neutral

DIRECT READING LEVELS

CO _________ VOCs _________ H_2S _________

LEL _________ O_2_________

OTHER CHEMICALS PRESENT

____

____

EXPOSURE / TOXICOLOGY

☐Inhalation ☐ Absorption ☐ Ingestion ☐ Injection ☐ Open wounds ☐ Other: _________

☐Asphyxiant ☐ Corrosive ☐Sensitizer ☐Eye/Skin /Respiratory Irritant ☐Carcinogen/Teratogen/Mutagen

SECTION C: EMERGENCY RESPONSE

	NAME	PHONE
Medical Facility		
Med. Facility Location		
Phone / Comm Sys. Available		
First Aid Kit Location		
Fire Extinguisher Location		
Eye Wash / Deluge Shower Location		
Evacuation Area		
Evacuation Route		

NRC Incident No. #______________________________

SECTION D: HAZARD IDENTIFICATION

HAZARD TYPE	HAZARD DESCRIPTION
☐ Slips / Trips / Falls	
☐ Lifting / Material Handling	
☐ Equipment / Machinery	
☐ Open Trench	
☐ Electrical	
☐ Insect	
☐ Animal	
☐ Other Biological	
☐ Heat Stress	
☐ Hypothermia	
☐ On / Over Water	
☐ Overhead Hazards	
☐ High Pressure (tanks / lines)	
☐ Elevated Work / Falls	
☐ Traffic	
☐ Night Operations	
☐ Noise	
☐	
☐	
☐	

SECTION E: PPE

☐ Level D ☐ Level C ☐ Hard Hat ☐ Nomex ☐ Work Gloves ☐ PFD ☐ Safety Boots
☐ Safety Glasses / Goggles ☐ Ear Plugs ☐ Safety Vest ☐ Respirator ☐ CPC ☐ Chem. Boots
☐ Chem. Gloves ☐ Respirator ☐ Other: ____________________

SECTION F: DECONTAMINATION

☐ None ☐ Limited ☐ Dry ☐ Full ☐ Emergency ☐ Equipment

Location

____

SIGNATURE DATE

TABLE 1

FACILITY INFORMATION
PRODUCTION PLATFORMS AND SATELLITE STRUCTURES IN OCS WATERS

AREA	BLOCK	LEASE	FAC. NAME	FAC. ID	WATER DEPTH	LATITUDE/ LONGITUDE	DIST. SHORE	API GRAV.	RATING *	HIGH WELL	ALL STOR	THRU VOLUME
6C	3337	P-300	Platform Elly		265’	33°35.025'N 118°07.76'W	8.56	13°-16°	E	N/A	9,562.5	6,000
6C	3337	P-300	Platform Ellen		265’	33°34.956'N 118°07.746'W	8.73	9°-19°	B		1,715.7	1,800-4,000
		P-301	Platform Eureka		700’	33°33.833'N 118°07.0'W	9.05	9°-19°	C		3,452.7	4,000-9,000

* Worst Case Discharge Rating
(Volume Barrels)

A -	0 - 1,000
B-	1,001-3,000
C-	3,001-10,000
D-	10,001-20,000
E-	20,001 +

1. Provide the 2-letter BSEE area designation of the facility (e.g., MP, PS, WC).
2. Provide the OCS Block No. of the facility (e.g., 25, 251, A-375).
3. Provide the OCS Lease No. of the facility (e.g., 091, 0425, G 10112).
4. Provide the facility designation (e.g., No. 2, A, JA).
5. Provide the 5-digit BSEE complex identification number for the facility.
6. Provide the water depth at the site of the facility in feet.
7. Provide the latitude and longitude of the facility in degrees and decimal minutes (e.g., 28 25.35'N, 90 09.08'W).
8. Provide the distance from the facility to the nearest shoreline in miles.
9. Provide the API Gravity of the densest oil being produced or stored at the facility.
10. Enter the appropriate worst-case discharge volume rating (e.g., A, B, C, D, or E).
11. If “Rating” in column 10 is “E” or if high rate well has a daily flow rate greater than 2,500 barrels, provide the rate that oil is being produced in barrels per day from an uncontrolled flow of the highest capacity well at the facility.
12. If “Rating” in column 10 is “E” or if high rate well has a daily flow rate greater than 2,500 barrels, provide the total volume in barrels of all tanks on the facility used for the storage of oil including production (e.g., fuel oil including diesel fuel, corrosion inhibitors).

    If “Rating” in column 10 is “E” or if high rate well has a daily flow rate greater than 2,500 barrels, provide the throughput volume in barrels of oil per day of the lease term pipelines that depart the facility.

TABLE 2

FACILITY INFORMATION
ROW PIPELINES IN OCS WATERS

FROM	LATITUDE/ LONGITUDE	TO	LATITUDE/ LONGITUDE	F/S BOUND.	SEG. NO.	ROW NO.	LENGTH (ft.)	SIZE (in.)	API GRAV.	LEAK DETECT SYSTEM	THRU VOLUME (Bbls)	DIST. SHORE (miles)	APPURT PLATFORM
Platform Elly	33 35.025'N 118 07.76'W	F/S	33 40.153'N 118 06.104'W	Y			33,521	16	15.0	Y	6,000	8.5 - 3.0	Y
Platform Eureka	33 33.833'N 118 07.0'W	Platfor m Elly	33 35.025'N 118 07.76'W	N			9,449	10	9-19	Y	10,200	8.5 - 9.2	Y
Platform Elly Water Injection Pipeline	33 35.025'N 118 07.76'W	Platfor m Eureka	33 33.833'N 118 07.0'W	N			8,994.8	10	N/A	N	12,000	8.5 - 9.2	Y
Platform Eureka Natural Gas Pipeline	33 33.833'N 118 07.0'W	Platfor m Elly	33 35.025'N 118 07.76'W	N			8,439.0	6	N/A	N	350 mcfd	8.5 - 9.2	Y

1. Provide the 2-letter BSEE area designation and the OCS Block No. of the originating point of the ROW pipeline (e.g., WC 425, HI A-375).
2. Provide the latitude and longitude of the originating point of the ROW pipeline in degrees and decimal minutes (e.g., 28 25.35'N, 90 09.08'W).
3. Provide the 2-letter BSEE area designation and the OCS Block No. of the terminus of the ROW pipeline (e.g., WC 425, HI A-375).
4. Provide the latitude and longitude of the terminus of the ROW pipeline in degrees and decimal minutes (e.g., 28 25.35'N, s90 09.08'W).
5. Indicate whether the ROW pipeline either terminates or originates at the Federal/State boundary (i.e., yes, no).
6. Provide the 5-digit BSEE Segment No. of the ROW pipeline (e.g., 00006, 01234, 11456).
7. Provide the OCS ROW No. of the ROW pipeline (e.g., 092, 0436, G 10992).
8. Provide the length of the ROW pipeline in feet.
9. Provide the internal diameter of the ROW pipeline in inches.
10. Provide the API Gravity of the oil being transported by the ROW pipeline.
11. Indicate whether the ROW pipeline is monitored by a leak detection system (i.e., yes, no).
12. Provide the throughput volume in barrels of oil per day of the ROW pipeline.
13. Provide the distance to shore of the point of the ROW pipeline that is nearest to the shoreline in miles.
14. Indicate whether the ROW pipeline has an associated appurtenance platform(s) (i.e., yes, no).

TABLE 3

FACILITY INFORMATION
ROW PIPELINES IN STATE WATERS SEAWARD OF THE COASTLINE

FROM	LATITUDE/ LONGITUDE	TO	LATITUDE/ LONGITUDE	F/S BOUND.	ID. NO.	ROW NO.	LENGTH (ft.)	SIZE (in.)	API GRAV.	LEAK DETECT SYSTEM	THRU VOLUME (Bbls)	DIST. SHORE (miles)	APPURT PLATFORM (yes/no)
F/S	33 40.153'N 118 06.104'W	Shore	33 45.208'N 118 11.552'W	Yes			41,448	16	16	Yes	6,000	0 (Shoreline)	No

1. Provide the 2-letter BSEE area designation and the Block No. of the originating point of the State ROW pipeline (e.g., SP 2, EI 21).
2. Provide the latitude and longitude of the originating point of the State ROW pipeline in degrees and decimal minutes (e.g., 28 25.35'N, 90 09.08'W).
3. Provide the 2-letter BSEE area designation and the Block No. of the terminus of the State ROW pipeline or the point at which the ROW pipeline crosses the coastline (e.g., HI 96, SS 10).
4. Provide the latitude and longitude of the terminus of the State ROW pipeline (if in State waters) or the point at which the ROW crosses the coastline in degrees and decimal minutes (e.g., 28 25.35'N, 90 09.08'W).
5. Indicate whether the ROW pipeline either terminates or originates at the Federal/State boundary (i.e., yes, no).
6. Provide the State-assigned identification number of the State ROW pipeline, if assigned.
7. Provide the State-assigned ROW No. of the State ROW pipeline.
8. Provide the length of the State ROW pipeline in feet.
9. Provide the internal diameter of the State ROW pipeline in inches.
10. Provide the API Gravity of the oil being transported by the State ROW pipeline.
11. Indicate whether the State ROW pipeline is monitored by a leak detection system (i.e., yes, no).
12. Provide the throughput volume in barrels of oil per day of the State ROW pipeline.
13. Provide the distance to shore of the point of the ROW pipeline that is nearest to the shoreline in miles.
14. Indicate whether the ROW pipeline has an associated appurtenance platform(s) (i.e., yes, no).

AREA MAP

WITT | O'BRIEN'S

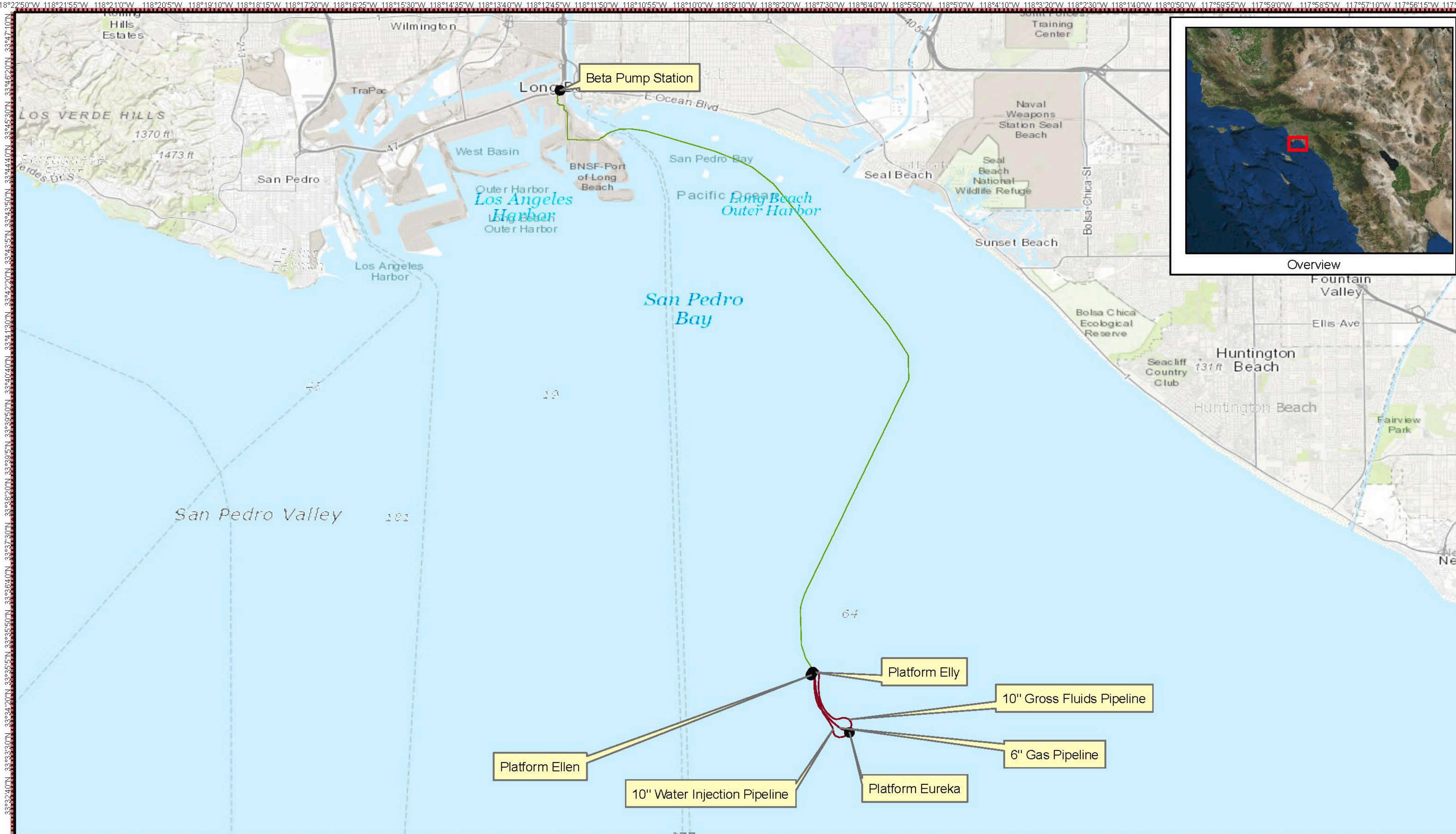
Map Prepared By; Witt O'Brien's
818 Town & Country Blvd., Houston, Texas 77024
(281)320-9796

Beta Offshore Corporate Office
111 West Ocean Boulevard, Suite 1240
Long Beach, California 90802
Office: (562)628-1526
Fax: (562)-628-4536 / Main: (562)628-9595

Area Map

N

0 5,600 11,200 16,800 22,400 28,000
Feet



OIL SPILL PREVENTION AND RESPONSE PLAN

BETA OFFSHORE
BSEE ID #3126

BETA UNIT COMPLEX
- Platform Eureka
- Platform Ellen
- Platform Elly
- Beta San Pedro Bay Pipeline
- Beta Onshore Pump Station

Prepared for:

Beta Offshore
111 W. Ocean Boulevard, Suite 1240
Long Beach, California 90802

Prepared by:

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(985) 781-0804
Spill Response Hotline

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RECORD OF REVISIONS		
REVISION	**DATE**	**DESCRIPTION OF REVISION AND PURPOSE**
Revision 0	November 2010	Initial plan submission (Similar to previous Pacific Energy plan, with updates to personnel, OSRO contracts and other contacts). A Health & Safety Plan Section with Decontamination Section was added (formerly in Emergency Action Plan).
Revision 1	April 2012	**Throughout Document:** Changed BOEMRE to BSEE **Title Page:** Listed current COFR numbers, updated report date **Plan Statement:** Updated signatures **Distribution List:** Updated names and addresses **Table of Contents:** Updated page numbers to reflect changes **Section 1, Introduction:** Updated Plan No., COFR numbers and throughput no.s **Section 2, Spill Response Plan (Core Plan):** Updated notification procedures to emphasize immediate notification to NRC and criteria for notification to Regional Supervisor and District Manager. Updated Table 2-2, Updated Emergency Incident Placard to correct QI references and various numbers, updated vessel names and equipment in Table 2-5 **Annex A:** Updated current throughput rates and description of intrafield pipelines (Sec. A.3 and Table A-5) to reflect new pipelines between Eureka and Elly installed in December 2011. Revised Figures A-2 and A-9. **Annex B:** Minor updates in Section B.1.1.2, Table B-1 (vessel names) **Annex C:** No changes except for Attachment C-1 (p.29, 30) **Annex D:** Clarified QIs on Page D-2, updated names throughout. Attachment D-1, page 2, revised IC designation **Annex E:** Agency name update **Annexes F and G:** No changes **Annex H:** Updated History of Spills table. Changed RSPA to PHMSA **Annex I:** Revised Worst Case Discharge for production pipeline between Eureka and Elly to reflect new 10" line. Revised page 1-7 to add discussion of dispersant and in-situ burning methods **Annex J:** No changes **Annex K:** Section K.7.1.3 Revised status of MSRC fire-resistant boom, including location and transit time.; Section K.7.1.2 Updated reference to California Dispersant Plan; Revised Response Planning Process section. **Annex L:** Updated reference to ACP (2011). **Annex M:** Updated Spill Trajectory Request Form and agency names **Annex N:** No changes **Annex O:** Updated some contact names and numbers **Annex P:** Updated equipment lists **Annex Q:** Replaced old crude oil MSDS with Beta Offshore MSDS **Annex R:** Updated agency acronyms **Annex S:** Agency names update **Annex T:** No changes
Revision 2	March 2013	Change CA Dept. of Fish and Game to CA Dept. of Fish and Wildlife, and OES to CalEMA throughout document Updated Table of Contents to match document Updated contact information – Pages ii; 1-2, 2-1, Attachment 2-1, Annex O Page 1-7: Exemption note attached to 40 CFR 112 reference Page 1-11: Updated COFR expiration dates and inserted new COFRs Page 2-6: Updated Communications chart. Page H-4: Added new leak event for 2012 Page H-12: Added Well Blowout scenario for Worst Case Discharge

2.b RECORD OF REVISIONS (Cont'd)

RECORD OF REVISIONS		
REVISION	**DATE**	**DESCRIPTION OF REVISION AND PURPOSE**
Partial	August 2014	Pages Revised: Plan Statement, iii, pI-1, I-5, I-11, 2-1, D-2, D-3, D-4 to reflect new contact information and expiration dates.
Revision 3	July 2016	Change QI's, contact names/numbers, titles & signatures throughout document 1.02 Update distribution list 1.04 Update well count 1.05 Update COFR 2.3 Added new 1st bullet item for reporting any amount of oil to water; and added HSE Mgr./designee to 2nd bullet item for preparing spill report. 2.9 Update table (remove reference to lights on tracking buoys) 3.3 Update drawings 10-14 Annex A Pgs. A-36+ tables updated w/strikethrough for out of service equipment Annex C Update IRT to IMT (Incident Management Team) Annex D Update IRT to IMT (Incident Management Team) Annex F Fix typo; Update IRT to IMT (Incident Management Team) Annex H Updated H.2 Spill History; H.2.3 Remaining Risk-Tanks-updated 2016 PHA associated with new Gerald Desmond Bridge (pg. H-14) Annex M M.2.1 Updated regulatory references to training Annex M 18.2 Updated Trajectory Request Form Annex N 2.05a Updated JSA format Annex P Updated OSRO (Patriot) DFW rating letter

RECORD OF REVISIONS			
CHANGE DATE	**REMOVE**	**INSERT**	**DESCRIPTION OF CHANGE(S)**
	PAGE NUMBER(S)		
February 2018	Entire Plan	Entire Plan	Reformatted Plan Distributed by Witt O'Brien's
October 2018	Section 1, 2-1 thru 2-4, 2-6, 2-9, 3-10, 4-3, 4-4, 4-29, 6-1, 6-2, 6-5, 7-2, 7-3, 8-1, 8-3, 10-1, 16-3, 16-4, 16-6, 19-7 thru 19-18, B-3, C-4, C-5, D-2 plus MSRC insert, F-3, H-8 thru end of App H, K-35 thru K-43, App M, N-12 thru N-14.	Section 1, 2-1 thru 2-4, 2-6, 2-9, 3-10, 4-3, 4-4, 4-29, 6-1, 6-2, 6-5 thru 6-13, 7-2, 7-3, 8-1, 8-3, 10-1, 16-3, 16-4, 16-6, 19-7, 19-8 plus insert California On-Water In-Situ Burn Plan, 21-4, 21-20 , 21-21, B-3, C-4, C-5, D-2 plus MSRC insert, F-3, H-9 thru H-43, K-35 thru K-43, App M, N-12 thru N-14.	Revisions to address BSEE review/comments dated June 11, 2018-Oct 3, 2018. Personnel information and administrative corrections. Additional info added to Section 1.
Sept 2019 - Feb 2020	Section 1-1 thru 1-10, 2-1 thru 2-9, 3-4 thru 3-8, 41 thru 4-4, 6-6 thru 6-12, 7-2, 7-3, B-3, D-Patriot matrix, E-2, H-9 thru H-41, M, N-6	Section 1-1 thru 1-10, 2-1 thru 2-9, 3-4 thru 3-8, 41 thru 4-4, 6-4 thru 6-7, 7-2, 7-3, B-3, E-2, H-9 thru H-40, M, N-6	Revisions to personnel; remove 2-750' boom from Ellen equip list

RECORD OF REVISIONS			
CHANGE DATE	REMOVE	INSERT	DESCRIPTION OF CHANGE(S)
	PAGE NUMBER(S)		
June -August 2020	Section 1-2, 2-6 thru 2-12; 4-3 thru 4-4, App E1-E-2, App H-9 thru H-19, App K-35	Section 1-2, 2-6 thru 2-12; 16- App E1-E-11, App H-9 thru H19, K-35	Revisions to personnel; BSEE edits to response equip in App E & H; App K cross ref edits to §254.24(a).

2.c DISTRIBUTION LIST

DISTRIBUTION LIST	
COPY NUMBER	PLAN HOLDER
1	Beta Offshore HSE Manager 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
2	Beta Offshore Vice President of Operations 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
3	Beta Offshore Facilities Engineering Supervisor 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
4	Beta Offshore Production Manager 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
5	Beta Offshore Pipeline Superintendent 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
6	Beta Offshore Purchasing and Support Services Manager 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
7	Beta Offshore Platform Elly - Control Room 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802

DISTRIBUTION LIST	
COPY NUMBER	**PLAN HOLDER**
8	Beta Offshore Platform Ellen - Compliance Office 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
9	Beta Offshore Platform Ellen - Platform Superintendent 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
10	Beta Offshore Platform Ellen - Maintenance Supervisor 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
11	Beta Offshore Platform Eureka - Building 60/Control Room 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
12	Beta Offshore Platform Eureka - Production Office 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
13	Beta Offshore Beta Pump Station 170 N. Pico Avenue Long Beach, CA 90802
14-18	Beta Offshore Corporate Office Go Kit 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
19 (Flash Drive)	California Department of Fish & Wildlife Office of Spill Prevention and Response Attn: Van Vu 4665 Lampson Avenue, Suite C Los Alamitos, CA 90720
20 (Flash Drive)	Bureau of Safety and Environmental Enforcement, Oil Spill Response Division Attn: Robert Zaragoza, Senior Preparedness Analyst 770 Paseo Camarillo, 2nd Floor Camarillo, CA 93010-6065

DISTRIBUTION LIST	
COPY NUMBER	**PLAN HOLDER**
21 (Flash Drive)	California State Lands Commission Mineral Resources Management Division Attn: Marina Voskanian, P.E. 301 East Ocean Blvd., Suite 350 Long Beach, CA 90802

DISTRIBUTION LIST (Cont'd)	
COPY NUMBER	**PLAN HOLDER**
22 (2 Flash Drives)	Office of Pipeline Safety (Attn: Response Plan Review) Pipeline and Hazardous Materials Safety Administration US Department of Transportation, PHP-5, East Building, 2nd Floor, E22-321 1200 New Jersey Ave, SE Washington, DC 20590 Contact: David K. Lehman Phone: (202) 366-4595
23 (1 Flash Drive)	Patriot Environmental Attn: Marc Ruffner 3628 Smith Ave. Acton, CA 93510
24 (1 Flash Drive)	Marine Spill Response Corporation Attn: Jeff Jappe 3300 E. Spring Street Long Beach, CA 90802
25 (Flash Drive)	O'Brien's Response Management Attn: Command Center 818 Town & Country Blvd., Suite 200 Houston, TX 77024
26 (Flash Drive)	Tom Haug, O'Brien's Response Management

3.0 INTRODUCTION

3.a COMPANIES COVERED

Beta Offshore, BSEE ID# 3126

3.b PURPOSE AND USE

The purpose of this Oil Spill Prevention and Response Plan (Plan) is to assist the production facilities (Facility) personnel prepare for and respond quickly and safely to a discharge originating from the Beta Unit Complex. The Plan provides techniques and guidelines for achieving an efficient, coordinated, and effective response to a discharge incident which may occur at the Facility. This Plan will serve as the Bureau of Safety and Environmental Enforcement (BSEE) approved Regional Response Plan for all Company operations.

The specific objectives of the Plan are to:

- Ensure an effective and comprehensive response which prevents injury to people and minimizes damage to the environment and property.
- Establish an Incident Management Team, assign individuals to fill the positions on the team, and define the roles and responsibilities of team members.
- Define notification, activation and mobilization procedures to be followed when a discharge occurs.
- Define organizational lines of responsibility and roles during a response operation.
- Document equipment, manpower and other resources available to assist with the response.
- Ensure compliance with the federal, state and local oil pollution regulations.
- Ensure consistency with the National Contingency Plan and Area Contingency Plan(s) for the area of operation.

3.c TYPES OF LEASES AND ROW PIPELINES

TYPE OF LEASES AND ROW PIPELINES	YES	NO
Federal Leases	✓	
Federal ROW Pipelines	✓	
State Facilities		✓
State ROW Pipelines	✓	

3.d FACILITY INFORMATION STATEMENT

Appendix A, "Facility Information," includes the listing of all of the facilities covered by this OSPRP.

3.e. COVERAGE AREA

N/A

3.f. PLAN REVIEW AND UPDATE PROCEDURES

Annual Review/Update

The HSE Manager will coordinate the following Plan review and update procedures.

- Annually review the relevant portions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and applicable ACPs and, if necessary, revise the OSPRP to ensure consistency.

- At least once each year, review and make appropriate revisions as required by operational or organizational changes.

- At least once each year, review and make appropriate revisions as required by changes in the names and telephone numbers detailed in Sections 4.0, 7.0, 8.0, and 9.0.

- Opportunities may occur during response team tabletop exercises or actual emergency responses which may initiate Plan review/update.

Agency Review and Revision Requirements

BSEE - Once BSEE approves your regional OSRP, you must review it at least every two (2) years and submit all resulting modifications to the appropriate BSEE office in accordance with 30 CFR § 254.30(a). If your biennial review does not result in modifications, you must inform the appropriate BSEE office in writing that there are no changes, as required by 30 CFR § 254.30(a). If a change occurs that requires revisions to your regional OSRP, submit the required revisions to the appropriate BSEE office for approval within 15 days of the change, as required by 30 CFR § 254.30(b).

3.f. PLAN REVIEW AND UPDATE PROCEDURES (Cont'd)

California OSPR - The plan holder shall ensure that all plans are up-to-date and complete. All plans shall be resubmitted for review once every five (5) years from the date of the most recent approval letter. If the most recently approved plan and all updates submitted since the last plan approval letter have not changed, on or before the five (5) year resubmittal due date the owner/operator shall, in lieu of submitting a complete plan as described above, submit correspondence to the Administrator stating that the plan currently on file with OSPR is up-to-date and complete. If the contingency plan on file is over five (5) years old from the date of most recent approval letter (original submission or resubmittal) and there has been no correspondence to the Administrator stating that the plan currently on file with the OSPR is up-to-date and complete, that plan will be revoked. Any significant change that could impact timely and adequate oil spill response including changes in ownership and Financial Responsibility coverage must be submitted to the Administrator as soon as possible, but at least within 24 hours.

DOT/PHMSA - The Operator shall revise and resubmit two electronic copies of the revised Plan to the Pipeline Response Plans Officer within 30 days for new or different operating conditions or information which will substantially affect the implementation of the response plan [49 CFR 194.121]. The Operator shall review the Plan at least every five years and resubmit two electronic copies of the revised Plan to the Pipeline Response Plans Officer. This review shall be conducted no later than the anniversary of the original submission date for substantial harm facilities and no later than the anniversary of the current approval date for significant and substantial harm facilities.

CONDITIONS REQUIRING CHANGES	BSEE	DOT/ PHMSA	OSPR
An extension of the existing pipeline or construction of a new pipeline in a response zone not covered by the previously approved Plan.		✓	
Relocation or replacement of portions of the pipeline, which in any way substantially affect the information included in this Plan, such as a change in the Worst Case Discharge volume.		✓	
A change in the type of oil handled, stored, or transferred that materially alters the required response resources.		✓	
A change in the name of the Oil Spill Removal Organization (OSRO).	✓	✓	
A material change in capabilities of the OSRO that provides equipment and personnel.	✓	✓	
A change in emergency response procedures.		✓	
A change in the Qualified Individual.		✓	
A change in the NCP or an ACP that has significant impact on the equipment appropriate for response activities.	✓	✓	
Any other changes that materially affect the implementation of the Plan.		✓	
As a result of post incident or drill evaluations.		✓	
A change occurs which significantly reduces your response capabilities	✓		
A significant change occurs in the worst case discharge scenario or in the type of oil being handled, stored, or transported at the facility	✓		
A significant change that could impact timely and adequate oil spill response including changes in ownership and Financial Responsibility coverage.			✓

3.f. PLAN REVIEW AND UPDATE PROCEDURES (Cont'd)

Regulatory Compliance

The development, maintenance, and use of this Plan implements Company policy and addresses the following regulatory requirements and guidelines:

- 30 CFR Part 254 - Oil Spill Response Requirements for Facilities Located Seaward of The Coast Line (BSEE)
- 49 CFR Part 194 - Response Plans for Onshore Pipelines (PHMSA)
- 29 CFR Parts 1910.38 (a) and (b), 1919.120, and 1910.165 - Emergency Action Plans, Hazardous Waste Operations and Emergency Management, and Employee Alarm Systems (OSHA)
- California Code of Regulations Title 8, Chapter 4, Subchapter 7, Group 1, Article 2, §3220 - Emergency Action Plan, and Group 27, Article 165 (§6184) - Employee Alarm Systems (California Department of Industrial Relations)
- California Code of Regulations Title 14, Division 1, Subdivision 4, Chapter 3, Subchapter 3 - Oil Spill Contingency Plans (OSPR)

3.g. AREA CONTINGENCY PLANS

In the event of a discharge, information from surrounding Area Contingency Plans (ACP) would be utilized regardless of the projected trajectory. Each ACP contains valuable information viable to the response of an oil spill such as, environmentally sensitive mapping, strategies to mitigate the potential damage from an oil spill and contact information for each region. Regardless of the region expected to be impacted from an oil spill, it is recommended that ACP's from the following areas be reviewed (Sections/Appendices listed under each ACP below are not fully addressed in this Plan and should be reviewed as appropriate.):

- California State Oil Spill Contingency Plan;
- Sector Los Angeles (LA)/Long Beach (LB);
  Sector LA-LB Area Contingency Plan and Southern Sector Area Committee - ACP 5 Area Contingency Plan - Sections that will be relied on include:
  - Section 9815 & 9817 - Geographic Boundaries (LA and Orange County (OC))
  - Section 9816.2 & 9817.2 Environmental Sensitive Sites Summary & Strategy Sheets
  - Section 9802.2 - Cultural and Historic Resources Contacts
  - Section 9816.3 and 9817.3 - Economic Sensitive Sites (LA / OC)
  - Section 9840 - Area Contingency Plan 5
  - Section 9816.2.2 - Los Angeles County GRA - 2
  - Section 9816.2.3 – Los Angeles County GRA - 4
  - Section 9817.2.1 - Orange County GRA - 3

3.h. CONTRACT CERTIFICATION STATEMENT

CERTIFICATION OF RESPONSE RESOURCES

Beta Offshore hereby certifies that said company has ensured by contract or other approval means the availability of private personnel and equipment necessary to respond, to the maximum extent practicable, to a worst case discharge or substantial threat of such discharge from offshore facilities to be located in the Pacific Ocean. Evidence of these contracts is presented in Appendix D of this Plan.

- MSRC, Patriot Environmental Services and Clean Harbors Environmental Services, Inc. are the Primary Spill Response Equipment Providers.

Plan Approved:

Dan Steward

Dan Steward
Beta Offshore
Beta Unit Oil Spill Prevention and Response Plan

Date: February 6, 2020

NOTE: Witt O'Brien's provided consulting and plan development services in the preparation of this plan utilizing data provided by the Company and/or the Facility. Witt O'Brien's assumes no liability for injury, loss, or damage of any kind resulting directly or indirectly from the use of the regulatory interpretation, response planning, or information contained in this Plan.

3.i. FEASIBILITY AND EXECUTABILITY STATEMENT

I certify, to the best of my knowledge and belief, under penalty of perjury under the laws of the State of California, that the information contained in this contingency plan is true and correct and that the plan is both feasible and executable.

Plan Approved:

Dan Steward

Dan Steward
Beta Offshore
Beta Unit Oil Spill Prevention and Response Plan

Date: February 6, 2020

OPERATOR'S STATEMENT – SIGNIFICANT AND SUBSTANTIAL HARM

FACILITY NAME: Beta Offshore
FACILITY ADDRESS: 111 W. Ocean Blvd., Suite 1240
Long Beach, CA 90802

Is the pipeline greater than 6 and 5/8 inches (168 mm) in outside nominal diameter, greater than 10 miles (16.1 km) in length? and

YES ✓ NO

1. Has any line section experienced a release greater than 1,000 barrels within the previous five years? or

   YES NO ✓

2. Has any line section experienced two or more reportable releases, as defined in Sec. 195.5, within the previous five years? or

   YES NO ✓

3. Does any line section contain any electric resistance welded pipe, manufactured prior to 1970 and operates at a maximum operating pressure established under Sec. 195.406 that corresponds to a stress level greater than 50 percent of the specified minimum yield strength of the pipe? or

   YES NO ✓

4. Is any line located within a 5-mile (8 km) radius of potentially affected public drinking water intakes and could reasonably be expected to reach public drinking water intakes? or

   YES NO ✓

5. Is any line located within a 1-mile (1.6 km) radius of potentially affected environmentally sensitive areas and could reasonably be expected to reach these areas?

   YES ✓ NO

Based on the U.S. DOT PHMSA criteria above, Beta Offshore operations are considered "Significant and Substantial Harm".

Beta Offshore herby certifies to the Pipeline and Hazardous Materials Safety Administration of the U.S. Department of Transportation that we have identified and ensured, by contract or by other means, the availability of personnel and equipment to respond, to the maximum extent practicable, to a worst case discharge.

Dan Steward
Signature

Vice President
Title

Dan Steward
Name (please type or print)

February 6, 2020
Date

3.j. INFORMATION SUMMARY

INFORMATION SUMMARY	
Operator Name: *(Mailing & Physical Address)*	Beta Offshore 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802
OPS Sequence #:	1185
BSEE Plan Number:	P.0001
OSPR Plan Control #:	M5-24-3231
CA COFR Number:	2-2475-00-001
Qualified Individual:	Dan Steward (936) 647-6737 (Cell) (562) 628-1539 (Office)
Alternate Qualified Individual:	Diana Lang (562) 628-1529 (office) (562) 522-5095 (cell) Rick Armstrong (310) 560-5281 (Cell) (562) 628-1534 (Office)
Name, Address, and Telephone Numbers To Whom Correspondence should be Sent:	Diana Lang HSE Manager Beta Offshore 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802 (562) 628-1526
Name and Address of Agent for Service of Process:	Dan Steward Beta Offshore 111 W. Ocean Blvd, Suite 1240 Long Beach, CA 90802 (562) 628-1526

3.j. INFORMATION SUMMARY (Cont'd)

INFORMATION SUMMARY (Cont'd)

States Traversed: California

County Traversed: Los Angeles

Pipeline Information:

Line Segment	From/To	Length (mi.)	Diameter (in.)	Products Handled
San Pedro Bay Pipeline	Platform Elly- Beta Pump Station	17.3	16	Crude Oil
10" Delivery Lines (3)	Beta Pump Station - THUMS Manifold	0.19	10	Crude Oil

Worst Case Discharge: 12,469 Bbls, Crude Oil.

Since all maintenance/operational functions are conducted by Beta Offshore personnel located in California, a single Response Zone (DOT/PHMSA response planning requirement under OPA 90) has been developed. Subsequently, the requirements for a Core Plan and a separate Response Zone Plan/Appendix for each Response Zone have been combined into this one Oil Spill Prevention and Response Plan.

This Plan is written in English and understood by personnel responsible for carrying out the Plan.

3.j. INFORMATION SUMMARY (Cont'd)

CALIFORNIA CERTIFICATE OF FINANCIAL RESPONSIBILITY (CA COFR)

OWNER OR OPERATOR:

SAN PEDRO BAY PIPELINE COMPANY

meets the financial responsibility requirements set forth in the Government Code Sections 8670.37.53 as it applies to the operation of

NAME:

CRUDE OIL PIPELINE 16" (SAN PEDRO BAY PIPE) PLATFORM ELLY (FED WATERS)

LOCATION:

TO BETA STATION; 10" BETA DELIVERY LINE 1, 2 & 3 - BETA STATION TO THUMS MANIFOLD

CERTIFICATE: 2-2475-00-001 **CONTROL #:** FE791

ISSUED DATE: June 01, 2018 **EXPIRATION DATE:** May 31, 2020

The holder of this document named above is subject to the provisions of California Code of Regulations, Title 14, Sections 791-797, implementing the financial responsibility requirements set forth in the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (Act). This certificate holder has provided the necessary evidence of financial responsibility mandated by these requirements.

For the purpose of determining liability pursuant to the Act, this Certificate of Financial Responsibility is conclusive evidence that the person or entity holding the certificate is the party responsible for the specific Marine Facility.

No alterations of this certificate are permitted after issuance by the Administrator of OSPR. If there is a change in the name or ownership of the Marine Facility, the certificate holder must notify the Office of Spill Prevention and Response (OSPR) immediately. If the certificate expires, a new certificate will be required.

This certificate remains valid as long as the current method for demonstrating financial responsibility is maintained (eg. insurance). Any changes in this status must be reported to OSPR immediately.

It is the owner or operator's responsibility to ensure that this certificate number is also included in the owner or operator's marine oil spill contingency plan, which must be submitted to this office for approval, before operating in a location where a spill could impact California marine waters.

If you have any questions, please contact

Stephen Snavely

Sincerely,

Stephen Snavely

Financial Analyst

(916) 322-1929

Office of Spill Prevention and Response

cacofr-facilities@wildlife.ca.gov

PROPERTY MANAGEMENT UNIT LEADER (PROP)

The Property Management Unit Leader (PROP) is responsible for all accountable property procured during a response.

The major responsibilities of the PROP are:

- Review Common Responsibilities.
- Set up property management unit.
- Request Property Management Unit resources.
- Organize Property Management Unit work force.
- Adhere to guidance provided in Company policies.
- Coordinate with the SPUL and PROC to ensure all orders and purchases are screened to identify accountable or reportable property items that would need to be entered into the appropriate organization property tracking software (e.g., Oracle Financial).
- Designate a Property Administrator responsible for entries into property tracking software.
- Ensure documentation is maintained on recorded property to include, but not limited to the Resource Request Message (ICS 213-RR) and invoice.
- Record location of accountable property and complete a physical inventory (including a joint inventory when transferring property to another Property Custodian).
- Depending on the size of the area affected by the incident, designate Property Custodians to ensure logistical control and accountability over the disbursed property.
- Ensure individuals responsible to maintain and monitor the item signs a Custody Receipt for Personal Property Pass (DHS 560-1) or the ICS-219-9A.
- Ensure all property assigned to the incident is appropriately marked and identifies ownership.
- Ensure property assigned to the incident is transferred back to or disposed of in accordance with owning organization regulations or funding source requirements.
- Establish procedures for the use of property passes for accountable and non-accountable property required for field operations.
- Designate custodial areas and property custodians in writing.
- Ensure reportable and/or accountable property is reviewed by the organization that provided the funding before action for disposal is taken.
- Ensure all property documents are available to the organization responsible for reimbursement billing.
- Maintain Unit Log (ICS 214-CG) and forward to the Documentation Unit Leader (DOCL) for disposition.

4.0 ORGANIZATION

4.a QUALIFIED INDIVIDUAL

Qualified Individuals:

Dan Steward
(936) 647-6737 (Cell)
(562) 628-1539 (Office)
dan.steward@amplifyenergy.com

Rick Armstrong
(310) 560-5281 (Cell)
(562) 628-1534 (Office)
rick.armstrong@amplifyenergy.com

Diana Lang
(562) 522-5095 (Cell)
(562) 628-1529 (Office)
diana.lang@amplifyenergy.com

Beta Offshore grants full authority to the above Qualified Individuals to obligate funds, implement response actions, and immediately notify appropriate Federal officials and response organizations.

Duties of the Qualified Individual (QI) and Alternate Qualified Individual (AQI) include:

- Notify all response personnel, as needed.
- Identify the character, exact source, amount, and extent of the release, as well as the other items needed for notification.
- Notify and provide necessary information to the appropriate Federal, State, and Local authorities with designated response roles, including the National Response Center (NRC), BSEE, State Emergency Response Commission (SERC), and local response agencies.
- Assess the interaction of the spilled substance with water and/or other substances stored at the Facility and notify response personnel at the scene of that assessment.
- Assess the possible hazards to human health and the environment due to the release. This assessment must consider both the direct and indirect effects of the release (i.e., the effects of any toxic, irritating, or asphyxiating gases that may be generated or the effects of any hazardous surface water runoffs from water or chemical agents used to control fire and heat-induced explosion).

4.a QUALIFIED INDIVIDUAL (Cont'd)

- Assess and implement prompt surface and subsea removal actions to contain and remove the substance released.
- Coordinate rescue and response actions as previously arranged with all response personnel.
- Activate contracted oil spill removal organizations.
- Use authority to access and deploy well containment equipment.
- Use authority to obligate Company funds to implement removal.
- Direct clean-up activities until properly relieved of this responsibility.
- Refer to Appendix B for a description of the training the QI has received.

4.b.i INCIDENT MANAGEMENT TEAM

QUALIFIED INDIVIDUALS			
NAME	**EMAIL**	**OFFICE**	**MOBILE**
Dan Steward	dan.steward@amplifyenergy.com	(562) 628-1539	(936) 647-6737
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281

IMT MEMBERS			
NAME	**EMAIL**	**OFFICE**	**MOBILE**
Incident Commander			
Dan Steward	dan.steward@amplifyenergy.com	(562) 628-1539	(936) 647-6737
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Safety Officer			
Rob Hurley, CSP	hurleyr@pacbell.net	Call Mobile	(805) 340-408
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Manuel Maldonado	mmaldonado@wittobriens.com	(985) 781-0804	(832) 808-9247
Information Officer			
Sam Sacco (Strategy & Communications Consl.)	sjsacco87@gmail.com	(510) 541-6449	(510) 541-6449
Kate Conrad	kate.conrad@amplifyenergy.com	(5620 685-9909	(310) 683-3817
Sean Fitzgerald	sfitzgerald@wittobriens.com	(985) 781-0804	(310) 384-5643
Liaison Officer			
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Pete Gardner-Cox	pgardnercox@wittobriens.com	(985) 781-0804	(206) 914-5131
Christian Zumaran	christian.zumaran@amplifyenergy.com	(562) 685-9903	(909) 374-2009

4.b.i INCIDENT MANAGEMENT TEAM (Cont'd)

IMT MEMBERS (Cont'd)			
NAME	**EMAIL**	**OFFICE**	**MOBILE**
Operations Section Chief			
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281
Aaron Holton	aholton@wittobriens.com	(985) 781-0804	(985) 290-6634
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Christian Zumaran	christian.zumaran@amplifyenergy.com	(562) 685-9903	(909) 374-2009
Planning Section Chief			
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Marielle Lomax	marielle.lomax@amplifyenergy.com	(562) 628-1544	(714) 300-9286
Logistics Section Chief			
Lorraine Lopez	lorraine.lopez@amplifyenergy.com	(562) 628-1528 Ext 225	(310) 753-4179
Drew White	drew.white@amplifyenergy.com	(562) 628-1530 Ext 224	(562) 833-3617
Leo Renteria	leo.renteria@amplifyenergy.com	(562) 685-9906 Ext 266	(714) 580-4934
Keith Towler	ktowler@wittobriens.com	(985) 781-0804	(985) 502-0030
Gill Berkins	gberkins@wittobriens.com	(985) 781-0804	(985) 285-8646
Finance Section Chief			
Veronica Banuelos	veronica.banuelos@amplifyenergy.com	(562) 628-1532 Ext 365	
Keith Towler	ktowler@wittobriens.com	(985) 781-0804	(985) 502-0030

4.b.i INCIDENT MANAGEMENT TEAM (Cont'd)

Responsibilities

The responsibilities of the IMT are:

- Operations, Planning, Logistics, and Finance report directly to Command.
- When IC does not assign a position, IC retains that responsibility.
- The five (5) functional areas of the IMT are modular in design and can be expanded with additional staff, reporting under the main areas, to meet the requirements of large scale or complex emergencies.
- The IC can set up functional groups or assign groups that are assigned to geographical areas.
- Training requirements for response personnel are attached in Appendix B.
- Additional roles and responsibilities may be found In the U.S. Coast Guard Incident Management Hand Book.

4.b.ii INCIDENT MANAGEMENT TEAM

The Company IMT includes a designated Oil Spill Response Coordinator (OSRC)/Incident Commander (IC) and alternates supplemented with contract IMT support as needed. The IC has been delegated the responsibility and authority to direct and coordinate response operations by the Company.

4.b.iii INCIDENT MANAGEMENT TEAM

IMT members that are not employees of the Company have been contracted to respond as necessary. Refer to Appendix D, Contractual Agreements.

4.b.iv INCIDENT MANAGEMENT TEAM

Refer to Appendix B, Training Information, for training the IMT members responsible for spill management decision making have received.

4.c SPILL RESPONSE OPERATING TEAM

Refer to 4.b.i and 4.b.iii. For the purposes of this Plan, the IMT and SROT are equivalent.

4.d OIL SPILL REMOVAL ORGANIZATIONS

The Company has contracts in place with MSRC, Patriot Environmental and Clean Harbors Environmental Services for response to a discharge. Contractual agreements are presented in Appendix D.

4.d OIL SPILL REMOVAL ORGANIZATIONS (Cont'd)

The Company maintains a relationship with various environmental and technical consultants that can provide support in the event of an emergency incident. These consultants can provide expertise and support in the areas of emergency response management, environmental services, site assessment, permitting, waste treatment, recycling, dewatering, hazardous waste disposal and remediation. Implementation of these services should be coordinated through the Qualified Individual and/or the Incident Commander.

4.e INCIDENT COMMAND SYSTEM

The Incident Command System (ICS) used as an emergency management tool to aid in mitigating all types of emergency incidents. ICS is readily adaptable to very small emergency incidents as well as more significant or complex emergencies. ICS uses the following criteria as key operational factors:

- Assigns overall authority to one individual
- Provides structured authority, roles and responsibilities during emergencies
- The system is simple and familiar, and is used routinely at all incidents
- Communications are structured
- There is a structured system for response and assignment of resources
- The system provides for expansion, escalation, and transfer and transition of roles and
- responsibilities
- Allows for Unified Command where agency involvement at the command level is required

Effective establishment and utilization of the ICS during response to all types of emergencies can:

- Provide for increased safety
- Shorten emergency mitigation time by providing more effective and organized mitigation
- Cause increased confidence and support from local, state, and federal public sector emergency response personnel
- Provide a solid cornerstone for emergency planning efforts

Response team duty job description sheets are on the following pages provide an overview of the duties of each assignment. For additional detailed information refer to the U.S. Coast Guard or U.S. EPA Incident Management Handbook.

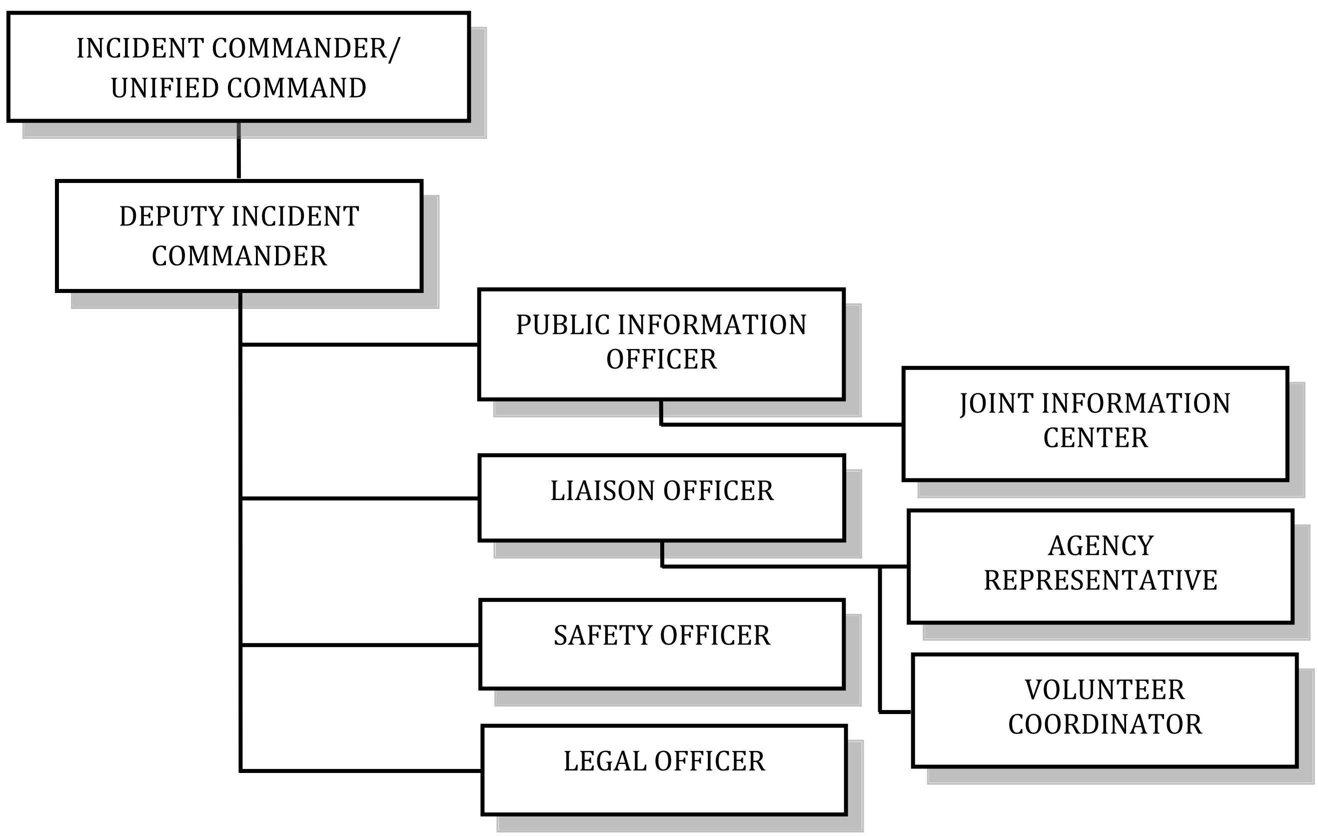
4.f INCIDENT MANAGEMENT TEAM JOB DESCRIPTIONS

Upon check-in, receive briefing from Incident Commander (IC), Section Chief, Unit Leader, or Branch Director as appropriate.

- Determine status of unit activities.
- Participate in meetings as appropriate.
- Comply with all safety practices and procedures, and report unsafe conditions to your immediate supervisor and the Safety Officer (SOFR).
- Use clear text and ICS terminology in all radio communications – no codes.
- Complete forms and reports required of assigned position.
- Ensure proper disposition of incident documentation as directed by the Documentation Unit.
- Determine resource needs.
- Order additional unit staff as appropriate.
- Confirm dispatch and estimated time of arrival of staff and supplies.
- Assign duties to and supervise staff.
- Maintain accountability for assigned personnel with regard to exact location(s), personal safety, and welfare at all times, especially when working in or around incident response operations.
- Ensure equipment is operational prior to each work period.
- Supervise demobilization of unit, including storage of supplies.
- Provide the Supply Unit Leader (SPUL) with a list of supplies to be replenished.
- Maintain unit records, including a Unit Log (ICS 214).
- Maintain a personal log of actions, decisions, and events if desired.

COMMAND

Incident Commander (IC) 4-9
Legal Officer 4-10
Liaison Officer (LOFR) 4-10
Safety Officer (SOFR) 4-12
Public Information Officer (PIO) 4-13



INCIDENT COMMANDER (IC)

The Incident Commander's (IC) responsibility is the overall management of the incident. The IC is selected based on qualifications and experience.

The IC may have Deputy ICs, who may be from the same organization or from an assisting agency. The Deputy IC must have the same qualifications as the IC, as they must be ready to take over that position at any time. When span of control becomes an issue for the IC, a Deputy IC may be assigned to manage the Command Staff.

The major responsibilities of the IC are:

- Review Common Responsibilities.
- Assess the situation and/or obtain a briefing from the prior IC (ICS 201).
- Determine incident objectives and general direction for managing the incident.
- Establish priorities.
- Establish an appropriate ICS organization.
- Establish an Incident Command Post (ICP).
- Brief Command Staff and Section Chiefs.
- Ensure planning meetings are scheduled as required.
- Approve and authorize the implementation of an Incident Action Plan (IAP).
- Approve the Site Safety and Health Plan, if developed.
- Ensure that adequate safety measures are in place.
- Coordinate activity for all Command and General Staff.
- Identify and coordinate with key people and officials.
- Approve requests for additional resources or for the release of resources.
- Keep agency administrator informed of incident status.
- Approve the use of trainees, volunteers, and auxiliary personnel.
- Authorize release of information to the news media.
- Ensure incident Status Summary (ICS 209) is completed and forwarded to appropriate higher authority.

INCIDENT COMMANDER (IC) (Cont'd)

- Order the demobilization of the incident when appropriate.
- Maintain Unit Log (ICS 214) and Forward to the Documentation Unit Leader (DOCL) for disposition.
- Assign any of the IC roles and responsibilities to a Deputy IC as needed.

LEGAL OFFICER

- Review Common Responsibilities.
- Participate in planning meetings, if requested.
- Advise on legal issues relating to in-situ burning, use of dispersants, and other alternative response technologies.
- Advise on legal issues relating to differences between Natural Resource Damage Assessment (NRDA) and response activities.
- Advise on legal issues relating to investigations.
- Advise on legal issues relating to finance and claims.
- Advise on legal issues relating to response.
- Maintain Unit Log (ICS 214) and forward to DOCL for disposition.

LIAISON OFFICER (LOFR)

Incidents that are multi-jurisdictional, or have several organizations involved, may require the establishment of the Liaison Officer (LOFR) position on the Command Staff. The LOFR is a conduit of information and assistance between organizations and does not normally have delegated authority to make decisions on matters affecting an organization's participation in the incident.

The major responsibilities of the LOFR are:

- Review Common Responsibilities.
- Serve as the primary coordinator for the liaison network, including Agency Representatives (AREP) and state, tribal, and local governments.
- Maintain a list of assisting and cooperating agencies and AREPs, including name, agency and contact information. Monitor check-in sheets daily to ensure that all AREPs are identified.
- Assist in establishing and coordinating interagency contacts.

LIAISON OFFICER (LOFR) (Cont'd)

- Participate in Command and General Staff Meetings, Planning Meetings, Operations Briefings, and other meetings and briefings as required.
- Assist in development of the Information Management Plan.
- Develop stakeholder coordination plan, including periodic public meeting schedules, if needed.
- Implement the Information Management Plan.
- Keep organizations supporting the incident response aware of incident status.
- Arrange consultations with federally recognized tribes as appropriate.
- Monitor incident operations to identify current or potential inter-organizational problems.
- Determine the need for a Volunteer Coordinator.
- Coordinate response resource needs for Natural Resource Damage Assessment (NRDA) activities with the Operations Section Chief (OSC) during oil spill and hazardous substance release responses.
- Coordinate response resource needs for incident investigation activities with the OSC.
- Coordinate with PIO on media and stakeholder communications about risk perceptions.
- Coordinate information sharing and distribution with the PIO.
- Coordinate with PIO to develop and implement social media strategy by providing input on social media uses and interface with stakeholders and the public.
- Coordinate with the Environmental Unit Leader to address stakeholder and public risk perceptions by assessing pollutant/hazard situation and obtaining technical content for stakeholder engagement.
- Coordinate activities of visiting dignitaries.
- Brief Command on agency issues and concerns.
- Ensure that all required agency forms, reports and documents are completed prior to demobilization.
- Have debriefing session with the IC prior to demobilization.
- Maintain Unit Log (ICS 214) and forward to DOCL for disposition.

SAFETY OFFICER (SOFR)

The Safety Officer (SOFR) is to develop and recommend measures to ensure personnel safety and occupational health of not only response workers, but also the public, and to anticipate, recognize, assess, and control hazardous and unsafe conditions or situations.

There is only one SOFR for each incident; however, the SOFR may have Assistance Safety Officers (ASOFs), or Technical Specialists (THSPs) as needed.

The major responsibilities of the SOFR are:

- Review Common Responsibilities.
- Ensure an incident-specific Health and Safety Plan, required by 29 CFR 1910.120, is developed specifically for the incident response. The Site Safety and Health Plan (ICS 208-CG) is a tool designed to assist in meeting the requirements of a HASP under 29 CFR 1910.120.
- Participate in Tactics and Planning Meetings, and other meetings and briefings as required.
- Identify hazardous situations associated with the incident.
- Review the Incident Action Plan (IAP) for safety and occupational health implications.
- Provide safety and occupational health advice in the IAP for assigned responders.
- Use Risk Based Decision Making (RBDM) methodologies to conduct Operational Risk Management (ORM) for the incident.
- Develop and implement intervention measures to prevent unsafe acts.
- Stop observed or reported unsafe acts. (Seek guidance and clarity from the IC/UC on the scope and limitation of authority.)
- Investigate accidents that have occurred within the incident area and determine if new safety and occupational health measures are needed.
- Identify, communicate and document safety, occupational, and environmental health hazards, needs, and concerns.
- Track and report accidents, injuries, and illnesses.
- Support reporting of accidents and mishaps using the Incident Mishap Reporting Record (ICS 237).
- Ensure all contractors and volunteers hired/brought in, meet and are aware of appropriate safety/health training levels, the HASP, and safety/health measures to achieve the response strategies. (A translator may be needed to achieve this goal.)
- Identify the need for and assign deputies, assistants, and THSPs as needed.

SAFETY OFFICER (SOFR) (Cont'd)

- Review and provide input to the Medical Plan (ICS 206).
- Review and provide input to the traffic plan, if developed, for both land and vessel traffic.
- Develop the Incident Action Plan Safety Analysis (ICS 215a) to document hazards as well as mitigation strategies.
- Serve as the IC/UC representative in meetings with federal, state, or local occupational safety and health authorities and stakeholders.
- Brief Command on safety and occupational health issues and concerns.
- Ensure that all required organization forms, reports, and documents are completed prior to demobilization.
- Have debriefing session with the IC prior to demobilization.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

PUBLIC INFORMATION OFFICER (PIO)

The Public Information Officer (PIO) is responsible for developing and releasing information about the incident to the media and public. The PIO may have assistants as necessary, and the assistants may come from other assisting organizations.

The major responsibilities of the PIO are:

- Review Common Responsibilities.
- Determine from the IC if there are any limits on information release.
- Develop media strategy and public information plan.
- Represent and advise the IC on all public information matters relating to the incident.
- Develop material for use in media briefings.
- Obtain IC approval of media releases.
- Inform media and conduct media briefings.
- Monitor and utilize social media as approved by the IC.
- Arrange tours, interviews and briefings.
- Coordinate information sharing and distribution with the LOFR.

PUBLIC INFORMATION OFFICER (PIO) (Cont'd)

- Assist in development of the Information Management Plan.
- Manage the Joint Information Center (JIC) if established.
- Assign a JIC manager if a JIC is established.
- Evaluate the need to establish JICs at additional locations.
- Obtain media information that may be useful to incident planning.
- Maintain current information summaries and/or displays on the incident and provide information on the status of the incident to assigned personnel.
- Brief Command on PIO issues and concerns.
- Coordinate with the Environmental Unit Leader and LOFR to address media and stakeholder risk perceptions and obtain technical content for external messages.
- Ensure that all required organization forms, reports and documents are completed prior to demobilization.
- Have debriefing session with the IC prior to demobilization.
- Maintain Unit Log (ICS 214) and forward to Documentation Unit Leader (DOCL) for disposition.

OPERATIONS

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Operations Branch Director (OPBD) 4-18

Air Operations Branch Director (AOBD)....................4-19

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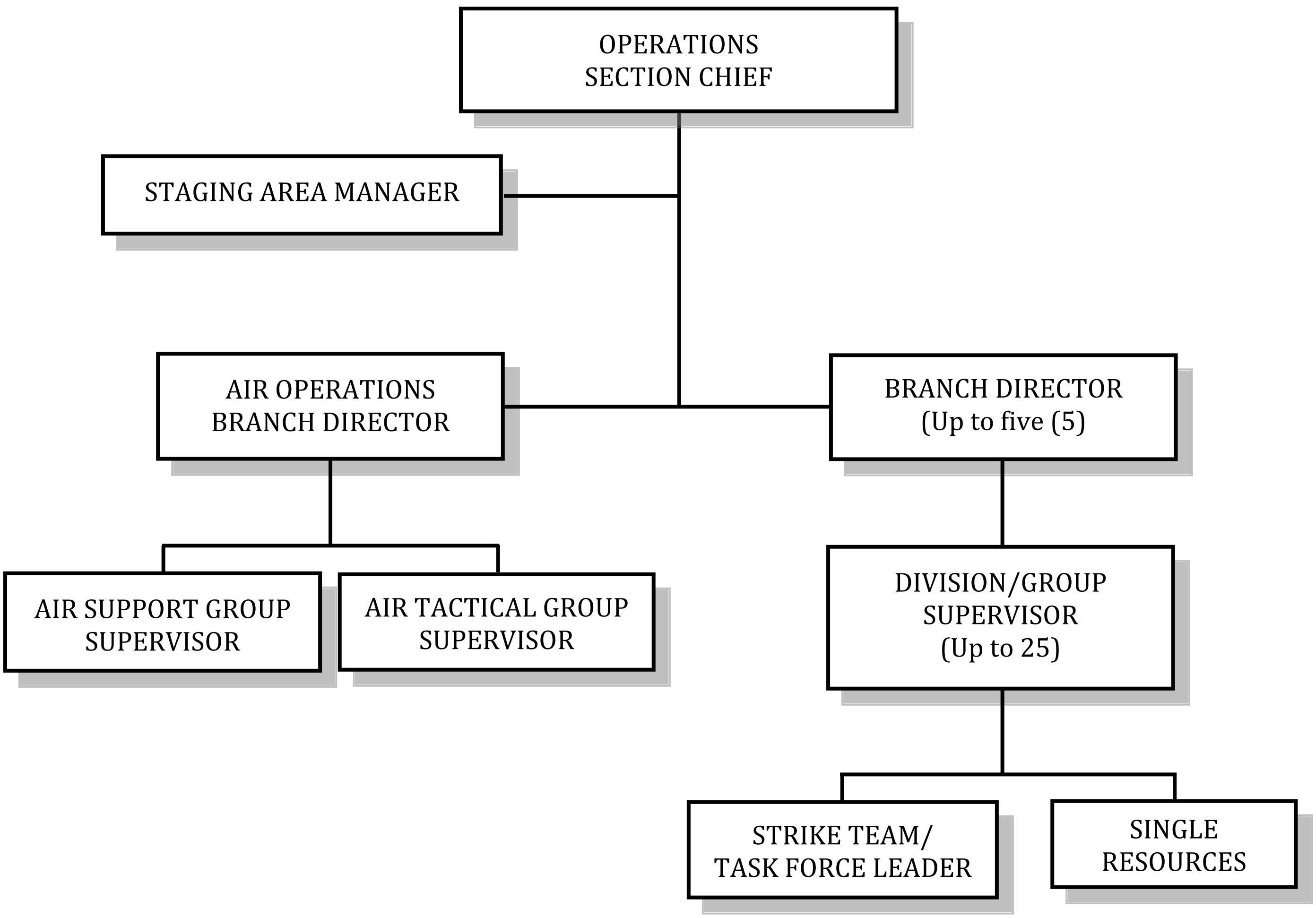

OPERATIONS SECTION CHIEF (OSC)

The Operations Chief is responsible for the management and implementation of spill response strategies pertaining to containment, protection, removal and disposal directly related to the primary mission.

The major responsibilities of the OSC are:

- Review Common Responsibilities.
- Obtain briefing from IC.
- Evaluate and request sufficient Section supervisory staffing for both operational and planning activities.
- Supervise Operations Section field personnel.
- Implement the Incident Action Plan (IAP) for the Operations Section.
- Evaluate on-scene operations and make adjustments to organization, strategies, tactics, and resources as necessary.
- Ensure the Resource Unit Leader (RESL) is advised of changes in the status of resources assigned to the Operations Section.
- In coordination with the Safety Officer (SOFR), ensure that Operations Section personnel execute work assignments while following approved safety practices.
- Monitor the need for and request additional resources to support operations as necessary.
- Assemble and/or demobilize Branches, Divisions, Groups, and task force/strike teams as appropriate.
- Identify and use staging areas.
- Evaluate and monitor the current situation for use in next operational planning period.
- Convert operational incident objectives into strategic and tactical options, which may be documented on a Work Analysis Matrix (ICS 234).
- Coordinate and consult with the Planning Section Chief (PSC), SOFR, Marine Transportation System Recovery Unit Leader (MTSL), Technical Specialists (THSPs), modeling scenarios, trajectories, etc., on selection of appropriate strategies and tactics to accomplish objectives.
- Identify kind, type, and number of resources required to support selected strategies.
- Determine the need for any specialized resources.
- Divide work areas into manageable units.
- Implement air space de-confliction plans as required.

OPERATIONS SECTION CHIEF (OSC) (Cont'd)

- Determine the need for an Air Branch Director.
- Request Captain of the Port (COTP) Safety or Security Zone or FAA Temporary Flight Restriction declaration around/over the incident response zone when warranted.
- Develop work assignments and allocate tactical resources based on strategic requirements using the Operational Planning Worksheet (ICS 215).
- Coordinate the development of the Operational Planning Worksheet (ICS 215) with the SOFR to mitigate safety risks.
- Participate in the planning process and the development of the tactical portions of the IAP, including the Assignment List (ICS 204) and Air Operations Summary (ICS 220).
- Review and approve final Assignment List (ICS 204(s)) prior to IAP approval.
- Assist with development of long-range strategic, contingency, and demobilization plans.
- Develop recommended list of Operations Section resources to be demobilized and initiate recommendation for release when appropriate.
- Receive and implement applicable portions of the incident Demobilization Plan.
- Participate in operational briefings to IMT members as well as briefings to the media and visiting dignitaries.
- Maintain Unit Log (ICS 214) and forward to Documentation Unit Leader (DOCL) for disposition.

OPERATIONS BRANCH DIRECTORS (OPBD)

The Operations Branch Directors (OPBDs) when activated, are under the direction of the Operations Section Chief, and are responsible for the implementation of the Incident Action Plan appropriate to Operations Branch.

The major responsibilities of the OPBD are:

- Review Common Responsibilities.
- Identify Divisions (DIVS), Groups, and resources assigned to the Operations Branch.
- Ensure that DIVS have a copy of the IAP.
- Implement IAP for the Operations Branch.
- Provide the OSC alternative or contingency strategies and tactics, including a list of additional resources needed in the Staging Area.
- Review the Assignment List (ICS 204) for Divisions/Groups within the Operations Branch and modify the lists based on the effectiveness of current operations.
- Assign specific work tasks to DIVS.
- Supervise Operations Branch operations.
- Resolve logistic problems reported by subordinates.
- Attend Planning Meetings as requested by the OSC.
- Ensure that the Resource and Situation Units are advised of changes in the status of resources assigned to the Operations Branch through the chain of command.
- Report to OSC when the IAP is to be modified, additional resources are needed, surplus resources are available, or hazardous situations or significant events occur.
- Approve accident and medical reports (home agency forms) originating within the Operations Branch.
- Evaluate the demobilization of excess resources well in advance of demobilization.
- Assemble and demobilize Branches, Divisions, Groups, and task force/strike teams as appropriate.
- Debrief with OSC and/or as directed at the end of each shift.
- Maintain Unit Log (ICS 214) and forward to DOCL for disposition.

AIR OPERATIONS BRANCH DIRECTOR (AOBD)

The Air Operations Branch Director (AOBD) is ground-based and primarily responsible for preparing the Air Operations Summary (ICS 220) and the air operations portion of the IAP, and for providing logistical support and direction to aircraft and personnel supporting incident response. The Air Operations Summary (ICS 220) serves a similar purpose as the Assignment List (ICS 204) by assigning and managing aviation resources on the incident.

The creation of an Air Operations Branch should be considered only after the number of air resources exceeds what would be assigned to an Air Operations Group.

The major responsibilities of the AOBD are:

- Review Common Responsibilities.
- Organize preliminary air operations.
- Supervise all air operations activities associated with the incident.
- Report to the OSC on air operations activities.
- Implement FAA air space closure and air space deconfliction plans to conduct operations as required.
- Oversee creation of air task orders or flight schedules to mitigate safety risk of aircraft operations in confined or saturated air space.
- Coordinate airspace use with the FAA.
- Request declaration or cancellation of Temporary Flight Restrictions (TFRs) in accordance with applicable Federal Aviation Regulations and post Notice to Airmen (NOTAM).
- Attend the Tactics and Planning Meetings to exchange information for development of the Air Operations Summary (ICS 220) and to confirm the number and type of aircraft needed for the next operational period.
- Participate in preparation of the IAP through the OSC, ensuring that the air operations portion includes the Air Traffic Control (ATC) requirements of assigned aircraft.
- Coordinate with the Communications Unit Leader (COML) to designate air tactical and support frequencies.
- Ensure reliable communication between the Air Operations Branch and air units.
- Perform operational planning for air operations including emergency evacuation procedures of injured responders.
- Prepare the Air Operations Summary (ICS 220), and provide the summary along with incident maps and copies of the IAP to the Air Support Group and Fixed-Wing Bases.

AIR OPERATIONS BRANCH DIRECTOR (AOBD) (Cont'd)

- Develop an aviation site safety plan in coordination with SOFR.
- Consider requesting an Aviation Safety Officer (ASOF) with aviation safety certifications to work within the Air Operations Branch as a Technical Specialist (THSP) or for the SOFR.
- Report safety concerns, special incidents, and accidents to the SOFR.
- Evaluate helibase and helispot locations.
- Establish procedures for emergency reassignment of aircraft.
- Coordinate approved flights of non-incident aircraft in the TFRs.
- Manage airspace deconfliction.
- Coordinate with appropriate Command Centers and the remote sensing coordinator through normal channels on incident air operations activities.
- Coordinate with trustee agencies and Environmental Unit Leader (ENVL) on flight restrictions and recommendations regarding threatened or endangered species and/or indigenous and migrating birds.
- Consider requests for logistical use of incident aircraft.
- Facilitate aircrew debriefs by Intelligence/Investigations Officer (INTO), Situation Unit Leader (SITL), Field Observers (FOBS), etc.
- Arrange for an accident investigation team when warranted.
- Implement noise abatement procedures as necessary.
- Debrief OSC at the end of each operational period as directed.
- Maintain a Unit Log (ICS 214-CG) and forward to the DOCL for disposition.

DIVISION SUPERVISOR (DIVS)

The Division/Group Supervisor (DIVS) reports to the OSC (or OPBD when activated). The DIVS is responsible for the implementation of the assigned portion of the IAP, assignment of resources within the Division/Group, and reporting on the progress of control operations and status of resources within the Division/Group.

The major responsibilities of the DIVS are:

- Review Common Responsibilities.
- Identify resources assigned to the Division/Group.
- Provide the IAP to subordinates, as needed.
- Review Division/Group assigned tasks and incident activities with subordinates.
- Implement the IAP for Division/Group.
- Assemble and demobilize task force/strike teams as appropriate.
- Supervise Division/Group resources and make changes as appropriate.
- Ensure that RESL is advised of all changes in the status of resources assigned to the Division/Group through the chain of command.
- Coordinate activities with adjacent Division/Group.
- Determine the need for assistance on assigned tasks.
- Submit situation and resource status information to the Branch Director or the OSC as directed.
- Coordinate with Field Observers (FOBS) assigned by the Situation Unit Leader (SITL).
- Report hazardous situations, special occurrences, or significant events (e.g., accidents, mishaps, sickness, and discovery of unanticipated sensitive resources) to immediate supervisor and SOFR.
- Ensure that assigned personnel and equipment get to and from assignments in a timely and orderly manner.
- Resolve logistics problems within the Division/Group.
- Participate in the development of Branch plans for the next operational period, as requested.
- Evaluate the demobilization of excess resources well in advance of demobilization.
- Debrief as directed at the end of each shift.
- Maintain Unit Log (ICS 214) and forward to DOCL for disposition.

STAGING/GROUP AREA MANAGER (STAM)

The Staging Area Manager (STAM) is under the direction of the OSC and is responsible for managing all activities within a Staging Area.

The major responsibilities of the STAM are:

- Review Common Responsibilities.
- Proceed to staging area.
- Obtain briefing from person you are relieving.
- Establish staging area layout.
- Determine any support needs for equipment, support staff, feeding, sanitation, and security.
- Establish check-in function as appropriate.
- Ensure security of staged resources using assets with authority, jurisdiction, and adequate capabilities to provide security.
- Establish check-in areas for identification and traffic control.
- Request maintenance service for equipment at staging area as appropriate.
- Respond to requests for resource assignments. (Note: Requests may be directly from the OSC or via the Incident Communications Center (ICC).)
- Obtain and issue receipts for supplies distributed and received at staging area. (i.e. radio equipment)
- Determine required resource levels from the OSC.
- Advise the OSC when reserve levels reach minimums.
- Maintain and provide status to Resource Unit of all resources in staging area.
- Maintain staging area in orderly condition.
- Coordinate with Field Observers (FOBS) assigned by the Situation Unit Leader (SITL).
- Ensure resources that are in the staging area and are scheduled for demobilization follow the Demobilization Plan if developed.
- Demobilize the staging area in accordance with the Demobilization Plan, or per OSC direction when no Demobilization Plan has been developed.
- Debrief with OSC or as directed at the end of each shift.
- Maintain Unit Log (ICS 214) and forward to DOCL for disposition.

PLANNING

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Demobilization Unit Leader (DMOB) 4-26

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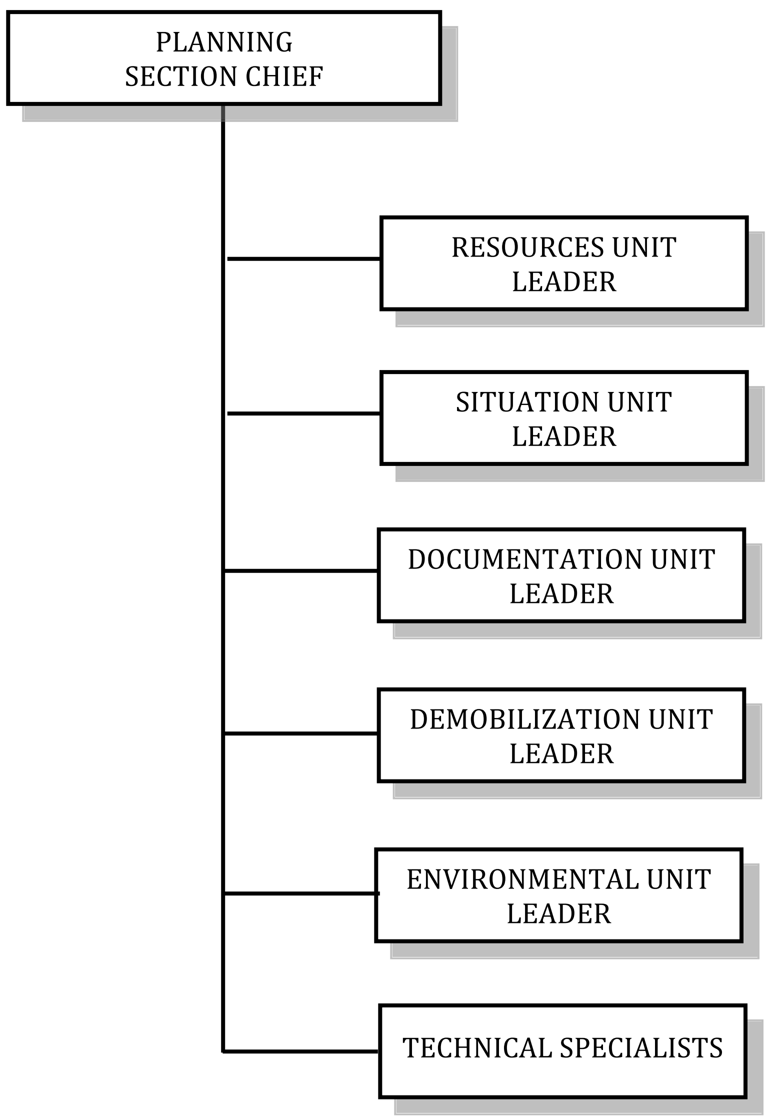

PLANNING SECTION CHIEF (PSC)

The Planning Section Chief (PSC) is a member of the General Staff and responsible for the development of the Incident Action Plan (IAP), the collection, evaluation, dissemination, and use of incident information and maintaining status of assigned and demobilized resources.

The major responsibilities of the PSC are:

- Review Common Responsibilities.
- Collect, process, display, and disseminate incident information.
- Assist Operations Section Chief (OSC) in the development of response strategies.
- Supervise preparation of the IAP.
- Facilitate planning meetings and briefings.
- Supervise the tracking of incident personnel and resources through the Resources Unit.
- Assign personnel already on-site to ICS organizational positions as appropriate.
- Oversee information management processes and plans, including the development and approval of the Information Management Plan (if needed).
- Ensure the accuracy of all information being produced by Planning Section Units with special attention to IC/UC Critical Information Requirements (CIRs) and their reporting requirements.
- Support information requirements and reporting schedules for Planning Section Units (Resources Unit, Situation Unit, etc.).
- Establish special information collection activities as necessary (e.g., weather, environmental, and toxics).
- Assemble information on alternative strategies.
- Provide periodic predictions on incident potential.
- Keep Spill Management Team apprised of any significant changes in incident status.
- Oversee preparation and implementation of the Incident Demobilization Plan.
- Incorporate plans (e.g., traffic, medical, communications, and site safety) into the IAP.
- Develop other incident supporting plans (e.g., salvage, transition, and security).
- Maintain Unit Log (ICS 214) and forward to Documentation Unit Leader (DOCL) for disposition.

DOCUMENTATION UNIT LEADER (DOCL)

The Documentation Unit Leader (DOCL) is responsible for the maintenance of accurate, up-to-date incident documentation which is critical to post-incident analysis.

The major responsibilities of the DOCL are:

- Review Common Responsibilities.
- Set up work area and begin organization of incident files.
- Develop a documentation plan to include archival of all incident specific information data as defined in the Information Management Plan.
- Coordinate with the Communications Unit Leader (COML) to ensure electronically stored information meets legal documentation and archival requirements.
- To the greatest extent possible the data archive should be readily recoverable and searchable.
- Ensure appropriate level of documentation storage is maintained based on the level of classification of the information being stored.
- Maintain the Incident Open Action Tracker (ICS 233).
- Establish duplication service and respond to duplication requests.
- File all official forms and reports.
- Develop a Freedom of Information Act (FOIA) plan in coordination the Liaison Officer (LOFR) and with appropriate legal input.
- Review records for accuracy and completeness, and inform units of errors or omissions.
- Provide incident documentation as requested.
- Organize files for submitting final incident documentation package.
- Submit incident documentation to the operational commander for maintenance and disposition.
- Maintain Unit Log (ICS 214).

DEMOBILIZATION UNIT LEADER (DMOB)

The Demobilization Unit Leader (DMOB) is responsible for developing the Incident Demobilization Plan. On large incidents, demobilization can be very complex, requiring a separate planning activity. Note that not all organizations require specific demobilization instructions.

The major responsibilities of the DMOB are:

- Review Common Responsibilities.
- Review incident resource records to determine the likely size and extent of demobilization effort and develop a resource matrix.
- Coordinate demobilization with Agency Representatives (AREPs).
- Monitor the on-going Operations Section resource needs.
- Identify surplus resources and probable release time.
- Establish communications with off-incident facilities, as necessary.
- Develop an Incident Demobilization Plan that should include:
    1. General information section.
    2. Responsibilities section.
    3. Release priorities.
    4. Release procedures (including any unique procedures needed).
    5. Demobilization Checkout Form (ICS 221).
    6. Directory.
- Prepare appropriate directories (e.g., maps and instructions) for inclusion in the demobilization plan.
- Track all demobilized tactical resources and overhead personnel to their home office/location.
- Distribute demobilization plan (on and off-site).
- Provide status reports to appropriate requestors.
- Ensure that sections and units understand their specific demobilization responsibilities.
- Supervise execution of the Incident Demobilization Plan.
- Brief the Planning Section Chief (PSC) on demobilization progress.
- Maintain Unit Log (ICS 214) and forward to Documentation unit Leader (DOCL) for disposition.

SITUATION UNIT LEADER (SITL)

The Situation Unit Leader (SITL) is the primary node for information management. The SITL is responsible for collecting, processing, organizing and disseminating incident information relating to status of current operations, incident growth, mitigation, or intelligence activities taking place on the incident. The SITL may prepare future projections of incident growth, maps, and intelligence.

The major responsibilities of the SITL are:

- Review Common Responsibilities.
- Begin collection and analysis of incident data as soon as possible.
- Prepare, post, and disseminate resource and situation status information as required, including special requests.
- Request and direct Display Processor(s) (DPRO) and/or Field Observers (FOBS) as needed.
- Develop the Information Management Plan, as required, in coordination with the Public Information Officer (PIO), Liaison Officer (LOFR), Operations Section chief (OSC), Planning Section Chief (PSC), Logistics Section Chief (LSC), and Communications Unit Leader (COML) for IC/UC approval.
- Collect, process, organize and disseminate incident information relating to status of current operations, incident growth, mitigation, or intelligence activities taking place on the incident.
- Prepare future projections of incident growth, maps, intelligence, and other incident specific predictions as requested by the PSC.
- Coordinate with COML to develop capabilities and capacities to support the information management methodologies.
- Prepare the Incident Status Summary (ICS 209).
- Provide charts, maps, and overlay imagery.
- Conduct situation briefings at meetings and briefings as required by the PSC.
- Develop and maintain master chart(s)/map(s) of the incident.
- Display master chart(s)/map(s) of incident in the Incident Command Post (ICP) common area for all responders to view.
- Maintain Unit Log (ICS 214-CG) and forward to Documentation Unit Leader (DOCL) for disposition.

RESOURCE UNIT LEADER (RESL)

The Resource Unit Leader (RESL) is responsible for maintaining the status of all assigned tactical resources and personnel at an incident. This is achieved by overseeing the check-in of all tactical resources and personnel, and using a status system that indicates the current location and status of all these resources.

The major responsibilities of the RESL are:

- Review Common Responsibilities.
- Establish the check-in function at incident locations.
- Prepare the Organization Assignment List (ICS 203) and Incident Organization Chart (ICS 207).
- Prepare appropriate parts of the Assignment List (ICS 204).
- Maintain a master roster of all tactical resources checked in at the incident and post their current status and location using the Resource Status Card (ICS 219) or an electronic resource tracking system.
- Request resources from Logistics Section Chief (LSC) via the Resource Request Message (ICS 213-RR).
- Attend meetings and briefings as required by the PSC.
- Maintain Unit Log (ICS 214-CG) and forward to DOCL for disposition.

LOGISTICS

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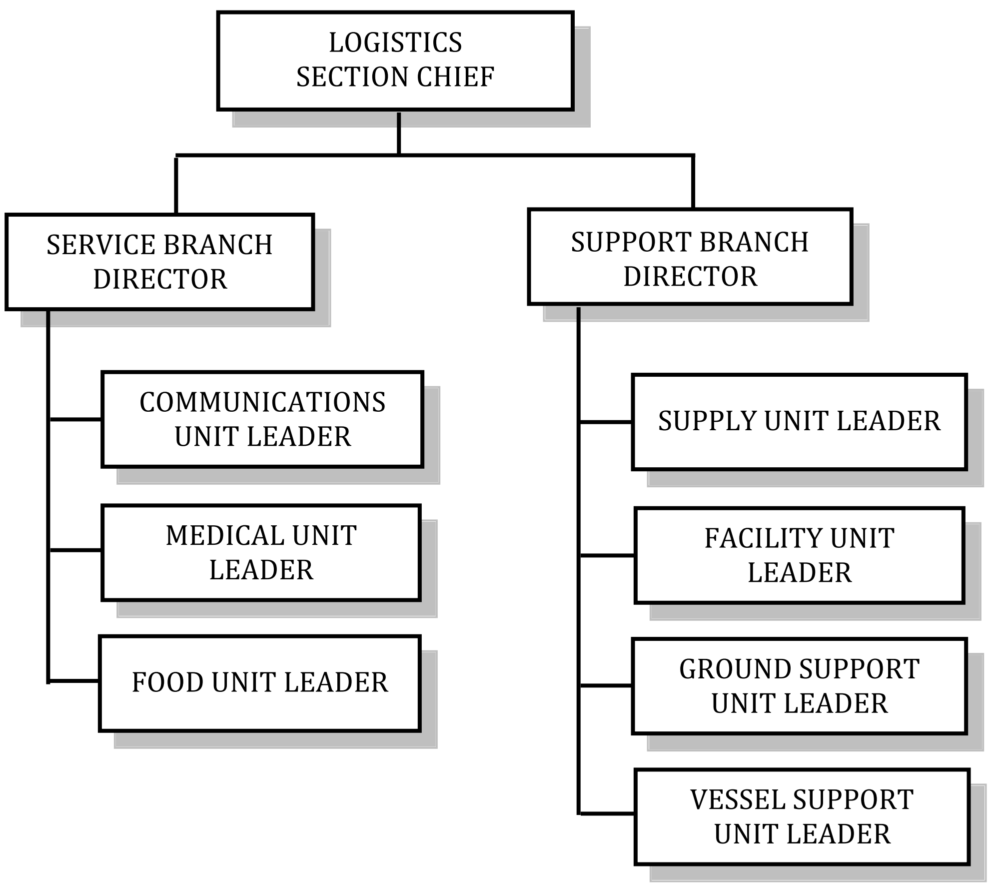


LOGISTICS SECTION CHIEF (LOSC)

The Logistics Section Chief (LSC) is a member of the General Staff and is responsible for providing facilities, services, people, and material in support of the incident. The LSC participates in the development and implementation of the IAP and supervises the branches and units within the Logistics Section.

The LSC may have Deputy LSCs. The Deputy LSC must have the same qualifications as the person for whom they work as they must be ready to take over that position at any time.

The major responsibilities of the LSC are:

- Review Common Responsibilities.
- Organize the Logistics Section.
- Assign work locations and work tasks to Section personnel.
- Notify the Planning Section/Resources Unit of activated Logistics Section Units, including names and locations of assigned personnel.
- Assemble and brief Logistics Branch Directors and Unit Leaders.
- Participate in the planning process.
- Determine and supply immediate incident resource and facility needs.
- Coordinate and process requests for additional resources.
- In conjunction with Command, develop and advise all Sections of the Spill Management Team resource request process, the resource approval process, and use of Resource Request form (ICS 213-RR).
- Develop resource ordering process with Finance Section Chief (FSC).
- Review proposed tactics for upcoming operational period to ensure ability to provide resources and logistical support.
- Advise Command and other Section Chiefs on resource availability to support incident needs.
- Identify long-term service and support requirements for planned and expected operations.
- Oversee development of the Communications Plan (ICS 205), Medical Plan (ICS 206), Transportation Plan and Traffic Plan, as required.
- Provide input to the Information Management Plan.
- Identify logistical resource needs for incident contingencies.

LOGISTICS SECTION CHIEF (LOSC) (Cont'd)

- Determine the type and amount of resources ordered and enroute to include reporting of status/location.
- Advise Section Chiefs on resource limitations, constraints, and appropriateness.
- Advise on current service and support capabilities.
- Participate in Business Management Meeting with the FSC.
- Request and/or set up expanded ordering processes as appropriate to support incident.
- Recommend Logistics Section resources to be demobilized and prioritize release order.
- Provide Logistics Section requirements to be included in the Demobilization Plan to Demobilization Unit Leader (DMOB).
- Receive and implement applicable portions of the incident Demobilization Plan.
- Maintain Unit Log (ICS 214) and forward to Documentation Unit Leader (DOCL) for disposition.

SERVICE BRANCH DIRECTOR (SVBD)

The Service Branch Director (SVBD) is activated under the supervision of the LSC and is responsible for the management of all service activities at the incident. The SVBD supervises the operations of the Communications, Medical, and Food Units.

The major responsibilities of the SVBD are:

- Review Common Responsibilities.
- Obtain working materials.
- Determine the level of service required to support operations.
- Confirm dispatch of Branch personnel.
- Participate in planning meetings of Logistics Section personnel.
- Review the Incident Action Plan (IAP).
- Organize and prepare assignments for Service Branch personnel.
- Coordinate activities of Branch Units.
- Inform the LSC of Branch activities.
- Resolve Service Branch problems.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

COMMUNICATIONS UNIT (COML)

The Communications Unit Leader (COML) is responsible for developing plans, obtaining, distributing, and supporting operation of computer and radio incident communications equipment and the data management infrastructure to support information flow.

The major responsibilities of the COML are:

- Review Common Responsibilities.
- Determine Unit personnel needs.
- Supervise Communications Unit activities.
- Support development and implementation of the Information Management Plan.
- Prepare and implement the Incident Radio Communications Plan (ICS 205).
- Obtain communications equipment and data management infrastructure.
- Develop contingency communications.
- Ensure the Incident Communications Center (ICC) and Message Center are established.
- Establish appropriate communications distribution and maintenance locations within the Incident Base.
- Ensure communications systems are installed, tested and maintained.
- Ensure an equipment accountability system is established.
- Ensure personal portable radio equipment from cache is distributed per Incident Radio Communications Plan (ICS 205).
- Establish and maintain the data management infrastructure to include hardware, software, and data to support information management.
- Establish and maintain automatic data processing computer information technology (IT) services for all facilities when available.
- Provide technical information as required on:
    1. Adequacy of communications systems currently in operation.
    2. Geographic limitation on communications systems.
    3. Equipment capabilities and limitations.
    4. Amount and types of equipment available.
    5. Anticipated problems in the use of communications equipment.
- Recover equipment from Units being demobilized.
- Maintain Unit Log (ICS 214) and forward to Documentation Unit Leader (DOCL) for disposition.

MEDICAL UNIT LEADER (MEDL)

The Medical Unit Leader (MEDL), under the direction of the SVBD or LSC, is primarily responsible for the development of the Medical Plan, providing medical care, overseeing health of response personnel, obtaining medical aid and transportation for injured and ill response personnel, coordinating with other functions to resolve health and safety issues, and preparation of medical reports and records.

The major responsibilities of the MEDL are:

- Review Common Responsibilities.
- Participate in Logistics Section/Service Branch planning activities, providing relevant medical input for strategy development.
- Establish the Medical Unit.
- Prepare the Medical Plan (ICS 206).
- Coordinate with the Safety Officer (SOFR), Operations, hazardous substance specialists, and others on proper personnel protection procedures for incident personnel.
- Prepare procedures for major medical emergency.
- Develop transportation routes and methods for injured incident personnel.
- Ensure incident personnel patients are tracked as they move from origin, to the care facility, and to final disposition.
- Provide continuity of medical care for incident personnel.
- Declare major medical emergency as appropriate.
- Provide or oversee medical and rehab care delivered to incident personnel.
- Monitor health of incident personnel including excessive incident stress.
- Respond to requests for medical aid, medical transportation, and medical supplies.
- Prepare and submit authorizations, reports and administrative documentation related to injuries, compensation, or death of incident personnel, in conjunction with Finance/Admin Section.
- Coordinate personnel and mortuary affairs for incident personnel fatalities.
- Provide oversight and liaison for injured response personnel across the emergency medical care system.
- Implement procedures to protect medical records and Personally Identifiable Information (PII) in accordance with the Health Insurance Portability and Accountability Act (HIPAA).
- Maintain Unit Log (ICS 214) and forward to Documentation Unit Leader (DOCL) for disposition.

FOOD UNIT LEADER (FDUL)

The Food Unit Leader (FDUL) is responsible for supplying the food needs for all tactical responders and overhead personnel, including all remote locations such as staging areas, as well as providing food for personnel unable to leave tactical field assignments.

The major responsibilities of the FDUL are:

- Review Common Responsibilities.
- Determine food and water requirements.
- Determine the method of feeding to best fit each facility or situation.
- Obtain necessary equipment and supplies.
- Ensure that well-balanced menus are provided.
- Account for responders who use incident supplied food services.
- Order sufficient food and potable water from the Supply Unit.
- Maintain an inventory of food and water.
- Maintain food service areas, ensuring that all appropriate health and safety measures are being followed.
- Supervise Food Unit personnel as appropriate.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

SUPPORT BRANCH DIRECTOR (SUBD)

The Support Branch Director (SUBD) is activated under the direction of the LSC and is responsible for the development and implementation of logistics plans in support of the IAP. The SUBD supervises the operations of the Supply, Facilities, Ground Support, and Vessel Support Units.

The major responsibilities of the SUBD are:

- Review Common Responsibilities.
- Obtain work materials.
- Identify Support Branch personnel dispatched to the incident.
- Determine support operations in coordination with the LSC and SVBD.
- Prepare organization and assignments for support operations.
- Assemble and brief Support Branch personnel.
- Determine if assigned Support Branch resources are sufficient.
- Track progress of Branch and Unit work assignments.
- Resolve problems associated with requests from the Operations Section.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

SUPPLY UNIT LEADER (SPUL)

The Supply Unit Leader (SPUL) is primarily responsible for receiving, inventorying, storing, and distributing all supplies, tactical resources, and personnel for the incident, including non-expendable supplies and equipment.

The major responsibilities of the SPUL are:

- Review Common Responsibilities.
- Participate in Logistics Section/Support Branch planning activities.
- Receive and respond to requests for personnel, supplies, and equipment.
- Order, receive, distribute, and store supplies and equipment.
- Determine the type and amount of supplies, tactical resources, and personnel ordered and enroute to include reporting of status and location.
- Review the IAP for information on operations of the Supply Unit.
- Develop and implement safety and security requirements.
- Service reusable equipment.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

FACILITIES UNIT LEADER (FACL)

The Facilities Unit Leader (FACL) is primarily responsible for the setup, maintenance and demobilization of incident facilities (e.g., Incident Base, Incident Command Post (ICP) and staging areas), as well as security services required to support incident operations. The FACL provides sleeping and sanitation facilities for incident personnel and manages Incident facility operations. Each facility is assigned a manager who reports to the FACL and is responsible for operation of the facility. The FACL reports to the SUBD.

The major responsibilities of the FACL are:

- Review Common Responsibilities.
- Obtain a briefing from the SUBD or the LSC.
- Receive and review a copy of the Incident Action Plan (IAP).
- Participate in Logistics Section/Support Branch planning activities.
- In conjunction with the Finance/Admin Section, determine locations suitable for incident support facilities and secure permission to use through appropriate means.
- Inspect facilities prior to occupation and document conditions and preexisting damage.
- Determine requirements for each facility, including the ICP.
- Prepare layouts of incident facilities.
- Notify Unit Leaders of facility layout.
- Activate incident facilities.
- Provide Facility Managers and personnel to operate facilities.
- Provide sleeping facilities.
- Provide security services.
- Provide food and water service.
- Provide sanitation and shower service.
- Provide facility maintenance services (e.g., sanitation, lighting, clean up, and trash removal).
- Inspect all facilities for damage and potential claims.
- Demobilize incident facilities.
- Maintain facility records.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

GROUND SUPPORT UNIT LEADER (GSUL)

The Ground Support Unit Leader (GSUL) is primarily responsible for management of tactical equipment, vehicles, mobile ground support equipment and fueling services; transportation of personnel, supplies, food and equipment in support of incident operations; and implementing the Traffic Plan for the incident.

The major responsibilities of the GSUL are:

- Review Common Responsibilities.
- Participate in Support Branch/Logistics Section planning activities.
- Develop and implement the Traffic Plan in coordination with the Environmental Unit Leader (ENVL).
- Support out-of-service resources.
- Notify the Resources Unit of all status changes on support and transportation vehicles.
- Arrange for and activate fueling, maintenance, and repair of ground resources.
- Maintain the Support Vehicle Inventory (ICS 218).
- Provide transportation services.
- Collect information on use of rented equipment.
- Requisition maintenance and repair supplies (e.g., fuel and spare parts).
- Maintain incident roads.
- Ensure vehicles are decontaminated prior to demobilization.
- Submit reports to SUBD as directed.
- Maintain Unit Log (ICS 214-CG) and forward to the Documentation Unit Leader (DOCL) for disposition.

VESSEL SUPPORT UNIT LEADER (VSUL)

The Vessel Support Unit Leader (VSUL) is responsible for implementing the Vessel Routing Plan for the incident and coordinating transportation on the water and between shore resources. Since most vessels will be supported by their own infrastructure, the Vessel Support Unit may be requested to arrange fueling, dockage, maintenance, and repair of vessels on a case-by-case basis.

The major responsibilities of the VSUL are:

- Review Common Responsibilities.
- Obtain a briefing from the SUBD or the LSC.
- Participate in Support Branch/Logistics Section planning activities.
- Coordinate development of the Vessel Routing Plan in coordination with the Environmental Unit Leader (ENVL).
- Coordinate vessel transportation assignments with the Protection and Recovery Branch or other sources of vessel transportation.
- Coordinate water-to-land transportation with the Ground Support Unit, as necessary.
- Maintain a prioritized list of transportation requirements that need to be scheduled with the transportation source.
- Support out-of-service vessel resources, as requested.
- Arrange for fueling, dockage, maintenance, and repair of vessel resources, as requested.
- Maintain the Support Vehicle Inventory (ICS 218).
- Ensure vessels are decontaminated prior to demobilization.
- Submit reports to SUBD as directed.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

SECURITY MANAGER (SECM)

The Security Manager (SECM) is responsible for providing safeguards needed to protect personnel and property from loss or damage. The SECM reports to the FACL.

The major responsibilities of the SECM are:

- Review Common Responsibilities.
- Establish contacts with local law enforcement, as required.
- Ensure facility and personnel security requirements are met.
- Develop Security Plan for incident facilities.
- Request required personnel support to accomplish work assignments.
- Ensure security of sensitive material and systems.
- Ensure that support personnel are qualified to manage security problems.
- Adjust Security Plan for personnel and equipment changes and releases.
- Coordinate security activities with appropriate incident personnel.
- Keep the peace, prevent assaults, and settle disputes.
- Prevent theft of all Company and personal property.
- Document all complaints and suspicious occurrences.
- Maintain Unit Log (ICS 214-CG) and forward to the Documentation Unit Leader (DOCL) for disposition.

FINANCE/ADMINISTRATION

Finance/Administration Section Chief (FSC) 4-42

Time Unit Leader (TIME) 4-44

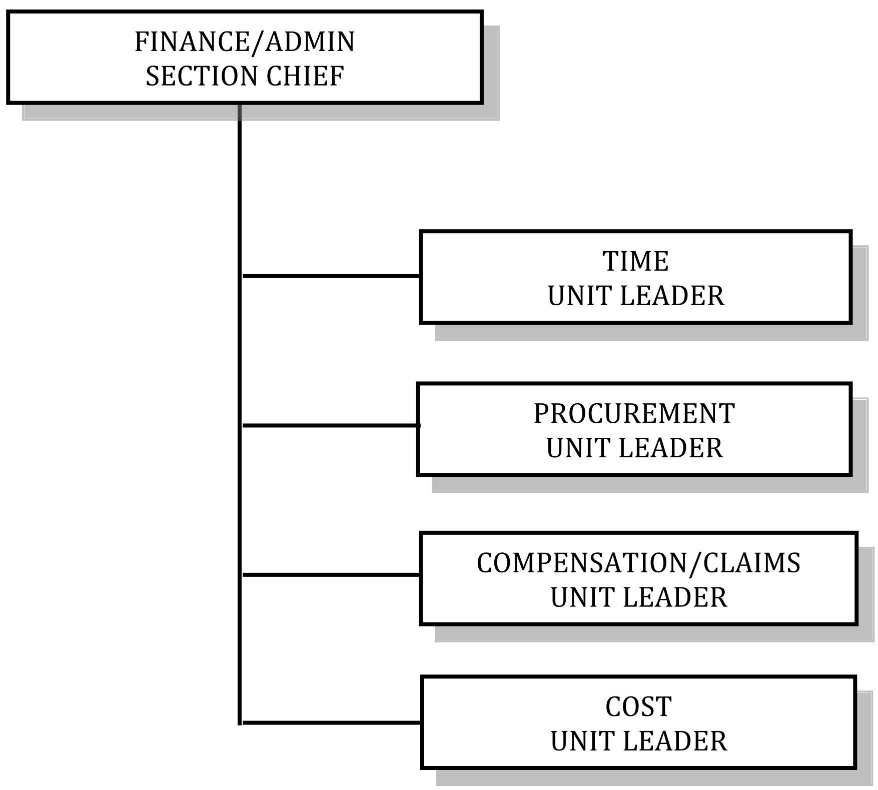
Procurement Unit Leader (PROC) 4-45

Compensation/Claims Unit Leader (COMP) 4-46

Cost Unit Leader (COST) 4-47

Administration Unit Leader (ADMN) 4-48

Property Management Unit Leader (PROP) 4-49



FINANCE/ADMINISTRATION SECTION CHIEF (FSC)

The Finance/Admin Section Chief (FSC) is a member of the General Staff and responsible for all financial, administrative, and cost analysis aspects of the incident and supervising members of the Finance/Admin Section.

The FSC may have Deputy FSCs. The Deputy FSC must have the same qualifications as FSC as they must be ready to take over that position at any time.

The major responsibilities of the FSC are:

- Review Common Responsibilities.
- Participate in incident planning meetings and briefings as required.
- Review operational plans and provide alternatives where financially appropriate.
- Manage all financial aspects of an incident.
- Identify all funding sources and ceilings for the response operation.
- Provide financial and cost analysis information, as requested.
- Gather pertinent information from briefings with responsible agencies.
- Develop an operating plan for the Finance/Admin Section.
- Fill supply and support needs.
- Meet with Assisting and Cooperating Agency Representatives (AREPs), as needed.
- Maintain daily contact with each organization's administrative headquarters on Finance/Admin matters.
- Coordinate with the Resource Unit Leader (RESL) to ensure that all personnel time records are accurately completed.
- Provide financial and administrative input to demobilization planning.
- Ensure that all funding obligation documents initiated at the incident are properly prepared and completed.
- Brief organization administrative personnel on all incident-related financial issues needing attention or follow-up prior to leaving incident.
- Develop recommended list of Section resources to be demobilized and initial recommendation for release when appropriate.

FINANCE/ADMINISTRATION SECTION CHIEF (FSC) (Cont'd)

- Receive and implement applicable portions of the incident Demobilization Plan.
- Participate in Business Management Meeting with the Logistics Section Chief (LSC).
- Actively manage incident funds, differentiating between the various funding sources used to carry out response activities.
- Ensure that financial recording software is open and access to the accounting line is established for the incident.
- Ensure that obligations are entered in financial recording software.
- Conduct Finance Section status meetings as required.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

TIME UNIT LEADER (TIME)

The Time Unit Leader (TIME) is responsible for equipment and personnel time recording and for managing the commissary operations.

The major responsibilities of the TIME are:

- Review Common Responsibilities.
- Determine incident requirements for time recording function.
- Determine resource needs.
- Contact appropriate organization personnel or Agency Representative (AREP) regarding organization-specific time recording requirements.
- Ensure that daily personnel time recording documents are prepared and in compliance with each organizations policy.
- Maintain separate logs for overtime hours.
- Submit cost estimate data forms to the Cost Unit Leader (COST), as required.
- Maintain records security.
- Ensure that all records are current and complete prior to demobilization.
- Release time reports from assisting organization personnel to the respective AREPs prior to demobilization.
- Develop and implement procedures to protect Personally Identifiable Information (PII).
- Brief the FSC on current problems and recommendations, outstanding issues, and follow-up requirements.
- Coordinate with Resource Unit Leader (RESL) to obtain copies of all check in/check out records each day.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

PROCUREMENT UNIT LEADER (PROC)

The Procurement Unit Leader (PROC) is responsible for administering all financial matters pertaining to vendor contracts, leases, and fiscal agreements.

Although the PROC works within the SMT in support of the IC/UC, specific procurement policies, authorities, and procedures, which include emergency authorization procedures to expedite purchases, cannot be circumvented by the IC/UC.

The major responsibilities of the PROC are:

- Review Common Responsibilities.
- Review incident needs and any special procedures with Unit Leaders, as needed.
- Coordinate with local jurisdiction on plans and supply sources.
- Obtain the Incident Procurement Plan.
- Prepare and authorize contracts, building, and land-use agreements.
- Draft memoranda of understanding (MOUs) as necessary.
- Establish contracts and agreements with supply vendors.
- Provide for coordination between the Property Management Unit Leader (PROP) and all procurement organizations supporting the incident.
- Ensure that a system is in place that meets organization property management requirements.
- Ensure proper accounting for all new property.
- Interpret contracts and agreements to resolve disputes within delegated authority.
- Coordinate with the Compensation/Claims Unit for processing claims.
- Coordinate with the SPUL and COST to ensure all obligations are entered in financial recording software and all costs are reconciled prior to demobilization.
- Coordinate with the SPUL to ensure all orders and purchases are screened for possible accountable/reportable property.
- Complete final processing of contracts and send documents for payment.
- Coordinate cost data in contracts with the COST.
- Brief the FSC on current problems and recommendations, outstanding issues, and follow-up requirements.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

COMPENSATION/CLAIMS UNIT LEADER (COMP)

The COMP is responsible for the overall management and direction of all administrative matters pertaining to compensation for injury and claims related activities (other than injury) for an incident.

The major responsibilities of the COMP are:

- Review Common Responsibilities.
- Obtain a briefing from the FSC.
- Establish contact with the incident Medical Unit Leader (MEDL), Safety Officer (SOFR) and Liaison Officer (LOFR).
- Determine the need for Compensation for Injury Specialists (INJRs), and Claims Specialists (CLMS), and order personnel as needed.
- Establish a compensation for injury work area within or as close as possible to the Medical Unit.
- Review the Medical Plan (ICS 206).
- Review and coordinate procedures for handling claims with the Procurement Unit.
- Brief the CLMS on incident activity.
- Periodically review logs and forms produced by the CLMS to ensure that they are complete, entries are timely and accurate, and that they are in compliance with organization requirements and policies.
- Ensure that all Compensation for Injury and Claims logs and forms are complete and routed to the appropriate agency for post-incident processing prior to demobilization.
- Keep the FSC briefed on Compensation/Claims Unit status and activity.
- Demobilize unit in accordance with the Incident Demobilization Plan.
- Maintain Unit Log (ICS 214) and forward to the Documentation Unit Leader (DOCL) for disposition.

COST UNIT LEADER (COST)

The Cost Unit Leader (COST) is responsible for collecting all cost data, performing cost effectiveness analyses, and providing cost estimates and cost saving recommendations for the incident.

The major responsibilities of the COST are:

- Review Common Responsibilities.
- Obtain a briefing from the FSC.
- Coordinate with organization's headquarters on cost reporting procedures.
- Collect and record all cost data.
- Develop incident cost summaries.
- Prepare resources-use cost estimates for the Planning Section.
- Make cost saving recommendations to the FSC.
- Ensure all cost documents are accurately prepared.
- Maintain cumulative incident cost records.
- Ensure cost documentation captures all costs associated with the incident.
- Coordinate with TIME to ensure all personnel and equipment costs are captured.
- Coordinate with the PROC and SPUL to ensure all obligations are entered in financial recording software.
- Complete account reconciliations as required by current Company financial policy.
- Complete all records prior to demobilization.
- Provide reports to the FSC.
- Maintain Unit Log (ICS 214-CG) and forward to the Documentation Unit Leader (DOCL) for disposition.

ADMINISTRATION UNIT LEADER (ADMN)

The Administration Unit Leader (ADMN) is responsible for all administrative personnel issues at a response.

The major responsibilities of the ADMN are:

- Review Common Responsibilities.
- Set up Administration Unit.
- Ensure Administration Unit supports all organization personnel assigned to the SMT.
- Request Administration Unit resources.
- Organize Administration Unit work force.
- Implement use of all necessary personnel management software tools.
- Ensure personnel assignment and organization travel orders are accurate.
- Provide pay and travel support to personnel.
- Ensure reporting personnel meet organization requirements for assignment to the SMT.
- Validate travel orders for all assigned civilian and military personnel.
- Validate time cards for all civilian personnel.
- Establish other organization points of contact (POCs) for non-Company personnel working at incident if not included in the Unit staff.
- Ensure eligible personnel know how to document overtime according to organization policy.
- Process overtime paperwork for appropriate organization signature prior to demobilization from incident.
- Provide advice and recommendations on personnel matters.
- Manage administrative databases and spreadsheets used for analyses and decision making.
- Review, analyze, and provide advice on human resource management issues.
- Ensure compliance with Privacy Act requirements to maintain the confidentiality of personnel documents.
- Maintain Unit Log (ICS 214-CG) and forward to the Documentation Unit Leader (DOCL) for disposition.

PROPERTY MANAGEMENT UNIT LEADER (PROP)

The Property Management Unit Leader (PROP) is responsible for all accountable property procured during a response.

The major responsibilities of the PROP are:

- Review Common Responsibilities.
- Set up property management unit.
- Request Property Management Unit resources.
- Organize Property Management Unit work force.
- Adhere to guidance provided in Company policies.
- Coordinate with the SPUL and PROC to ensure all orders and purchases are screened to identify accountable or reportable property items that would need to be entered into the appropriate organization property tracking software (e.g., Oracle Financial).
- Designate a Property Administrator responsible for entries into property tracking software.
- Ensure documentation is maintained on recorded property to include, but not limited to the Resource Request Message (ICS 213-RR) and invoice.
- Record location of accountable property and complete a physical inventory (including a joint inventory when transferring property to another Property Custodian).
- Depending on the size of the area affected by the incident, designate Property Custodians to ensure logistical control and accountability over the disbursed property.
- Ensure individuals responsible to maintain and monitor the item signs a Custody Receipt for Personal Property Pass (DHS 560-1) or the ICS-219-9A.
- Ensure all property assigned to the incident is appropriately marked and identifies ownership.
- Ensure property assigned to the incident is transferred back to or disposed of in accordance with owning organization regulations or funding source requirements.
- Establish procedures for the use of property passes for accountable and non-accountable property required for field operations.
- Designate custodial areas and property custodians in writing.
- Ensure reportable and/or accountable property is reviewed by the organization that provided the funding before action for disposal is taken.
- Ensure all property documents are available to the organization responsible for reimbursement billing.
- Maintain Unit Log (ICS 214-CG) and forward to the Documentation Unit Leader (DOCL) for disposition.

5.0 SPILL RESPONSE OPERATIONS CENTER AND COMMUNICATIONS

5.a SPILL RESPONSE OPERATIONS CENTER

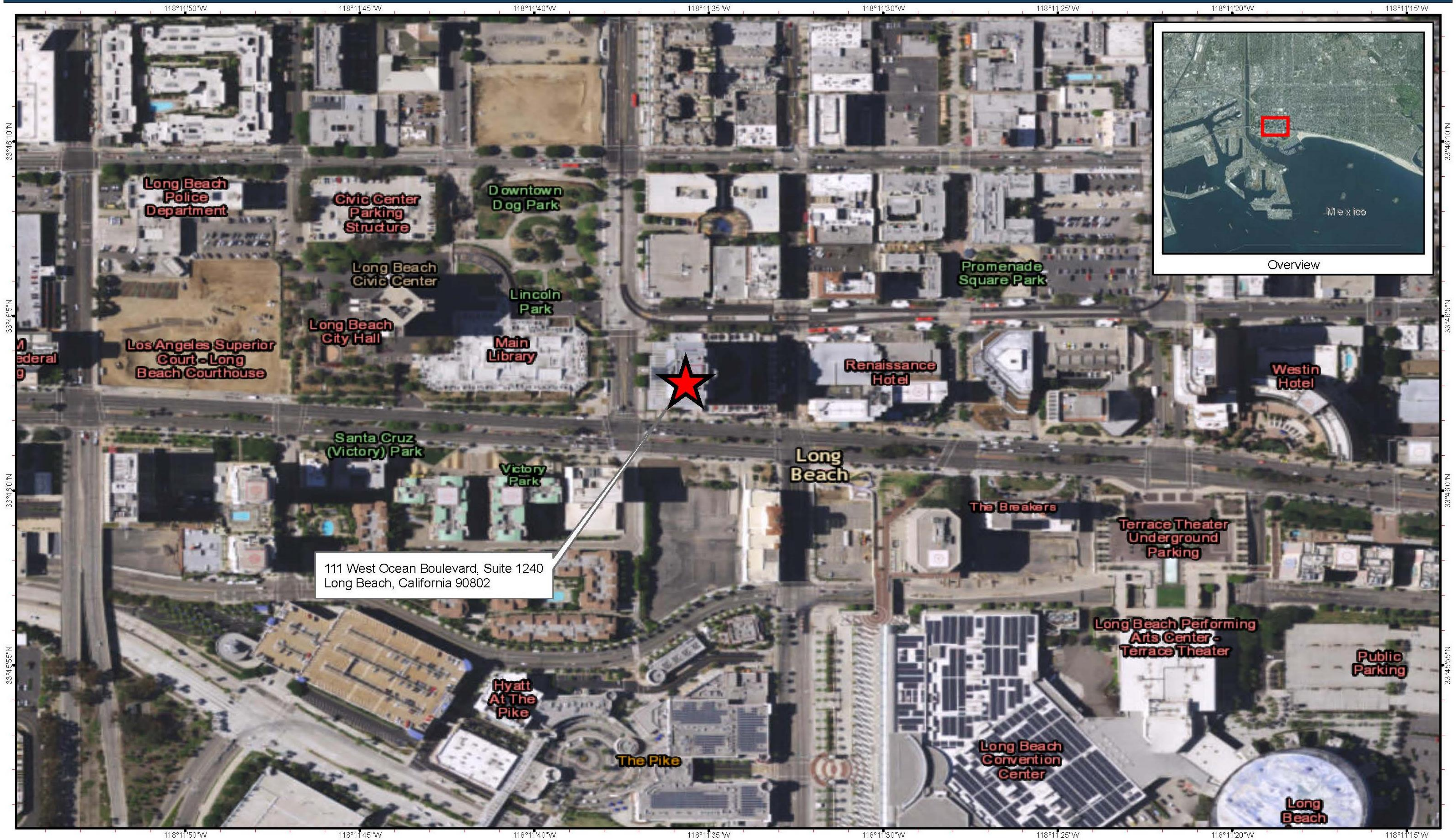
The Spill Response Operations Center/Incident Command Post will be established at the Beta Offshore offices in Long Beach, California. A map of the location is provided below.

WITT | O'BRIEN'S

Map Prepared By; Witt O'Brien's
818 Town & Country Blvd., Houston, Texas 77024
(281)320-9796

Beta Offshore Corporate Office
111 West Ocean Boulevard, Suite 1240
Long Beach, California 90802
Office: (562) 628-1526
Fax: (562) 628-1536 (Main)/(562) 628-9595 (HR)

Incident Command
Post Location



5.b COMMUNICATIONS

Effective and efficient communications systems are essential for emergency response at every level. The communications system will be utilized to gather information and current status reports as well as to provide coordination and direction to widely separated work groups involved in search, containment/diversion, repair, traffic control, public control or evacuation, and restoration.

Communications Equipment

The primary and alternate communication systems used to direct and coordinate response to an oil spill are hand held radios, cellular telephones and land telephone lines. In some cases communication equipment can be enhanced with contract resources as the situation demands.

The Incident Command Post has an ample amount of phones and fax machines for a response.

- ICP Phone (562) 628-1526
- ICP Fax (562) 628-1536

Common frequencies used during marine emergencies are:

CHANNEL	PURPOSE	FREQUENCY (MHz)
PRIMARY		
16	Distress, Safety and Calling	156.800
SECONDARY		
6	Intership Safety	156.300
13	Navigational	156.650
22A	Coast Guard Liaison	157.100
68	Non-Commercial Working	156.475
72	Non-Commercial	156.625
73	Port Operations	156.675
74	Port Operations	156.675
WX1	Weather	162.550
WX2	Weather	162.400
WX3	Weather	162.475

BETA FACILITY COMMUNICATIONS SYSTEM				
TYPE	**LOCATION/CHANNEL**	**CALL SIGN**	**PURPOSE**	**FREQUENCY**
Hand-held Radios	**Elly/Ellen** **Compliance/8** **Safety/8** **Cranes/8** **Wellbay/3** **Operations/3** **Facilities/3** **PICs, Supervisors/3** **Elly Control Rm/3** **Eureka** **Cranes, roustabouts/3** **Wellbay/2** **Operations/2** **Supervisors/2**	**Name of Person**	**Communicate throughout platform and between all platforms**	**UHF (MHz)** **Transmit/Receive** **Ch1 466.46/461.46** **Ch2 461.46/461.46** **Ch3 469.54/464.54** **Ch4 464.54/464.54** **Ch5 459.00/454.00** **Ch6 454.00/454.00** **Ch7 468.63/468.63** **Ch8 455.05/455.05**

BETA FACILITY COMMUNICATIONS SYSTEM (Cont'd)				
TYPE	**LOCATION/CHANNEL**	**CALL SIGN**	**PURPOSE**	**FREQUENCY**
Intercom/PA System	**Throughout Platforms Elly and Ellen**	**NA**	**Paging/Announcements Communicate throughout platform**	**NA**
Intercom/PA System	**Throughout Platform Eureka**	**NA**		**Ext. 709 from Elly, Ellen or LB**
Vessel to Platform Radios (same system as hand-helds and base-stations)	**Elly Control Room** **Eureka Control Room** **Compliance** **Ellen Crane** **Elly Crane** **Crew Boat** **Work Boat** **Eureka East Crane** **Eureka Ctr Crane** **Eureka West Crane** **Fuel Transfer** **Eureka Fuel Transfer**	**12** **19** **15** **3** **9** **43** **47** **284** **282** **283** **13** **19**	**Communication throughout and between platforms and crew/supply boats**	**UHF (MHz)** **Transmit/Receive** **Ch1 466.46/461.46** **Ch2 461.46/461.46** **Ch3 469.54/464.54** **Ch4 464.54/464.54** **Ch5 459.00/454.00** **Ch6 454.00/454.00** **Ch7 468.63/468.63** **Ch8 455.05/455.05**
MSRC hand-held response radio	**Elly Control Room** **Eureka Bldg. 60**		**Platform to MSRC response vessel**	**(Ch 2) UHF 454.00 MHz** ***Compatible with Beta Offshore Hand-held Channel 6***
Marine Radio Channel	**Elly Control Room** **Ellen Compliance Office**		**Communication with ships, boats, Coast Guard**	**Marine band radio 16 (VHF) 129.00 MHz**
Helicopter Radio	**Elly Control Room**	**04 Tango**	**Communication with Helicopter Pilots**	**129.00 MHz**
Emergency Cell Phone	**1) Elly Control Rm** **2) Compliance Office** **3) Eureka**	**- -**	**Alternate Emergency Communication (Power Failure)**	**1) 562-755-3396** **2) 562-755-3455** **3) 562-755-3419**

Communication Types

Radios **-** Handheld, vehicle and vessel mounted radio sets are the most effective means of communication for the field response operation. The units are battery operated, multi-channeled, and have a typical range that will cover the area of the response operation. Additional radio sets and battery packs/charges will be necessary in the event of a prolonged response operation.

Telephone (Cellular) **-** Cellular telephones allow for added mobility and response effectiveness. Cellular phones are commonly maintained by certain Company personnel. Additional cellular phones can be secured in the event of a prolonged response operation.

6.0 SPILL DETECTION AND SOURCE IDENTIFICATION AND CONTROL

6.a PIPELINE SPILL DETECTION AND LOCATION

Leak Detection Systems

All three intra-field pipelines are visually monitored daily for leak detection. In addition, all three intra-field pipelines are equipped with high/low pressure detection devices and shut-in block valves. A new leak detection system was installed in early 2008 on the Bulk Fluids intra-field pipeline between Platforms Eureka and Elly. Its function is based on comparison of fluid flow into versus out of the pipeline. Alarms are initiated if volume balance discrepancies vary beyond specific short term and long term limits.

Leak Size (% of nominal flow)	Detection Time
1.5%	24 hrs
5%	1 hr
≥ 10%	10 min

Table 6.a Estimated Detection times for a selection of leak sizes – Intra-field pipelines.

The 16" San Pedro Bay Pipeline and the onshore Beta Pump Station are continuously monitored by a SCADA system. This includes:

- Automated monitoring and direct reporting of any detected anomalies to the control rooms at Platform Elly and Beta Pump Station (staffed 24 hours/day).
- Leak detection surveillance of the line.
- Regulatory surveillance of the line via a weekly pipeline row survey.

The SCADA system accumulates statistical information concerning the flow difference between inlet and outlet, and will consider generating a leak alarm when the test statistic reaches a certain limit (the alarm threshold). A pattern recognition technique is used to determine whether a leak alarm should be generated when the limit is exceeded.

Detection Time and Accuracy of Leak Rate Estimate
Assuming the following conditions:
Steady state operations (changes less than approximately 5% from present operating conditions)
Repeatability for the instrumentation = 0.5%
Flow meter accuracy = 1%
The following leak size and detection time should be achievable by ATMOS PIPE

6.a PIPELINE SPILL DETECTION AND LOCATION (Cont'd)

Leak Detection System (Cont'd)

Leak Size (% of nominal flow)	Detection Time
1%	50 min
1.67%	25 min
3.33%	10 min
≥ 10%	4 min

Table 6.b Estimated Detection times for a selection of leak sizes - 16" San Pedro Bay Pipeline.

The leak size (% of nominal flow) is based on the observed flow rate of 250 bbls/h from data collected. Leak size estimates are expected to have an accuracy of ±10% of real leak size or better. It should be pointed out that the above performance figures may change depending on the actual instrument performance.

Leak Location Accuracy

As a general rule for the 16" San Pedro Bay Pipeline, the location error decreases exponentially as the leak size increases. Leak location estimation depends on the quality of the measurements. For large leaks (greater than 20% of flow), an accuracy of ±5% of the distance from nearest two pressure meters is achievable.

Surveillance of the line with this leak detection system is conducted at Platform Elly's control room, manned 24 hours per day. The control room operators recognize the alarms generated and respond to each alarm. The specific procedures used by the control room operators are contained in the Beta Operations and Maintenance Manual. This manual lists the normal and abnormal operating procedures for the pipeline. Should the leak detection system become inoperative, routine surveillance of the pipeline is conducted until the system is repaired.

In the event of a leak, the control room operators have the ability to close the platform discharge shutdown valve (ML3). Closure of this valve automatically shuts down the shipping pumps.

In General – For Spill Response - Do Not Delay.

Plan Ahead.

Over-respond and stand down if necessary.

Do not get behind on the curve.

6.b SOURCE CONTROL

INITIAL RESPONSE

- ____ Take appropriate personal protective measures.
- ____ Call for medical assistance if an injury has occurred.
- ____ Restrict access to the site and adjacent area as the situation demands. Take other steps necessary to minimize any threat to health and safety.
- ____ Identify/isolate the source and minimize the loss of product.
- ____ If material is released or a threat of material exists, verify the type of product and quantity released.
- ____ Advise personnel in the area of any potential threat and/or initiate evacuation procedures.
- ____ Use testing and sampling equipment to determine potential safety hazards, as the situation demands.
- ____ Take necessary fire precautions.
- ____ Eliminate possible sources of ignition in the near vicinity of the spill/release, if appropriate.
- ____ Notify Corporate Management of the incident.
- ____ Consider placing Alternative Response Technologies (Dispersant, In-situ Burning) resources on stand-by, including USCG SMART, ADDS Pack, fireboom, and helitorches.
- ____ Activate additional response resources, as necessary, including: response vessels, deck and tank barges, tugs/crew boats, Vessel of Opportunity Skimming Systems, etc.

LINE/VESSEL BREAK OR LEAK OR TANK FAILURE, SPECIFIC RESPONSE

- ____ Consider activation of Facility ESD.
- ____ Shut down pumping equipment.
- ____ Close upstream and downstream block valves.
- ____ Use available air monitoring equipment to test for lack of O2 and/or flammable/toxic atmosphere to ensure that areas are safe to enter for continued response operations.
- ____ Mitigate spreading of the product, as the situation demands. Potential containment/ response strategies include:
  - Spreading sorbent material over the spill
  - Dispersant application
  - In-situ Burning
- ____ Prevent the spill from entering the water to the greatest extent possible.
- ____ Determine the direction and expected duration of spill movement.
- ____ Drain the line section, as the situation demands.
- ____ Request authorities to establish vessel and air traffic control in the area, as the situation demands.
- ____ Make all necessary repairs.
- ____ Return the line to service when repairs are complete.
- ____ Clean up spilled product to eliminate any possible environmental problems.
- ____ If the spill escapes to water, review the location of socio-economic and environmentally sensitive areas. Determine which of these may be threatened by the spill and direct the response operation to these locations. Initiate protection and recovery actions.
- ____ Complete follow-up and written reporting, as the situation demands.

EXPLOSIONS AND/OR FIRE, SPECIFIC RESPONSE

- ____ Shut down Facility operations and mitigate fuel sources (activate ESD).
- ____ Utilize applicable Facility firefighting capability after conducting safety assessment of the area, if appropriate.
- ____ Eliminate possible sources of ignition in the vicinity of the spill/release, if appropriate.
- ____ Initiate Confined Space Entry procedures, as applicable.
- ____ Use available air monitoring equipment to test for lack of O_2 and/or flammable/toxic atmosphere to ensure that areas are safe to enter for continued response operations.
- ____ Notify fire-fighting resources, as the situation demands.
- ____ Evacuate area, as the situation demands.
- ____ Complete follow-up and written reporting, as the situation demands.

6.c. Beta Pump Station Response Strategy for East-Flowing Spill.

<table>
<tr><th>SPILL SCENARIO</th><th>POTENTIAL IMPACTS</th><th>ACTIONS TO BE TAKEN</th></tr>
<tr><td>Spill flows east towards 710 Freeway/Los Angeles River.

Flow heads to storm drain at NE corner of property but could back up at drain.

Pump station on east side of freeway starts up automatically upon detecting fluid and pumps into Los Angeles River.</td><td>Flooding of oil on railroad tracks disrupting industrial commerce.

Roadways shut down for safety.

Commerce into Port of Long Beach disrupted.

Spill to navigable waters, that is, the Los Angeles River.

If tide carries upstream to Anaheim Street, could impact birds there.</td><td>Physically shut down pump on east side of freeway.

Activate Clean Harbors or Patriot Environmental to assist in pump shutdown, notifications, blocking storm drains and containing spill.

Notify City of Long Beach Public Works (Annex O, Table CL-5 Local).

Protective booming by MSRC if spill advances into or backs up into Los Angeles River.
• Entrance to Catalina Cruises berth just northwest of Queensway Bridge.
• Booms off Shoreline Village Lagoon (sensitive area).
• THUMS boom near Production Island Grissom to protect Long Beach Marina.

Recovery/response booming at:
• South of Ocean Blvd. Bridge.
• South of Ocean Blvd. Bridge across to downstream edge of slough into boat launch area of Golden Shore RV Park.
• Across from Reef Restaurant/Island Express Area upstream of Queen Mary to the Long Beach Marina sidewalk/parking lot.
• Downstream edge of Queen Mary breakwater to Long Beach Marina sidewalk/parking lot.

Potential staging areas/locations for vacuum trucks to recover fluids at:
• Golden Shore RV Park.
• Long Beach Marina.</td></tr>
</table>

6.d Beta Pump Station Response Strategy for West-Flowing Spill.

SPILL SCENARIO	POTENTIAL IMPACTS	ACTIONS TO BE TAKEN
Spill flows west toward Pico Avenue to a storm drain located close to southeast corner of property. Storm drain flows underneath Pico Avenue towards northwest draining into berth at Pier D-51 near Forest Terminal.	Potential disruption of port activities.	Activate MSRC to deploy boom. Coordinate boom deployment with responsible agencies and the Port. Ensure notifications made to appropriate Port tenants. Potential staging areas: • CRC/Tidelands (refer to Emergency Placard for contact). • Golden Shores RV Park parking area. • Long Beach Marina.

6.e Beta Pipeline Onshore Spill Response Strategy.

SPILL SCENARIO	POTENTIAL IMPACTS	ACTIONS TO BE TAKEN
Leak from 16-inch pipeline between Queen Mary and Beta Pump Station, OR Leak in one of three 10-inch pipelines from Beta Pump Station to THUMS Manifold.	Disruption of port activities.	Identify and isolate downstream storm drain(s) to prevent/minimize gravity flow into shipping berths. Activate MSRC and other responders immediately.

7.0 QI, SMT, SROT AND OSRO NOTIFICATIONS

7.a REPORTING PROCEDURES

The following internal notifications should be made for each emergency incident to the extent that the incident demands. In no event shall notification be delayed because the immediate supervisor is inaccessible. **Authorization is given to bypass management levels if necessary to provide immediate notification to upper management.** The typical internal notification responsibilities for each person potentially involved in the initial response are as follows:

Incident Observer

☐ **Immediately notify the Platform Superintendent/On-Duty Supervisors (PIC).**

Platform Superintendent / *On-Duty Supervisors (PIC)*

☐ Notify ***Qualified Individual (QI)/Alternate Qualified Individual (AQI)***

☐ Activate ***SoCal Ship Services***

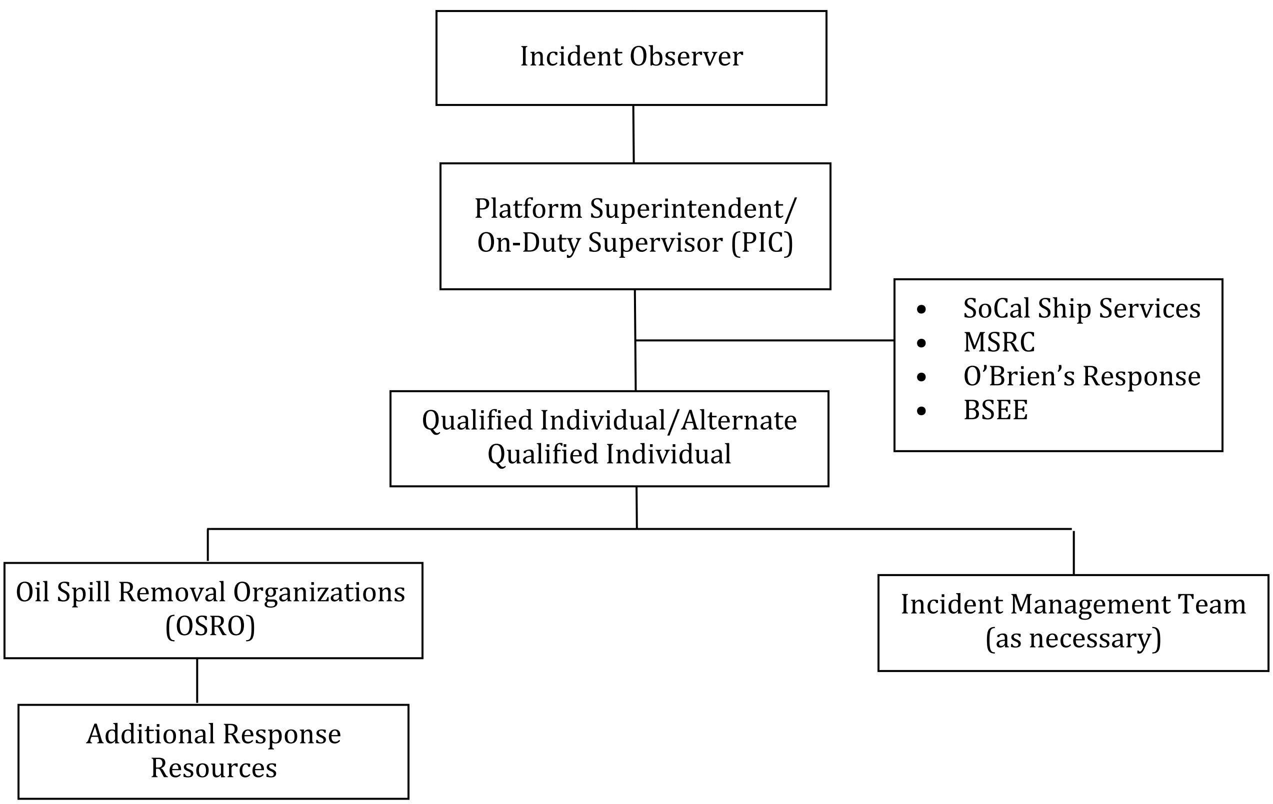
☐ Activate ***MSRC***

☐ Activate ***O'Brien's Response Management (Agency Notifications)***

☐ Notify ***BSEE (Spills >1 barrel)***

☐ Activated additional ***Oil Spill Removal Organizations (OSROs)***

☐ Activate ***Incident Management Team***



7.b.i-iv COMPANY CONTACT INFORMATION

QUALIFIED INDIVIDUALS			
NAME	EMAIL	OFFICE	MOBILE
Dan Steward	dan.steward@amplifyenergy.com	(562) 628-1539	(936) 647-6737
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281

IMT MEMBERS			
NAME	EMAIL	OFFICE	MOBILE
Incident Commander			
Dan Steward	dan.steward@amplifyenergy.com	(562) 628-1539	(936) 647-6737
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Safety Officer			
Rob Hurley, CSP	hurleyr@pacbell.net	Call Mobile	(805) 340-4048
Terry Mullin	terry.mullin@amplifyenergy.com	(562) 606-5720	(562) 685-9902
Information Officer			
Sam Sacco (Strategy & Communications Consultants)	sjsacco87@gmail.com	(510) 594-8575	(510) 541-6449
Kate Conrad	kate.conrad@amplifyenergy.com	(562) 685-9909	(310) 683-3817
Tim O'Leary	toleary@wittobriens.com	(281) 379-7173	(281) 352-7740
Liaison Officer			
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Tim O'Leary	toleary@wittobriens.com	(281) 379-7173	(281) 352-7740

7.b.i-iv COMPANY CONTACT INFORMATION (Cont'd)

IMT MEMBERS (Cont'd)			
NAME	**EMAIL**	**OFFICE**	**MOBILE**
Operations Section Chief			
Ed Rothenay	ed.rothenay@amplifyenergy.com	(562) 606-5705	(562) 755-2674
Paul Napoleone	paul.napoleone@amplifyenergy.com	(562) 606-5705	(562) 708-9046
Rick Armstrong	rick.armstrong@amplifyenergy.com	(562) 628-1534	(310) 560-5281
Ed Turner	eturner@wittobriens.com	(985) 781-0804	(985) 960-0127
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Christian Zumaran	christian.zumaran@amplifyenergy.com	(562) 685-9903	(909) 374-2009
Planning Section Chief			
Diana Lang	diana.lang@amplifyenergy.com	(562) 628-1529	(562) 522-5095
Tom Haug	thaug@wittobriens.com	(985) 781-0804	(562) 217-3511
Dan Sobieski	dsobieski@wittobriens.com	(985) 781-0804	(714) 342-6358
Situation Unit Leader			
Marielle Lomax	marielle.lomax@amplifyenergy.com	(562) 628-1544	(714) 300-9286
Logistics Section Chief			
Lorraine Lopez	lorraine.lopez@amplifyenergy.com	(562) 628-1528 Ext 225	(310) 753-4179
Drew White	drew.white@amplifyenergy.com	(562) 628-1530 Ext 224	(562) 833-3617
Leo Renteria	leo.renteria@amplifyenergy.com	(562) 685-9906 Ext 266	(714) 580-4934
Keith Towler	ktowler@wittobriens.com	(985) 781-0804	(985) 502-0030
Ed Turner	eturner@wittobriens.com	(985) 781-0804	(985) 960-0127
Finance Section Chief			
Veronica Banuelos	veronica.banuelos@amplifyenergy.com	(562) 628-1532 Ext 365	
Keith Towler	ktowler@wittobriens.com	(985) 781-0804	(985) 502-0030

7.c SROT CONTACT INFORMATION

SPILL RESPONSE OPERATING TEAM (SROT)				
CONTRACTOR	**ADDRESS**	**24 HOURS**	**OFFICE**	**FAX**
O'Brien's Response Management	818 Town & Country Blvd., Suite 200 Houston, TX 77024	(985) 781-0804	(281) 320-9796	(281) 320-9700
MSRC	3300 East Spring Street Long Beach, CA 90806	(800) 259-6772 (800) 645-7745	(562) 981-7600	(562) 981-7601

7.d OSRO CONTACT INFORMATION

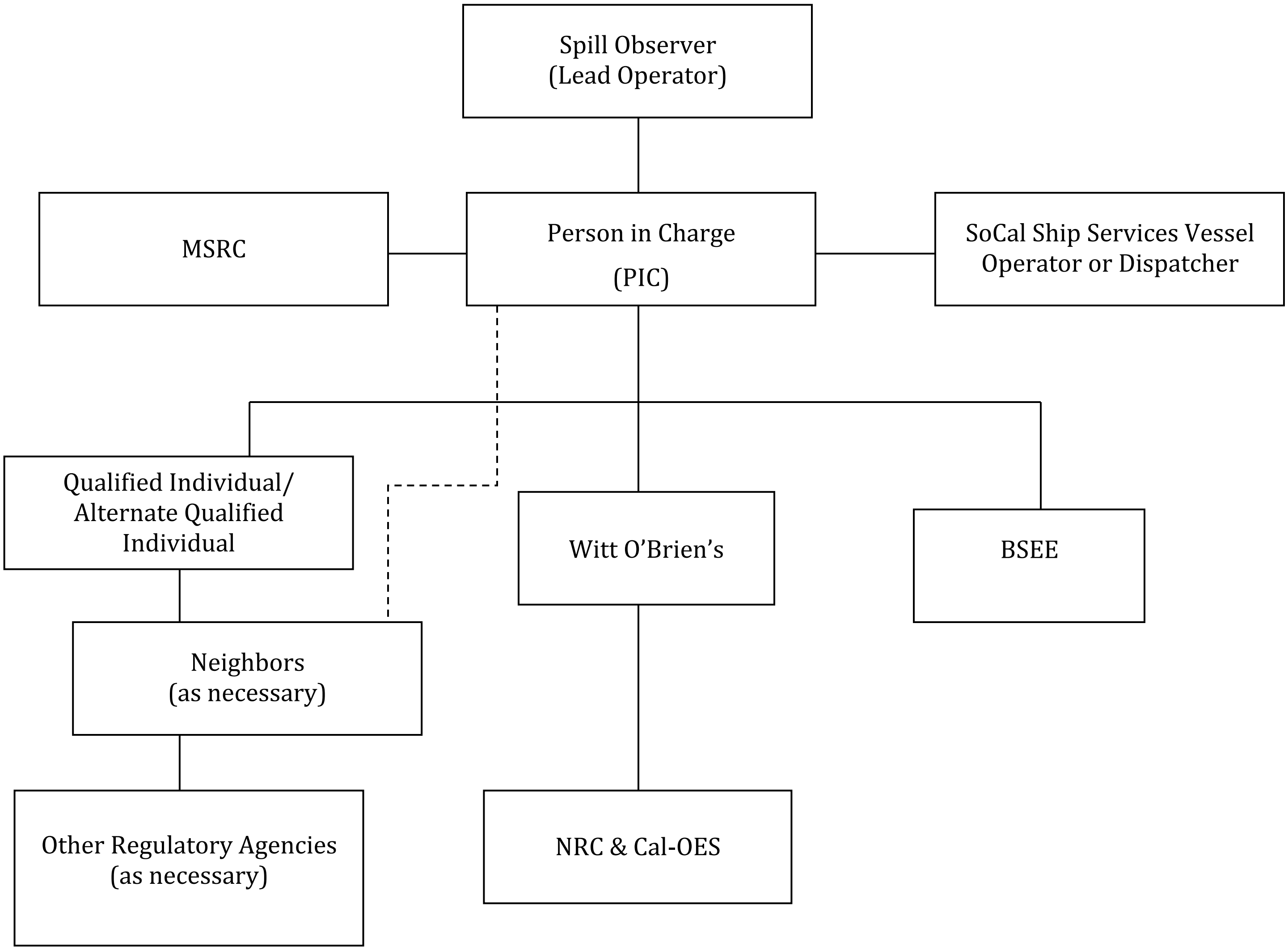
OIL SPILL RESPONSE ORGANIZATION (OSRO)				
CONTRACTOR	**ADDRESS**	**24 HOURS**	**OFFICE**	**FAX**
MSRC	3300 East Spring Street Long Beach, CA 90806	(800) 259-6772 (800) 645-7745	(562) 981-7600	(562) 981-7601
Patriot Environmental Services	508 East E Street, Wilmington, CA 90744	(800) 624-9136	(562) 436-2614	(562) 436-2688
Clean Harbors Environmental Services	2500 East Victoria Street, Compton, CA 90220	(800) 645-8265	(310) 764-5851	

Refer to Appendix F, "Support Services and Supplies", for a directory of additional personnel, materials, and supplies, equipment, and services.

7.e INTERNAL SPILL REPORTING FORMS

For spill reporting forms, see Appendix G, "Notification and Reporting Forms", for copies of appropriate Company Spill Incident Reporting forms.

8.a REPORTING PROCEDURES



8.b.i EXTERNAL CONTACT INFORMATION

U. S. COAST GUARD		
NRC - NATIONAL RESPONSE CENTER		
(CG-5335) - Stop 7581 2100 2nd Street, SW Washington, DC 20593-0001	(800) 424-8802 (202) 267-2675 (202) 267-1322 (Fax)	
REPORTING REQUIREMENTS: TYPE: Any oil discharge that has impacted or threatens to impact navigable waters or release of a hazardous substance in an amount equal to or greater than the reportable quantity. VERBAL: Immediately. WRITTEN: Not Required.		
SECTOR OFFICES / MARINE SAFETY UNITS		
REPORTING REQUIREMENTS: Not Required. Numbers are provided for courtesy notification or to request immediate assistance.		
Sector Los Angeles - Long Beach 1001 S. Seaside Ave., Bldg. 20 San Pedro, CA 90731	(800) 221-8724 (24 Hr) (310) 521-3600	(310) 521-3813 (Fax)

STATE OF CALIFORNIA	
California Office of Emergency Services	
3650 Schriever Ave. Mather, California 95655	(800) 852-7550 (24 Hr)
REPORTING REQUIREMENTS: TYPE: Notify if the spill 1) was greater than 1 barrel OR 2) was greater than 5 gallons if State Fire Marshal jurisdictional OR 3) entered or threatened to enter waters of the state. Notify if the spill involves an extremely hazardous material or CERCLA-listed material over reportable quantities. VERBAL: Initial notification should take place as soon as practicable. According to applicable California laws and regulations (aboveground Petroleum Storage Act, Porter-Cologne Act, and CCR Title 22 - Section 67145) a petroleum spill of 42 gallons (one barrel) or more must be reported immediately. WRITTEN: As may be requested by the agency.	

8.b.ii EXTERNAL CONTACT INFORMATION

BSEE – BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT			
DISTRICT OFFICES			
REPORTING REQUIREMENTS: TYPE: For spill of 1 bbl or more VERBAL: Immediately. WRITTEN: Written report must be submitted to the Pacific Oil Spill Preparedness Division Regional Branch Supervisor within 15 days after spill is stopped or has ceased			
PACIFIC REGION	760 Paseo Camarillo Suite 102 Camarillo, CA 93101	(805) 384-6370 (24 Hr)	(805) 383-6309 (Fax)
PIPELINE SECTION			
REPORTING REQUIREMENTS: TYPE: Any spill or leak involving an OCS pipeline. VERBAL: Immediately. WRITTEN: Written report must be submitted to the Pacific Oil Spill Preparedness Division Regional Branch Supervisor within 15 days after spill is stopped or has ceased			
PACIFIC REGION	760 Paseo Camarillo Suite 102 Camarillo, CA 93101	(805) 384-6370 (24 Hr)	(805) 383-6309 (Fax)

8.b.iii EXTERNAL CONTACT INFORMATION

OTHER POTENTIAL REQUIRED NOTIFICATION	
PHMSA – PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRAION	
Office of Pipeline Safety PHP-30 1200 New Jersey Ave, SE Washington, DC 20590	(202) 366-4595 http://www.pipelineonlinereporting.phmsa.dot.gov
REPORTING REQUIREMENTS: TYPE: Any discharge from a DOT regulated line. VERBAL: Report to NRC within one (1) hour of confirmed discovery. Update report to NRC within 48 hours to include volume released. WRITTEN: Within 30 days submit electronically	
ENVIRONMENTAL PROTECTION AGENCY REGION IX	
75 Hawthorne Street San Francisco, California 94105	(800) 300-2193 (24 Hr) (415) 947-4400 (24 Hr)
REPORTING REQUIREMENTS: TYPE: Immediately for all spills that impact or threaten navigable water or adjoining shoreline. VERBAL: Notification to the EPA is typically accomplished by the call to the NRC. WRITTEN: As the agency may request depending on circumstances.	

8.b.iii EXTERNAL CONTACT INFORMATION (Cont'd)

OTHER POTENTIAL REQUIRED NOTIFICATION (Cont'd)			
STATE OF CALIFORNIA			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
Department of Fish and Wildlife Office of Spill Prevention and Response	4665 Lampson Ave., Suite C Los Alamitos, CA 90720	(562) 342-7212	
CalOSHA	10350 Heritage Park Dr., Suite 20 Santa Fe Springs, CA 90670	(800) 963-9424 (24 Hr)	
California Coastal Commission (CCC)	45 Fremont Street, Suite 2000 San Francisco, CA 94105-2291	(800) 262-7848 (24 Hr)	(415) 904-5200 Office (415) 904-5216 FAX
CCC South Coast District Office	200 Oceanside Blvd., 10th floor Long Beach, Ca 90802	(562) 590-5071	(562) 590-5084 FAX
Cal-EPA Department of Toxic Substance Control	5796 Corporate Avenue Cypress, CA 90630	(800) 852-7550 (CalOES)	(714) 484-5300
California Highway Patrol Southern Division Communications Center	2901 West Broadway Los Angeles, CA 90041	(323) 259-2000	911
CalTrans	1120 "N" Street, Room 3200 Sacramento, CA 95814	(800) 963-9424 (24 Hr)	
CalTrans District 7 - Los Angeles County	100 S. Main Street Los Angeles, CA 90012	(213) 897-3656	
CalTrans District 12 - Orange County	3337 Michelson, Suite CN-380 Irvine, CA 93612	(949) 724-2000	
Department of Conservation, Division of Oil and Gas and Geothermal Resources	5816 Corporate Avenue Cypress, CA 90630-4731	(714) 816-6847	(714) 816-6853 FAX
Regional Water Quality Board Los Angeles County (Region 4)	320 W 4th Street Los Angeles, CA 90013	(213) 576-6600	
Regional Water Quality Board Orange County (Region 8)	3737 Main, Suite 500 Riverside, CA 92501	(951) 782-4130	
State Fire Marshall Pipeline Safety Division	3950 Paramount Blvd., Suite 210 Lakewood, CA 90712	(562) 497-9103	(562) 497-9104 FAX
State Lands Commission Minerals Resource Management	ARCO Towers 200 Oceangate, 12th Floor Long Beach, CA 90802-4471	(562) 590-5201 (24 Hr)	
State Lands Commission Minerals Resource Management	1700 Pacific Coast Highway Huntington Beach, CA 92648	(714) 536-3018	
State Lands Commission Marine Inspection Division	200 Oceangate, Suite 900 Long Beach, CA 90802	(562) 499-6348	
California State Parks Angeles District	1925 Las Virgenes Road Calabasas, CA 91302	(818) 880-0350	

8.b.iii EXTERNAL CONTACT INFORMATION (Cont'd)

OTHER POTENTIAL REQUIRED NOTIFICATION (Cont'd)			
STATE OF CALIFORNIA			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
California State Parks North Sector	18331 Enterprise Lane Huntington Beach, CA 92648	(800) 444-7275	
Huntington State Beach		(714) 536-1454	
Bolsa Chica State Beach		(714) 377-2481	
Huntington City Beach		(714) 536-5280	
California State Parks Orange Coast District	8471 Pacific Coast Highway Laguna Beach, CA 92651	(949) 366-4895	
Crystal Cove State Park		(949) 494-3539	
California State Parks Pendleton Coast District	3030 Avenida Del Presidente San Clemente, CA 92672	(714) 492-0802	
Doheny State Park		(949) 496-6171	
San Clemente State Beach		(949) 492-3156	
San Onofre Beach		(949) 492-4872	
ORANGE COUNTY			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
Public Works	300 N. Flower Street Santa Anna, CA 92703	(714) 667-8800	
Flood Control District	300 N. Flower Street Santa Anna, CA 92703	(714) 834-6192	
Fire Authority	1 Fire Authority Road Irvine, CA 92602	(714) 573-6000	(714) 538-3501 (Emergency) 911
Waste & Recycling	300 N. Flower Street, Suite 400 Santa Anna, CA 92703	(714) 834-4000	(714) 834-4001 FAX
Sanitation District	10844 Ellis Avenue Fountain Valley, CA 92708	(714) 962-2411 (24 Hr)	
Sheriff's Department Emergency Communications Bureau	2644 Santiago Canyon Road Silverado, CA 92676	(714) 647-7000	(949) 770-6011
South Coast Air Quality Management District	21865 Copley Drive Diamond Bar, CA 91765	(800) 288-7664 (24 hr)	(909) 396-2000
City of Huntington Beach Emergency Services	2000 Main Street Huntington Beach, CA 92648	(714) 536-5980	
Huntington Beach Fire Department	18311 Gothard Street Huntington Beach, CA 92648	(714) 536-5411	
Huntington Beach - Beach Operations Supervisor	103 Pacific Coast Highway Huntington Beach, CA 92648	(714) 536-5287	(714) 298-1661 Cell Scott Smith

8.b.iii EXTERNAL CONTACT INFORMATION (Cont'd)

OTHER POTENTIAL REQUIRED NOTIFICATION (Cont'd)			
LOS ANGELES COUNTY			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
Long Beach Emergency Communications and Operations Center	2990 Redondo Avenue long Beach, CA 90806	(562) 570-9250	(562) 570-9254 FAX
Long Beach Public Works environmental Services	2929 E Willow Street Long Beach, CA 90806	(562) 570-2876	(562) 570-2875 FAX
Long Beach Fire Department		(562) 591-7631 (Dispatch)	(562) 570-1286 (Marine Safety Division)
Long Beach Police Department		(562) 435-6711	911
Port of Long Beach Harbor Patrol Dispatch		(562) 590-4185	

PROPERTY OWNERS AND ADJACENT OPERATORS	
OWNER/OPERATOR	**TELEPHONE**
CRC Long Beach Platform Emmy (State Waters)	(714) 969-3206 (714) 969-3287 FAX
CRC Long Beach Company (former OXY,THUMS &Tidelands facilities) 111 W. Ocean Blvd., Suite 800 Long Beach, CA 90802	(562) 624-3452 (Dispatcher, Port of Long Beach area)
Dos Cuadras Offshore Resources, LLC (DCOR) 290 Maple Ct., Suite 290 Ventura, CA 93003	(805) 739-9111
DCOR Spill Coordinator	(805) 535-22072
DCOR Platform Edith	(714) 960-6342 (714) 960-6343 FAX
DCOR Platform Eva (State Waters)	(714) 960-6592 (714) 960-6593 FAX

8.c EXTERNAL SPILL REPORTING FORMS

Refer to Appendix G, Notification and Reporting Forms, for copies of Spill Incident Reporting forms.

9.0 AVAILABLE TECHNICAL EXPERTISE

AGENCY RESOURCES			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
PHMSA - Pipeline and Hazardous Materials Safety Administrations	Office of Pipeline Safety PHP30 1200 New Jersey Ave, SE Washington, DC 20590	(202) 366-4595	(202) 493-2311 (Fax)
Federal Aviation Administration	15000 Aviation Blvd. Lawndale, CA. 90261	(310) 725-3300 (24 Hr)	(310) 725-6849 (FAX)
Flight Service Station (Weather)	Long Beach, CA Hawthorne, CA Orange County, CA	(800) 992-7433 (24 Hr)	(562) 424-0572 (310) 973-8930 (714) 424-0590
National Marine Fisheries Service (NMFS) Marine Mammals	501 West Ocean Blvd., Suite 4200 Long Beach, CA 90802-4213	(562) 980-4000	(562) 980-4081
National Oceanic and Atmospheric Administration (NOAA): Channel Islands National Marine Sanctuary	113 Harbor Way Santa Barbara, CA 93109	(805) 966-7107	
NOAA Injury Assessment Coordinator (Miki Hirano)	501 West Ocean Blvd., Suite 4470 Long Beach, CA 90802	(562) 980-4081	(562) 980-4005
NOAA Scientific Support Coordinator	Alameda, CA	(510) 437-5344	(510) 437-5345 FAX
NOAA Trajectory Analysis	7600 Sandpoint Way NE Bin C15700 Seattle, WA 98115	(206) 526-4911 Emergency	(206) 526-6317 Office (206) 526-6329 FAX (800) 759-8888 PGR PIN 579-8808
National Weather Service	Oxnard, CA	(805) 988-6620	
U.S. Fish and Wildlife Service Endangered Species Recovery	2730 Loker Avenue West Carlsbad, CA 92008	(760) 431-9440	
U.S. Fish and Wildlife Service OCS Coordinator (Steve Schwarzbach)	2800 Cottage Way, Room W-2605 Sacramento, CA 95825-6430	(916) 414-6600	
California Department of Fish and Wildlife - OSPR	4665 Lampson Ave. Suite C Los Alamitos, CA 90720	(562) 342-7212	
California Coastal Commission	45 Fremont Street, Suite 2000 San Francisco, CA 94105-2291	(800) 262-7848	(415) 904-5200 Office (415) 904-5216 FAX
California Coastal Commission South Coast District Office	200 Oceangate Blvd., 10th floor Long Beach, CA 90802	(562) 590-5071	(562) 590-5084 FAX
Cal-EPA Dept. Toxic Substance Control	5796 Corporate Ave. Cypress, CA 90630	(714) 484-5300	
CalOSHA	10350 Heritage Park Drive Suite 201 Santa Fe Springs, CA 90670	(800) 963-9424	
CalTrans	1120 "N" Street, Room 3200 Sacramento, CA 95814	(916) 653-3442 (24 Hr)	
CalTrans District 7 Los Angeles County	100 S. Main Street Los Angeles, CA 90012	(213) 897-3656	

AGENCY RESOURCES (Cont'd)			
AGENCY	**LOCATION**	**OFFICE**	**ALTERNATE**
CalTrans District 12 Orange County	3337 Michelson, Suite CN-380 Irvine, CA 93612	(949) 724-2000	
California division of Oil and Gas and Geothermal Resources	5816 Corporate Avenue Cypress, CA 90630-4731	(714) 816-6847	(714) 816-6853 FAX
LEPC Region 1 Southern Region	4671 Liberty Avenue, Bldg. 283 Los Alamitos, CA 90720	(562) 795-2900	(562) 795-2877 FAX
California Highway Patrol		911	
Los Angeles County: (Region 4) Regional Water Quality Control Board	320 W. 4th Street Los Angeles, CA 90013	(213) 576-6600	
Orange County: (Region 8) Regional Water Quality Control Board	3737 Main, Suite 500 Riverside, CA 92501	(951) 782-4130	
California State Fire Marshall Pipeline Safety Division	3950 Paramount Blvd., Suite 210 Lakewood, CA 90712	(562) 497-9103	(562) 497-9104 FAX
California State Lands Commission Minerals Resource Management	ARCO Towers 200 Oceangate, 12th Floor Long Beach, CA 90802-4471	(562) 590-5201 (24 Hr)	
California State Lands Commission Minerals Resource Management	1700 Pacific Coast Highway Huntington Beach, CA 92648	(714) 536-3018	
California State Lands Commission Marine Inspection Division	200 Oceangate, Suite 900 Long Beach, CA 90802	(562) 499-6348	

SUPPORT SERVICES

DISPERSANT APPLICATION			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
EADC Ed Rosenberg		(888) 323-2148 (24 Hr)	
ENVIRONMENTAL SERVICES			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
MBC - Applied Environmental Science	Costa Mesa, CA	(714) 850-4830	(714) 850-4840 FAX
Cardno	Walnut Creek, CA	(805) 477-5003 (800) 476-5886 (925) 935-9920	
WILDLIFE & MARINE LIFE SPECIALISTS			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Oiled Wildlife Care Network (OWCN) Dr. Mike Ziccardi	Davis, CA	(530) 752-4167 (530) 754-5701 (877) 823-6926 (24 Hr)	(916) 556-7509 Cell (530) 979-7509 Cell www.owcn.org
Wildlife Emergency Services	Moss Landing, CA	(866) 945-3911 (24 Hr)	
Statewide Whale Rescue Team (distressed whales and dolphins)		(877) 767-9425 (24 Hr)	
Fort MacArthur Marine Mammal Care Center (Los Angeles County Marine Wildlife Rescue)	San Pedro, CA	(310) 548-5677	
Pacific Marine Mammal Center (Orange County Marine Wildlife Rescue)	Laguna Beach, CA	(949) 494-3050	
International Bird Rescue Los Angeles Center	San Pedro, CA	(310) 514-2573	
National Marine Fisheries Service (Dead seals, sea lions and sea turtles)	Long Beach, CA	(562) 980-4017	
Los Angeles County Museum of Natural History (Dead whales and dolphins)	Los Angeles, CA	(323) 585-5015	

10.0 SPILL ASSESSMENT

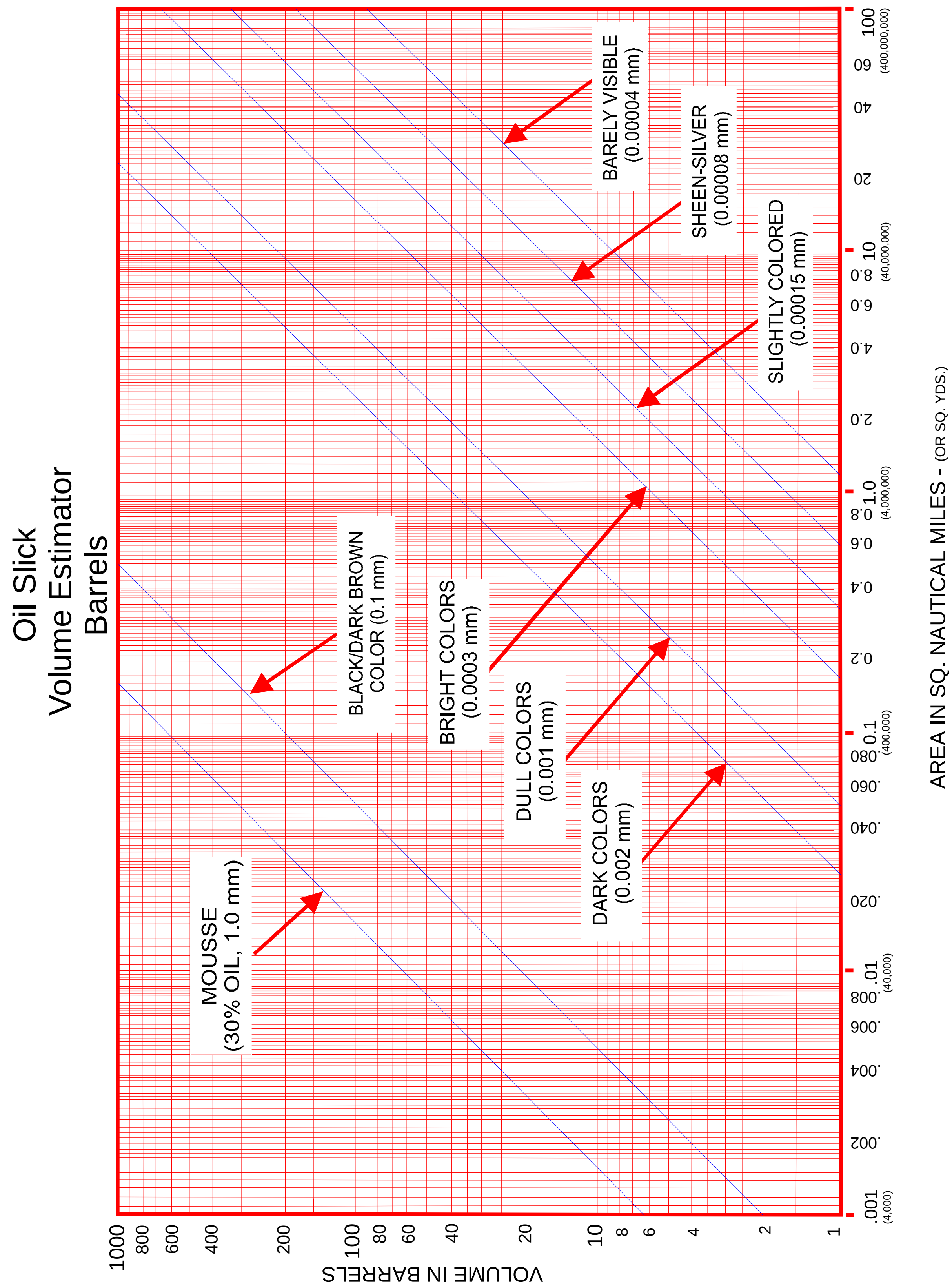
10.a LOCATING A SPILL

Once detected, procedures will be initiated to locate the spill, which include the following:

- Validate sensor activation by field verification, if appropriate.
- Coordination of surveillance by transient resources, such as crew boats, helicopter transports, and commercial vessels.
- Use of infrared and other technology to locate the spill during reduced visibility.
- Employ spill tracking trajectory technology coupled with historic positions of the spill to anticipate current spill location.

10.b DETERMINING THE SIZE AND VOLUME OF A SPILL

Quality spill volume estimates are required to evaluate the equipment and manpower requirements necessary to handle the response. The primary and most accurate method of estimating the spill volume is from tank gauging and/or pump rate estimates (depending on the type of incident which caused the spill). In the event that tank or pump estimates are not available, the secondary method of visual estimation can be performed by analyzing the color and size of the slick and converting that data using the Oil Slick Volume Estimator Chart on the following page.


Oil Slick
Volume Estimator
Barrels
BARELY VISIBLE
(0.00004 mm)
SHEEN-SILVER
(0.00008 mm)
SLIGHTLY COLORED
(0.00015 mm)
BLACK/DARK BROWN
COLOR (0.1 mm)
BRIGHT COLORS
(0.0003 mm)
DULL COLORS
(0.001 mm)
DARK COLORS
(0.002 mm)
MOUSSE
(30% OIL, 1.0 mm)
VOLUME IN BARRELS
AREA IN SQ. NAUTICAL MILES - (OR SQ. YDS.)
1000 800 600 400 200 100 80 60 40 20 10 8 6 4 2 1
.001 (4,000) .002 .004 .006 .008 .01 (40,000) .020 .040 .060 .080 0.1 (400,000) 0.2 0.4 0.6 0.8 1.0 (4,000,000) 2.0 4.0 6.0 8.0 10 (40,000,000) 20 40 60 100 (400,000,000)

10.c PREDICTING SPILL MOVEMENT

Oil spilled on water will react primarily to the effects of wind and current. The oil will tend to spread to a thin layer under the influence of gravity (primary) and chemical (secondary) forces. The following describes the behavior of oil on water:

- Oil will move in the direction and at the rate of the current under negligible wind conditions.
- Oil will move in the direction and at approximately 3.4 % of the velocity of the wind under negligible current conditions.
- The combined effects of wind and current on the oil should be carefully analyzed. A method of vector analysis can be performed to determine the net direction of movement (wind forces can work in addition to, against, or in many other combinations with the current).
- Computer software systems can also be used to predict oil movement. Information needed to perform trajectories, may be provided to the IMT by on-scene personnel or weather services using the form provided in this section.

SPILL INFORMATION NEEDED FOR OIL SPILL TRAJECTORY

Please provide all or part of the following information to ccenter@wittobriens.com as it becomes available.

INCIDENT INFORMATION			
Contact Name:		Company:	
Phone #:		Fax #:	
Alternate #:		E-mail Address:	
Source (*Circle One*): Platform Pipeline Rig Facility Vessel			
Date/Time of Spill (to closest hour):			
Location of Source (Latitude/Longitude):			
Last known location of spill (Latitude/Longitude):			
Appearance of Slick (if known):		Estimated Length and Width:	
Type of Oil (API, if known):		Estimated volume of initial release:	
If continuing release - How much (BPH):		For how long:	
ON-SCENE WEATHER CONDITIONS			
Time:		Air Temperature:	
Wind Direction:		Wind Speed:	
Wave Height:		Water Temperature:	
Current Direction:		Current Speed:	
Cloud Ceiling (feet):		Water Depth (feet):	
Forecast (if known):			
Additional Information:			

10.d MONITORING AND TRACKING THE SPILL MOVEMENT

The primary method of surveillance of a spill for the Facility will be visual. The use of aerial surveillance and surveillance from vessels will generally be adequate to track the movement of the oil. The use of aerial photographs and satellite imagery can also be used, if available, to provide the unified command with further details of oil movement.

Visual monitoring and photography is limited, however, during times of inclement weather and at night. Also, nighttime and inclement weather pose increased danger to aerial surveillance aircraft. The use of aircraft during these periods must be evaluated between the value of the surveillance versus the increased risk to the aircraft.

During nighttime, the most effective surveillance technique is to use an infrared or X-Band systems onboard a vessel. This is the safest surveillance technique; however, it is somewhat less effective.

The use of advanced monitoring equipment such as the integrated X-Band/IR system should be taken into consideration during an oil spill response. Utilizing systems such as these can allow for a more precise recovery by allowing response personnel to operate more efficiently 24 hours a day.

Another form of monitoring is through the use of remote sensing technologies. Remote sensing can provide responders with an overall picture of the affected area, potentially increasing the effectiveness of recovery operations. Different forms of remote sensors can be found in the table which follows.

Witt O'Brien's CommandPro Software maintains and shares spill trajectory and clean-up efforts electronically with individuals in the field. By integrating the data electronically response efforts are maximized.

Remote Sensing Information						
SENSOR TYPE	**CAPABLE OF DETECTING SPILL**	**CAPABLE OF DETERMINING SPILL AREA**	**CAPABLE OF DETERMING SPILL VOLUME**	**CAPABLE OF OPERATING UNDER ALL WEATHER CONDITIONS**	**CAPABLE OF OPERATING DAY AND NIGHT**	**CAPABLE OF MAPPING**
Infrared/Ultraviolet Line Scanner	Yes	Yes	Yes	No	Infrared – Yes Ultraviolet - No	Yes
Side-Looking Airborne Radar	Yes	Yes	No	Yes	Yes	Yes
Microwave Radiometer	Yes	Yes	Yes	Yes	Yes	Yes
Laser Fluorosensor	Yes	No	No	No	Yes	No
Visible Line Scanner	Yes	Yes	Yes	No	No	Yes

*The format and information of this table was gathered from the following source. 1

1 Long, M. (n.d.). *Remote sensing for offshore marine oil spill emergency management, security and pollution control.*

11.0 RESOURCE IDENTIFICATION

Environmental/socio-economic sensitivities are of extreme importance when planning a response effort. The health and safety of the public and the environment, as well as the protection of the various socio-economic sensitivities, must be promptly addressed in order to mitigate the extent of damage and minimize the cost of the clean-up effort.

All environmental/socio-economic sensitivities are worthy of protection, but must be prioritized during a response effort. When making decisions on which areas to designate as collection areas and which to protect, the following sources may be consulted:

- U.S. Fish and Wildlife Service and California Department of Fish and Wildlife
- Applicable Area Contingency Plans
- Other industry and private experts

The environmental and socio-economic sensitivities can be divided into a number of categories. The following summary describes these categories which may be impacted by a discharge:

Environmental:

- Environmentally sensitive areas are prevalent throughout any marine and/or terrestrial environment and may be affected by any potential discharge incident.
- Environmentally sensitive areas subjected to stress and sudden change may be severely damaged. All means of exclusion/diversion should be used to minimize the impact on these areas.

Historical Areas:

- Properties listed in the National Register of Historic Places and Natural Landmarks are included in this category.
- These areas may be boomed or otherwise protected to minimize impact.

Major Recreational Areas:

- A discharge affecting these areas may pose a public safety/health risk during a response effort.
- Shoreline access for personnel and equipment deployment (boats, boom, etc.) is typically available in these areas.

Marinas:

- These areas have a high degree of public exposure (personal and property) and should be boomed for protection.
- Boats and other water deployed equipment can often be deployed and/or obtained in these areas.

Residential Areas:

- These are areas with high public impact and may warrant evacuation in extreme cases.

- Cleanup must be performed with extreme caution due to extensive public exposure.

Commercial Farming/Ranching Areas:

- Commercial farming/ranching areas have the potential of human and livestock impact, as well as socio-economic impact in the potential loss of crops or loss of property use.

Wildlife Management Areas and Refuges:

- These areas have a high degree of exposure to threatened/endangered species and many other types of wildlife.

- Protection booming and clean-up efforts are high priority in these areas.

Endangered/Threatened Species

The U.S. Fish and Wildlife Service (USFWS) and related state agencies classify the status of various wildlife species in the potentially affected states. A summary of critical birds, reptiles, mammals and plant species status as related to the Company's operating areas (area of highest oil spill potential) is presented in this section.

Environmental Sensitivity Maps

This OSRP uses the USCG Sector LA-LB Area Contingency Plan and NOAA's Environmental Sensitivity Index (ESI) Maps as resource identification tools for areas of high economic or environmental importance.

The Environmental Sensitivity Maps located in these resources are to be used as guidelines only. During an actual response effort Federal, State and Local agencies should be contacted to provide further assistance.

These resources are accessible by clicking the following links:

https://www.wildlife.ca.gov/OSPR/Preparedness/LA-LB-Spill-Contingency-Plan

https://response.restoration.noaa.gov/maps-and-spatial-data/environmental-sensitivity-index-esi-maps.html

ENDANGERED/THREATENED SPECIES LISTING

The following is list of endangered and threatened species with known or possible occurrence in Los Angeles and Orange Counties. These counties have the highest potential land impact based on the spill trajectory analysis.

Los Angeles and Orange Counties	
Plants	
Common Name	**Scientific Name**
San Clemente Island bird's-foot trefoil	*Acmispon argophyllus var. adsurgens*
San Clemente Island lotus	*Acmispon dendroideus var. traskiae*
Marsh sandwort	*Arenaria paludicola*
Braunton's milk-vetch	*Astragalus brauntonii*
Ventura Marsh milk-vetch	*Astragalus pycnostachyus var. lanosissimus*
Coastal dunes milk-vetch	*Astragalus tener var. titi*
Nevin's barberry	*Berberis nevinii*
Thread-leaved brodiaea	*Brodiaea filifolia*
Mt. Gleason paintbrush	*Castilleja gleasoni*
San Clemente Island paintbrush	*Castilleja grisea*
Catalina Island mountain-mahogany	*Cercocarpus traskiae*
Salt marsh bird's-beak	*Chloropyron maritimum ssp. maritimum*
San Fernando Valley spineflower	*Chorizanthe parryi var. fernandia*
Santa Susana tarplant	*Deinandra minthornii*
San Clemente Island larkspur	*Delphinium variegatum ssp. kinkiense*
Beach spectaclepod	*Dithyrea maritime*
Slender-horned spineflower	*Dodecahema leptoceras*
Agoura Hills dudleya	*Dudleya cymosa ssp. agourensis*
Marcescent dudleya	*Dudleya cymosa ssp. marcescens*
Santa Monica dudleya	*Dudleya cymosa ssp. ovatifolia*
San Clemente Island bedstraw	*Galium catalinense ssp. acrispum*
Island rush-rose	*Helianthemum greenei*
San Clemente Island woodland star	*Lithophragma maximum*
San Clemente Island bush-mallow	*Malacothamnus clementinus*
Gambel's water cress	*Nasturtium gambelii*
Moran's nosegay	*Navarretia fossalis*
California Orcutt grass	*Orcuttia californica*
Lyon's pantachaeta	*Pentachaeta lyonii*
Santa Cruz Island rock cress	*Sibara filifolia*

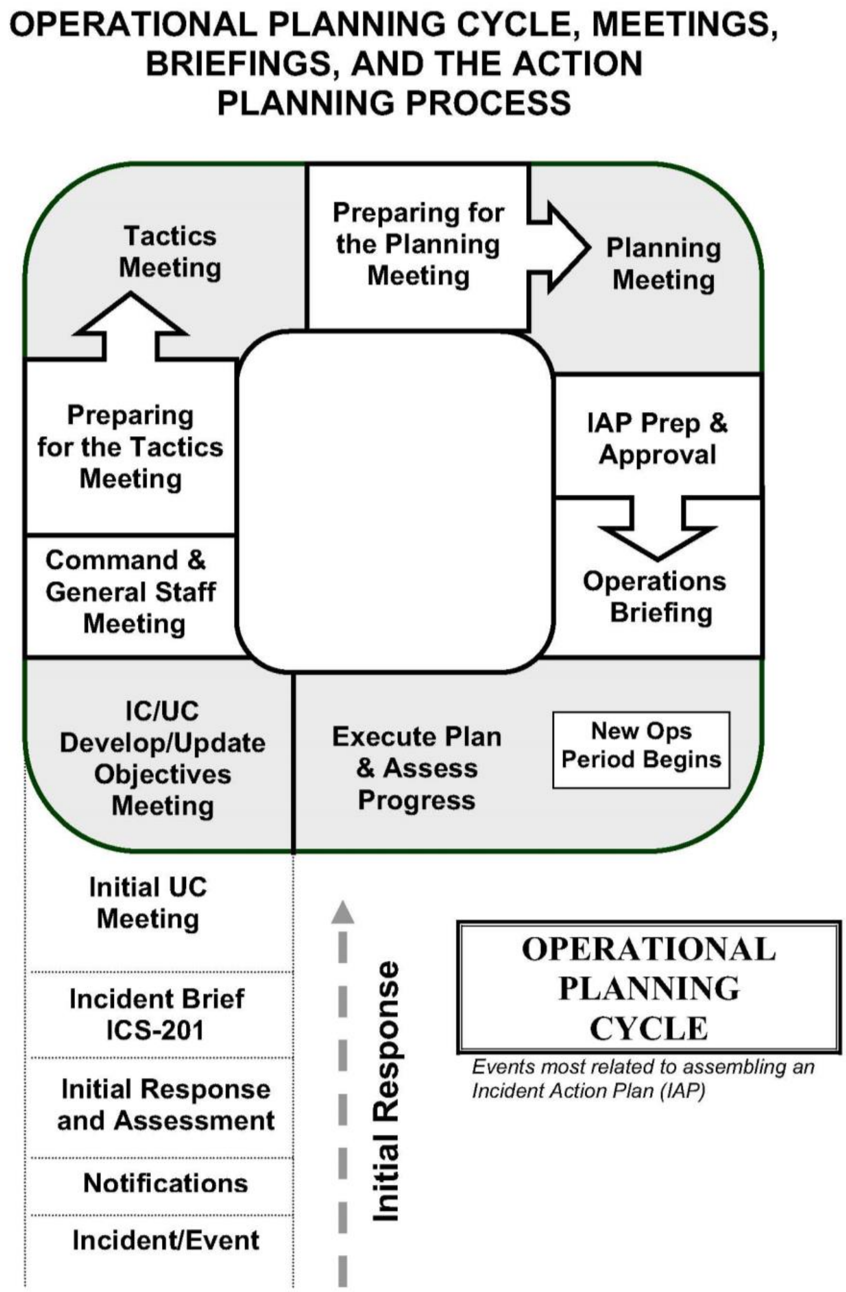
ENDANGERED/THREATENED SPECIES LISTING (Cont'd)

Los Angeles and Orange Counties	
Wildlife	
Common Name	**Scientific Name**
Nelson's antelope squirrel	*Ammospermophilus nelson*
Arroyo toad	*Anaxyrus californicus*
Swainson's hawk	*Buteo swainsoni*
Santa Ana sucker	*Catostomus santaanae*
Western snowy plover	*Charadrius alexandrines nivosus*
Green sea turtle	*Chelonia mydas*
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*
San Bernardino kangaroo rat	*Dipodomys merriami parvus*
Southwestern willow flycatcher	*Empidonax traillii extimus*
Tidewater goby	*Eucyclogibius newberryi*
El Segundo blue butterfly	*Euphilotes battoides allyni*
Unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*
Palos Verdes blue butterfly	*Glaucopsyche lygdamus palosverdesensis*
Desert tortoise	*Gopherus agassizii*
California condor	*Gymnogyps californianus*
Bald eagle	*Haliaeetus leucocephalus*
California black rail	*Laterallus jamaicensis coturniculus*
Southern steelhead – southern California DPS	*Oncorhynchus mykiss irideus*
Belding's savannah sparrow	*Passerculus sandwicensis beldingi*
Pacific pocket mouse	*Perognathus longimembris pacificus*
Coastal California gnatcatcher	*Polioptila californica californica*
California red-legged frog	*Rana draytonii*
Sierra Madre yellow-legged frog	*Rana muscosa*
Mohave tui chub	*Siphateles bicolor mohavensis*
California least tern	*Sternula antillarum browni*
Least Bell's vireo	*Vireo bellii pusillus*
Mohave ground squirrel	*Xerospermophilus mohavensis*

12.0 STRATEGIC RESPONSE PLANNING

Strategic response planning will be dictated by the Incident Command System.

The Incident Command System Planning Cycle, shown below, will be followed to develop and maintain incident action plans.



Initial objectives will be based on the location, volume, weather and other characteristics of the potential spill. Example objectives are shown below.

Safety:

- Provide for the safety and welfare of citizens and response personnel.
- Provide for the safety and security of responders as well as maximize the protection of public health and welfare.
- Identify safety and risk management factors and monitor for compliance for both the public and responders.
- Implement practices that allow for the safety and welfare of the passengers and non-essential crew.
- Conduct Operational Risk Assessment and ensure controls are in place to protect responders and the public.

Oil/HAZMAT Spills:

- Initiate actions to control the source and minimize the volume released.
- Determine oil/hazmat fate and effect (trajectories) identify sensitive areas, develop strategies for protection and conduct pre-impact shoreline debris removal.
- Contain and recover spilled material (Oil/Hazmat).
- Conduct assessment and initiate shoreline cleanup efforts.
- Remove product from impacted areas.
- Conduct efforts to effectively contain, clean up, recover and dispose of spilled product.

Environmental:

- Provide protection of environmental sensitive areas including wildlife and historic properties.
- Identify and maximize the protection of environmental sensitive areas.
- Identify threatened species and prepare to recover and rehabilitate injured wildlife.
- Investigate the potential for and if feasible, utilize alternative technologies to support response efforts.

These example incident objectives were taken from the 2014 USCG Incident Management Handbook.

Witt O'Brien's CommandPro software maintains and shares spill trajectory and clean-up efforts electronically with individuals in the field. By integrating the data electronically, response efforts are maximized.

13.0 RESOURCE PROTECTION METHODS

13.a NEARSHORE/SHORELINE PROTECTION AND CLEANUP ACTIVITIES

The following preparations for dealing with the expected shoreline oil impact should commence.

- Request following resources:
  - Shallow water skimming systems.
  - Tank Barges with tugs.
  - Communications resources.
  - Wildlife Rehabilitation trailer.
  - Wildlife hazing cannons.
- Procure services of Private Contractors to provide additional response equipment dependent upon availability.
- Crew boats to serve as mother ships for each of the contractor manned shoreline boom and cleanup task forces.
- Deck/spud barges and tugs to provide initial logistics platforms for field operations.
- Establish a shoreline forward base camp. Base should have facilities for:
  - Command and communications.
  - Staging area for logistics support.
  - Personnel support (meals and berthing).
  - Helipad/float plane dock.
- Cleanup activities can be found in Section 15.

13.b SHORELINE STRATEGIC PLAN

Based on surveillance flights and trajectory information, the area of shoreline impact should be identified. Boom may be placed at breakwaters, coastal lagoons and wetland inlets to prevent oil from penetrating into the marsh and wetland environment. Booming strategy may include placement of deflection boom in front of the inlet, and angling of the boom inside of the inlets to collect any oil that may pass the deflection boom. Snare boom or viscous sweep may be used along the face of marsh grass and vegetation in areas too large to protect with containment boom.

Shallow water skimmers may be placed at the end of deflection booms and in coastal lagoons and wetland inlets that are especially sensitive and/or natural collecting points. In open shallow water areas, skimmers may be used in a dynamic mode.

Using the Area Contingency Plan environmentally sensitive areas will be prioritized and protected using local OSRO resources. Shallow water equipment will be strategically positioned along the coast to allow for a faster response time once impact has occurred. As the oil gets closer to shore, equipment will be cascaded and funneled into the area most likely impacted, while keeping some equipment in reserve in the event landfall is made in another area. Local Stake Holders will be engaged immediately and their input will be greatly valued in the placement of the booming strategies. If the landscape allows, pre-cleaning of the beaches will be conducted once the oil passes a ten (10) mile "go/no-go" line. This will include pulling the natural debris above the high tide line to minimize its contamination.

Areas that are not sensitive will be assessed for use as collection or diversion areas to enhance the speed of recovery. Equipment necessary for that task will be staged near those locations to reduce the amount of travel time in the event they are activated.

A detailed table summarizing cleanup techniques can be found in this section.

SHORELINE CLEANUP MATRIX

SHORELINE CLEANUP MATRIX Very Light Oil	SHORELINE TYPES											
	Coastal Structures	Bluffs	Fine Sand Beach	Coarse Sand Beach	Shell Beach	Perched Sand Beach	Perched Shell Beach	Sandy Tidal Flat	Muddy Tidal Flat	Forested Swamp	Fresh Marsh	Salt Marsh
CLEANUP METHOD	1	2	3	4	5	6	7	8	9	10	11	12
No Action	A	A	A	A	A	A	A	A	A	A	A	A
Manual Debris Removal	A	A	A	A	P	P	P	P	P	P	P	P
Manual Sediment Removal		P	P	P	P	P	P	P				
Manual Sorbent Application	A	P	P	P	P							
Manual Scraping		P	P	P		P		P				
Manual Vegetation Cutting												
Motor Grader/Elevating Scraper		P	P	P	P							
Elevating Scraper		P	P	P	P							
Motor Grader/Front-End Loader		P	P	P	P							
Front-End Loader: Rubber Tired or - Tracked		P	P	P	P							
Bulldozer: Rubber – Tired Front-End Loader		P	P	P	P							
Backhoe		P	P	P	P							
Beach Cleaner		P	P	P	P							
Dragline/Clamshell		P	P	P	P							
Cold Water Deluge Flooding	A	P	P	P	P	P	P	P	P	A	A	A
Low Pressure Cold Water Washing	A		P	P	P					A	A	A
High Pressure Cold Water Washing	A											
Low Pressure Hot Water Washing	A		P	P	P							
High Pressure Hot Water Washing	A											
Steam Cleaning	A											
Sand Blasting	A											
Vacuum	A	P	P	P	P	P	P	P	P	P	P	P
Trenching/Vacuum		P	P	P	P			P				
Sediment Removal, Cleaning & Replacement												
Push Contaminated Substrate into Surf												
Pavement Breakup												
Disc into Substrate												
Burning												
Chemical Oil Stabilization												
Chemical Protection of Beaches												
Chemical Cleaning of Beaches												
Nutrient Enrichment	P	P	P	P	P	P	P	P	P	P	P	P
Bacterial Enrichment	P	P	P	P	P	P	P	P	P	P	P	P

A (ADVISED) : Method which best achieves the goal of minimizing destruction or injury to the environment.
P (POSSIBLE): Viable and possibly useful but may result in limited adverse effects to the environment.
SHADED AREA: Do not use this method.

SHORELINE CLEANUP MATRIX (Cont'd)

SHORELINE CLEANUP MATRIX Light Oil	SHORELINE TYPES											
	Coastal Structures	Bluffs	Fine Sand Beach	Coarse Sand Beach	Shell Beach	Perched Sand Beach	Perched Shell Beach	Sandy Tidal Flat	Muddy Tidal Flat	Forested Swamp	Fresh Marsh	Salt Marsh
CLEANUP METHOD	1	2	3	4	5	6	7	8	9	10	11	12
No Action	P	P	P	P	P	P	P	P	P	P	P	P
Manual Debris Removal	A	A	A	A	P	P	P	P	P	P	P	P
Manual Sediment Removal		P	P	P	P	P	P	P				
Manual Sorbent Application	A	P	A	A	P	P	P	P	P	P	P	P
Manual Scraping	A	P	A	A	P	P	P	P	P			
Manual Vegetation Cutting											P	P
Motor Grader/Elevating Scraper		P	A	A	P	P	P	P				
Elevating Scraper		P	A	A	P	P	P	P				
Motor Grader/Front-End Loader		P	A	A	P	P	P	P				
Front-End Loader: Rubber Tired or - Tracked		P	A	A	P	P	P	P				
Bulldozer: Rubber – Tired Front-End Loader		P	A	A	P	P	P	P				
Backhoe		P	A	A	P	P	P	P				
Beach Cleaner		P	A	A	P	P	P	P				
Dragline/Clamshell		P	A	A	P	P	P	P				
Cold Water Deluge Flooding	A	P	A	A	P	P	P	P		A	A	A
Low Pressure Cold Water Washing	A	A	A	A	P	P	P	P		P	P	P
High Pressure Cold Water Washing	A			P				P		P	P	P
Low Pressure Hot Water Washing	A	P	P	P	P	P	P	P				
High Pressure Hot Water Washing	A			P				P				
Steam Cleaning	A											
Sand Blasting	A											
Vacuum	A	P	P	P	P	P	P	P	P	P	P	P
Trenching/Vacuum		P	P	P	P			P				
Sediment Removal, Cleaning & Replacement			P	P								
Push Contaminated Substrate into Surf			P	P	P							
Pavement Breakup			P	P	P							
Disc into Substrate			P	P								
Burning												
Chemical Oil Stabilization												
Chemical Protection of Beaches												
Chemical Cleaning of Beaches												
Nutrient Enrichment	P	P	P	P	P	P	P	P	P	P	P	P
Bacterial Enrichment	P	P	P	P	P	P	P	P	P	P	P	P

A (ADVISED) : Method which best achieves the goal of minimizing destruction or injury to the environment.
P (POSSIBLE): Viable and possibly useful but may result in limited adverse effects to the environment.
SHADED AREA: Do not use this method.

SHORELINE CLEANUP MATRIX (Cont'd)

SHORELINE CLEANUP MATRIX Medium Oil	SHORELINE TYPES											
	Coastal Structures	Bluffs	Fine Sand Beach	Coarse Sand Beach	Shell Beach	Perched Sand Beach	Perched Shell Beach	Sandy Tidal Flat	Muddy Tidal Flat	Forested Swamp	Fresh Marsh	Salt Marsh
CLEANUP METHOD	1	2	3	4	5	6	7	8	9	10	11	12
No Action	P	P	P	P	P	P	P	P	P	P	P	P
Manual Debris Removal	A	A	A	A	P	P	P	P	P	P	P	P
Manual Sediment Removal		P	P	P	P	P	P	P				
Manual Sorbent Application	A	P	A	A	P	P	P	P	P	A	A	A
Manual Scraping	A	P	A	A	P	P	P	P	P			
Manual Vegetation Cutting										P	P	P
Motor Grader/Elevating Scraper		P	A	A	P	P	P	P				
Elevating Scraper		P	A	A	P	P	P	P				
Motor Grader/Front-End Loader		P	A	A	P	P	P	P				
Front-End Loader: Rubber Tired or - Tracked		P	A	A	P	P	P	P				
Bulldozer: Rubber – Tired Front-End Loader		P	A	A	P	P	P	P				
Backhoe		P	A	A	P	P	P	P				
Beach Cleaner		P	A	A	P	P	P	P				
Dragline/Clamshell		P	A	A	P	P	P	P				
Cold Water Deluge Flooding	A	A	A	A	P	P	P	P	P	A	A	A
Low Pressure Cold Water Washing	A	P	P	P	P	P	P	P		P	P	P
High Pressure Cold Water Washing	A			P				P				
Low Pressure Hot Water Washing	A	P	P	P	P	P	P	P				
High Pressure Hot Water Washing	A			P				P				
Steam Cleaning	A											
Sand Blasting	A											
Vacuum	A	P	A	A	P	P	P	P	P	P	P	P
Trenching/Vacuum		P	P	A	P			P				
Sediment Removal, Cleaning & Replacement			P	P								
Push Contaminated Substrate into Surf			P	P	P							
Pavement Breakup			P	P	P							
Disc into Substrate			P	P								
Burning	P	P	P	P	P						P	P
Chemical Oil Stabilization	P	P	P	P	P	P	P	P				
Chemical Protection of Beaches	A	P	P	P	P	P	P			P	P	P
Chemical Cleaning of Beaches	A	P	P	P	P	P	P			P	P	P
Nutrient Enrichment	P	P	P	P	P	P	P	P	P	P	P	P
Bacterial Enrichment	P	P	P	P	P	P	P	P	P	P	P	P

A (ADVISED) : Method which best achieves the goal of minimizing destruction or injury to the environment.
P (POSSIBLE): Viable and possibly useful but may result in limited adverse effects to the environment.
SHADED AREA: Do not use this method.

SHORELINE CLEANUP MATRIX (Cont'd)

SHORELINE CLEANUP MATRIX Heavy Oil	SHORELINE TYPES											
	Coastal Structures	Bluffs	Fine Sand Beach	Coarse Sand Beach	Shell Beach	Perched Sand Beach	Perched Shell Beach	Sandy Tidal Flat	Muddy Tidal Flat	Forested Swamp	Fresh Marsh	Salt Marsh
CLEANUP METHOD	1	2	3	4	5	6	7	8	9	10	11	12
No Action	P	P	P	P	P	P	P	P	P	P	P	P
Manual Debris Removal	A	A	A	A	P	P	P	P	P	P	P	P
Manual Sediment Removal		P	P	P	P	P	P	P				
Manual Sorbent Application	A	P	A	A	P	P	P	P	P	A	A	A
Manual Scraping	A	P	A	A	P	P	P	P	P			
Manual Vegetation Cutting										P	P	P
Motor Grader/Elevating Scraper		P	A	A	P	P	P	P				
Elevating Scraper		P	A	A	P	P	P	P				
Motor Grader/Front-End Loader		P	A	A	P	P	P	P				
Front-End Loader: Rubber Tired or - Tracked		P	A	A	P	P	P	P				
Bulldozer: Rubber – Tired Front-End Loader		P	A	A	P	P	P	P				
Backhoe		P	A	A	P	P	P	P				
Beach Cleaner		P	A	A	P	P	P	P				
Dragline/Clamshell		P	A	A	P	P	P	P				
Cold Water Deluge Flooding	A	A	A	A	P	P	P	P	P	A	A	A
Low Pressure Cold Water Washing	A	P	P	P	P	P	P	P		P	P	P
High Pressure Cold Water Washing	A			P				P				
Low Pressure Hot Water Washing	A	P	P	P	P	P	P	P				
High Pressure Hot Water Washing	A			P				P				
Steam Cleaning	A											
Sand Blasting	A											
Vacuum	A	P	A	A	P	P	P	P	P	P	P	P
Trenching/Vacuum		P	P	A	P			P				
Sediment Removal, Cleaning & Replacement			P	P								
Push Contaminated Substrate into Surf			P	P	P							
Pavement Breakup			P	P	P							
Disc into Substrate			P	P								
Burning	P	P	P	P	P						P	P
Chemical Oil Stabilization	P	P	P	P	P	P	P	P				
Chemical Protection of Beaches	A	P	P	P	P	P	P			P	P	P
Chemical Cleaning of Beaches	A	P	P	P	P	P	P			P	P	P
Nutrient Enrichment	P	P	P	P	P	P	P	P	P	P	P	P
Bacterial Enrichment	P	P	P	P	P	P	P	P	P	P	P	P

A (ADVISED) : Method which best achieves the goal of minimizing destruction or injury to the environment.
P (POSSIBLE): Viable and possibly useful but may result in limited adverse effects to the environment.
SHADED AREA: Do not use this method.

14.0 MOBILIZATION AND DEPLOYMENT METHODS

MOBILIZATION

The company relies on its response contracts in order to efficiently mobilize assets during a response effort. These assets include personnel and equipment. The Company will work with their contracted resources to direct the organization of assets during a spill response. This will be handled through the Incident Command System.

The contracted OSROs maintain various staging areas and warehouses throughout the Pacific Coast to respond quickly to any incident.

Contractor Name	City	State
Marine Spill Response Corporation (MSRC)	Long Beach (Terminal Island)	CA
MSRC	Long Beach (Berth 121-Andeavor)	CA
MSRC	Long Beach (Berth 85- Andeavor)	CA
MSRC	Long Beach (Berth 57)	CA
MSRC	Long Beach (Warehouse/Yard)	CA
MSRC	Alamitos Bay	CA
MSRC	El Segundo	CA
MSRC	Port Hueneme	CA
MSRC	Ventura Harbor	CA
MSRC	San Diego (G Street Marina)	CA
MSRC	San Diego (10th Ave Marine Terminal)	CA
MSRC	San Diego (Warehouse/Yard)	CA
MSRC	National City (24th St Marine Terminal)	CA
MSRC	National City (Pier 32 Marina)	CA
MSRC	Santa Barbara	CA
MSRC	Cojo Mooring	CA
Patriot Environmental Services	Wilmington	CA
Patriot Environmental Services	Acton	CA
Patriot Environmental Services	San Diego	CA
Patriot Environmental Services	Santa Paula	CA
Clean Harbors Environmental Services (CHES)	Wilmington	CA
CHES	Compton	CA
CHES	Carson	CA
CHES	Los Angeles	CA
CHES	Camarmillo	CA
CHES	San Diego	CA

DEPLOYMENT

The following is a chart of different modes of transportation and the primary utilization of that transportation.

Methods of Transportation		
Mode of Transportation	Primary Utilization	Vehicle types
Vessels	• Transport Personnel and Equipment to Site • Skimming Operations • Boom Deployment • Physical Cleanup Activities	• Work boats • Crew boats • Tug Boats • Barges
Aircraft	• Transport Personnel and Equipment to Site • Dispersant Operations • Observation • Slick Tracking	• Helicopters • Single Engine Aircraft • Aerial Dispersant
Trucks/Vehicles	• Transport Personnel and Equipment to Staging Areas and Shoreline Cleanup Sites • Vacuum Operations • Haul Waste for Disposal	• Cars • Pickup Trucks • 18 Wheeler Trucks • Vacuum Trucks of Various Sizes

Since each oil spill is different depending on many variables, pre - identifying route is not feasible. The OSRO along with the Unified Command will work to ensure that the above transportation types are used in the most effective and expedient manor. An initial launch site may be used for initial deployment of personnel and equipment. The UC will evaluate the staging areas for capability, location, accessibility and safety to determine if the staging area needs to be relocated, reorganized, or removed. It will be the responsibility of the Logistics Section Chief to ensure that equipment is transported to the spill site by the most expedient means.

VESSEL TRACKING SYSTEMS

All MSRC vessels are required to report their positions every six hours. Additionally, all vessels are equipped with an Automatic Identification System (AIS). The AIS relays vessel information, including position, course and speed, to other vessels and Vessel Traffic Services (VTS) stations.
Vessels of opportunity contracted under MSRC will be trained appropriately to report in every six hours.

15.0 OIL AND DEBRIS REMOVAL PROCEDURES

15.a OFFSHORE PROCEDURES

Authorization to apply dispersant may be given within one hour of providing the FOSC the application document. Therefore, the first sortie may be on scene within three (3) hours of notification, if weather and daylight permits. Sorties may continue through daylight hours as established by the Unified Command.

A safety zone should be established between recovery operations and dispersant operations. Dispersant aircraft may initially attack the leading edge of the slick. Upon arrival, skimming vessels will skim near the spill source. Slick size during the initial hours may not allow for dispersant operations near the platform and skimming operations near leading edge.

In-situ burning may require additional safety zones from other operations. As the slick size increases and more skimming resources arrive, high volume recovery resources will be situated near the source, and dispersant and in-situ burning operations will be conducted in the fresh oil. Highly mobile skimming equipment may be concentrated on the leading edge of the oil.

As the oil moves towards shore, additional skimming vessels will be deployed to conduct skimming operations. Vessels of opportunity will work with the skimmers towing boom to maximize skimming capability. OSRO and third party barges will work in support to provide temporary storage allowing the skimmers to stay in the area of operations as much as possible. Resources deployed in the offshore area will be redirected to work in the near shore area to prevent shoreline impact. A Vessels of Opportunity (VoO) program will be established to identify and train VoO operators on both containment techniques as well as skimming and recovery strategies.

15.b SHALLOW WATER/NEARSHORE PROCEDURES

The following preparations for dealing with the expected shoreline oil impact should commence.

- Request following resources:
  - Shallow water skimming systems.
  - Tank Barges with tugs.
  - Communications resources.
  - Wildlife Rehabilitation trailer.
  - Wildlife hazing cannons.
- Procure services of Private Contractors to provide additional response equipment dependent upon availability.
- Crew boats to serve as mother ships for each of the contractor manned shoreline boom and cleanup task forces.
- Deck/spud barges and tugs to provide initial logistics platforms for field operations.
- Establish a shoreline forward base camp. Base should have facilities for:
  - Command and communications.
  - Staging area for logistics support.
  - Personnel support (meals and berthing).
  - Helipad/float plane dock.

15.b SHALLOW WATER PROCEDURES (Cont'd)

Based on surveillance flights and trajectory information, the area of shoreline impact should be identified. Boom may be placed at breakwaters, coastal lagoons and wetland inlets to prevent oil from penetrating into the marsh environment. Strategies may include placement of deflection boom in front of the inlet, and angling of the boom inside of the inlets to collect any oil that may pass the deflection boom. Snare boom or viscous sweep may be used along the face of marsh grass and vegetation in areas too large to protect with containment boom.

Shallow water skimmers may be placed at the deflection booms and in coastal lagoons and wetland inlets that are especially sensitive and/or natural collecting points. In open shallow water areas, skimmers may be used in a dynamic mode.

A detailed table summarizing cleanup techniques can be found in Section 13.

15c. SHORELINE

Shoreline response measures will vary depending on the makeup of the subject shoreline. Shoreline Cleanup Assessment Teams (SCAT) will be utilized to analyze an affected shoreline and establish cleanup priorities. A Shoreline Treatment Recommendation (STR) will be issued based upon that analysis. The STR will detail procedures to be implemented to effectively address the oiled shoreline in the most appropriate, environmentally sound manner.

Potential practices may include, but are not limited to:

- Protection booming for some or all inlets and inland waterways;
- Hot- or cold-water pressure washing, utilizing different pressures as appropriate;
- Manual removal by response personnel with hand tools;
- Utilization of beach-cleaning machines or heavy equipment such as graders, backhoes and bulldozers;
- Low pressure/high volume flushing into open water for removal using skimmers or vacuum trucks (potentially barge-mounted);
- The use of sorbent materials;
- Controlled burning, in certain exigent circumstances; or
- Passive response (*i.e.* natural dissipation).

FIGURE 15.1

SHORELINE CLEANUP METHODS AND APPLICATION

Approved Physical Methods Include:

1. No Action

OBJECTIVE: No attempt to remove any stranded oil, to minimize impacts to the environment or because there is no proven effective method for cleanup.
DESCRIPTION: No action is taken.
APPLICABLE SHORELINE TYPES: Can be used on all shoreline types.
WHEN TO USE: If the shoreline is extremely remote or inaccessible, when natural removal rates are very fast, or cleanup actions will do more harm than leaving the oil to be removed naturally.
BIOLOGICAL CONSTRAINTS: This method may be inappropriate for areas where high numbers of mobile animals (birds, marine mammals, crabs, etc.) use the intertidal zone or adjacent nearshore waters.
ENVIRONMENTAL EFFECTS:
Intertidal — The same as the oil.
Subtidal — The same as the oil.

2. Manual Removal

OBJECTIVE: Removal of stranded surface oil with hand tools and manual labor.
DESCRIPTION: Removal of surface oil and oily debris by manual means (hands, rakes, shovels, etc.) and placing in containers for removal from the shoreline. No mechanized equipment is used.
APPLICABLE SHORELINE TYPES: Can be used on all shoreline types.
WHEN TO USE: Generally used on shorelines where the oil can be easily removed by this nonmechanical means. Most appropriate for light to moderate oiling conditions.
BIOLOGICAL CONSTRAINTS: Foot traffic over sensitive areas (shellfish beds, algal mats, bird nesting areas, dunes, etc.) is to be restricted. May be periods when shoreline access is restricted (e.g., bird nesting, mammal pupping).
ENVIRONMENTAL EFFECTS:
Intertidal — Minimal if surface disturbance by cleanup activities and work force movement is limited.
Subtidal — None.

3. Passive Collection Sorbents

OBJECTIVE: Removal of oil by sorption onto oleophilic material placed in the intertidal zone.
DESCRIPTION: Sorbent material is placed on the surface of the shoreline substrate allowing it to absorb oil as it is released by tidal or wave action. Oil removal is dependent on the capacity of the particular sorbent, energy available for lifting oil off the shoreline, and degree of weathering.
APPLICABLE SHORELINE TYPES: Can be used on any shoreline type.
WHEN TO USE: When the shoreline oil is mobile and transport of oil is expected on or off the site. The oil must be of a viscosity and thickness to be released by the substrate and absorbed by the sorbent. Often used as a secondary treatment method after gross oil removal, and along sensitive shorelines where access is restricted.
BIOLOGICAL CONSTRAINTS: None, although this method can be slow thus allowing oil to remain in critical habitats during sensitive periods of time.
ENVIRONMENTAL EFFECTS:
Intertidal — None, except for the amount of oil remaining on the shoreline after the sorbents are no longer effective.
Subtidal — None.

4. Debris Removal

OBJECTIVE: Removal of contaminated debris and logs.
DESCRIPTION: Manual or mechanical removal of debris from the upper beachface and the zone above high tide beyond the normal wash of waves. Can include cutting and removal of oiled logs.
APPLICABLE SHORELINE TYPES: Can be used on any shoreline type, where safe access is allowed.
WHEN TO USE: When driftwood and debris is heavily contaminated and, either a potential source of chronic oil releaseor a source of contamination of other organisms on the shoreline.
BIOLOGICAL CONSTRAINTS: Disturbance to adjacent upland areas should be minimized. Foot traffic over sensitive intertidal areas (shellfish beds, algal mats, bird nesting areas, dunes, etc.) is to be restricted. May be periods when shoreline access is restricted (e.g., bird nesting, mammal pupping).
ENVIRONMENTAL EFFECTS:
Intertidal — None.
Subtidal — None.

5. Trenching

OBJECTIVE: Remove subsurface oil from permeable substrates.
DESCRIPTION: Dig trenches to the depth of the oil and remove oil floating on the water table by vacuum pump or super sucker. Water flooding or high-pressure spraying at ambient temperatures can be used to flush oil to the trench.
APPLICABLE SHORELINE TYPES: Can be used on beaches ranging in grain size from fine sand to gravel.
WHEN TO USE: When large quantities of oil penetrate deeply into permeable sediments and cannot be removed by surface flooding. The oil must be liquid enough to flow at ambient temperatures.
BIOLOGICAL CONSTRAINTS: Trenches should not be dug in the lower intertidal when attached algae and organisms are abundant.
ENVIRONMENTAL EFFECTS:
Intertidal — On gravel beaches, there may be a period of beach unstability as the sediments are redistributed after the trenches are filled in.
Subtidal — None.

6. Sediment Removal

OBJECTIVE: Removal of surface oiled sediments.
DESCRIPTION: Oiled sediments are removed by either manually using hand tools or mechanically using various kinds of motorized equipment. The oiled material must be transported and disposed of off-site.
APPLICABLE SHORELINE TYPES: Can be used on any shoreline with surface sediments. On rocky coasts, only manual removal is feasible. Equipment is to be used only on beaches, with special supervision to minimize sediment removal.
WHEN TO USE: When only very limited amounts of oiled sediments have to be removed.
Should not be considered where beach erosion may result. Care should be taken to remove the sediments only to the depth of oil penetration, which can be difficult with heavy equipment.
BIOLOGICAL CONSTRAINTS: Mechanized equipment may be restricted when sensitive habitats are adjacent (e.g., stream mouths, tidal flats, marshes, or dunes).
ENVIRONMENTAL EFFECTS:
Intertidal — The equipment is heavy, and required support personnel is extensive. May be detrimental if excessive sediments are removed without replacement. All organisms resident in the beach will be affected, though the need for removal of the oil may be determined to be the best overall alternative.
Subtidal — Release of oil and fine-grained oily sediments to the water during sediment removal activities and tidal flushing of the excavated beach surface.

7. Cold Water Flooding (Deluge)

OBJECTIVE: To wash surface oil and oil from crevices and rock interstices to water's edge for collection.
DESCRIPTION: A large diameter header pipe is placed parallel to the shoreline above the oiled area. A flexible perforated header hose is used during deluge of intertidal shorelines to better conform to their profiles. Ambient seawater is pumped through holes in the header pipes and flows down the beach face to the water. On porous beaches, water flows through the substrate pushing loose oil ahead of it (or floats oil to the water's surface) then transports the oil down slope for pickup. Flow is maintained as long as necessary to remove the majority of free oil. Oil is trapped by booms and picked up with a skimmer or other suitable equipment.
APPLICABLE SHORELINE TYPES: Beaches with sediments coarser than sand, and gently sloping rocky shorelines. Generally not applicable to mud, sand, vegetated, or steep rocky shorelines.
WHEN TO USE: On heavily oiled shorelines when the oil is still fluid and loosely adhering to the substrate; and where oil has penetrated into cobble or boulder beaches. This method is frequently used in combination with other washing techniques (low or high pressure, cold or warm water).
BIOLOGICAL CONSTRAINTS: Not appropriate at creek mouths. Where the lower intertidal contains rich biological communities, flooding should be restricted to tidal stages when the rich zones are under water, to prevent secondary oiling.
ENVIRONMENTAL EFFECTS:
Intertidal — Habitat may be physically disturbed and smothered as sand and gravel components are washed down slope. Organisms may be flushed into lower tidal zones.
Subtidal — Oiled sediment may be transported to shallow subtidal areas, contaminating them and burying benthic organisms.

8 a. Cold Water/Low Pressure Washing

OBJECTIVE: Remove liquid oil that has adhered to the substrate or man-made structures, pooled on the surface, or become trapped in vegetation.
DESCRIPTION: Low pressure washing with ambient seawater sprayed with hoses is used to flush oil to the water's edge for pickup. Oil is trapped by booms and picked up with skimmers or sorbents. Can be used with a deluge system on beaches to prevent released oil from re-adhering to the substrate.
APPLICABLE SHORELINE TYPES: On heavily oiled gravel beaches, rocky coasts, riprap and seawalls where the oil is still fresh and liquid. Also, in marshes where free oil is trapped.
WHEN TO USE: Where adhered oil is still fresh and must be removed due to continued release of oil.
BIOLOGICAL CONSTRAINTS: May need to restrict use of flushing to certain tidal elevations so that the oil/water effluent does not drain across sensitive low tide habitats. In marshes, use only at high tide and either from boats or the high-tide line to prevent foot traffic in vegetation.
ENVIRONMENTAL EFFECTS:
Intertidal — If containment methods are not sufficient, contamination may be flushed into lower intertidal zone.
Subtidal — Oiled sediment may be transported to shallow subtidal areas, contaminating them and burying benthic organisms.

8 b. Cold Water/High Pressure Washing

OBJECTIVE: Remove oil that has adhered to hard substrates or man-made structures.
DESCRIPTION: Similar to low pressure washing except that water pressure is up to 100 psi. High pressure spray will better remove oil that has adhered to rocks. Because water volumes are typically low, may require placement of sorbents directly below treatment areas.
APPLICABLE SHORELINE TYPES: Rocky shores, riprap, and seawalls. Can be used to flush floating oil or loose oil out of tide pools and between crevices on rocky shores.
WHEN TO USE: When low pressure washing is not effective at removal of adhered oil, which must be removed due to continued release of oil. When directed water jet can remove oil from hard to reach sites. To remove oil from man-made structures for aesthetic reasons.
BIOLOGICAL CONSTRAINTS: May need to restrict use of flushing to certain tidal elevations so that the oil/water effluent does not drain across sensitive low tide habitats.
ENVIRONMENTAL EFFECTS:
Intertidal — Removes many organisms on the surface. May drive oil deeper into the substrate if water jet is improperly applied. If containment methods are not sufficient, contamination may be flushed into lower intertidal zone.
Subtidal — Oiled sediment may be transported to shallow subtidal areas, contaminating them and burying benthic organisms.

9. Warm Water/Moderate-to-High Pressure Washing

OBJECTIVE: Mobilize thick and weathered oil adhered to rock surfaces prior to flushing it to the water's edge for collection.
DESCRIPTION: Seawater heated up to 100° is applied at moderate to high pressure to mobilize weathered oil that has adhered to rocks. The warm water may be sufficient to flush the oil down the beach. If not, "deluge" flooding and additional low or high pressure washing can be used to float the oil to the water's edge for pickup. Oil is trapped by booms and picked up with skimmers or sorbents.
APPLICABLE SHORELINE TYPES: Rocky shores, gravel beaches, riprap, and seawalls that are heavily oiled.
WHEN TO USE: When the oil has weathered to the point that low pressure washing with cold water is not effective at removal of adhered oil, which must be removed due to continued release of oil. To remove oil from man-made structures for aesthetic reasons.
BIOLOGICAL CONSTRAINTS: Must restrict use to certain tidal elevations so that the oil/water effluent does not drain across sensitive low tide habitats (damage can result from exposure to oil, oiled sediments, and warm water). Should be restricted adjacent to stream mouths, tide pool communities, and similar rich intertidal communities.
ENVIRONMENTAL EFFECTS:
Intertidal — Can kill or remove most organisms. If containment methods are not sufficient, contamination may be flushed into lower intertidal zones that would otherwise not be oiled.
Subtidal — Oiled sediment may be transported to shallow subtidal areas, contaminating them and burying benthic organisms.

10. Hot Water/High Pressure Washing

<u>OBJECTIVE:</u> Dislodge trapped and weathered oil from inaccessible locations and surfaces not amenable to mechanical removal.
<u>DESCRIPTION:</u> Water heaters mounted offshore on barges or small land-based units heat water up to 170°F, which is usually sprayed by hand with high pressure wands. Used without water flooding, this procedure requires immediate use of vacuum (vacuum trucks or super suckers) to remove the oil/water runoff. With a deluge system, the oil is flushed to the water surface for collection with skimmers or sorbents.
<u>APPLICABLE SHORELINE TYPES:</u> Rocky shores, gravel beaches, riprap, and seawalls that are heavily oiled.
<u>WHEN TO USE:</u> When the oil has weathered to the point that even warm water at high pressure is not effective at removal of adhered oil, which must be removed due to continued release of oil. To remove oil from man-made structures for aesthetic reasons.
<u>BIOLOGICAL CONSTRAINTS:</u> Restrict use to certain tidal elevations so that the oil/water effluent does not drain across sensitive low tide habitats (damage can result from exposure to oil, oiled sediments, and hot water). Should be restricted near stream mouths, tide pool communities, etc. Released oil must be recovered to prevent further oiling of adjacent environments.
<u>ENVIRONMENTAL EFFECTS:</u>
Intertidal — All attached organisms in the direct spray zone will be removed or killed, and significant mortality of the lower intertidal communities will result even when used properly. Where the intertidal community is rich, the tradeoff between damage to the intertidal community from the hot water washing versus potential damage from leaving the oil has to be weighed.
Subtidal — Oiled sediment may be transported to shallow subtidal areas, contaminating them and burying benthic organisms.

11. Slurry Sand Blasting

<u>OBJECTIVE:</u> Remove heavy residual oil from solid substrates.
<u>DESCRIPTION:</u> Use of sandblasting equipment to remove oil from the substrate. May include recovery of used (oiled) sand in some cases.
<u>APPLICABLE SHORELINE TYPES:</u> Seawalls and riprap. Equipment can be operated from boat or land.
<u>WHEN TO USE:</u> When heavy oil residue is remaining on the shoreline, which needs to be cleaned for aesthetic reasons, and even hot water wash is not effective.
<u>BIOLOGICAL CONSTRAINTS:</u> Not to be used in areas of oyster/clam beds, or areas with high biological abundance on the shoreline directly below or adjacent to the structures.
<u>ENVIRONMENTAL EFFECTS:</u>
Intertidal — Complete destruction of all organisms in the intertidal zone.
Subtidal — Possible smothering of subtidal organisms with sand. When the used sand is not recovered, introduces oiled sediments into the subtidal habitat.

12. Vacuum

OBJECTIVE: Remove free oil pooled on the substrate or from the water surface in sheltered areas.
DESCRIPTION: Use of a vacuum unit with a suction head to recover free oil. The equipment can range from small portable units which fill individual 55-gallon drums to large supersuckers that are truck-mounted and can lift large rocks. Can be used with water spray systems to flush the oil towards the suction head.
APPLICABLE SHORELINE TYPES: Can be used on any shoreline type if accessible. May be mounted offshore on barges, onshore on trucks, or as individual units on boats or ashore at low tide.
WHEN TO USE: When free, liquid oil is stranded on the shoreline (usually along the high-tide line) or trapped in vegetation which is readily accessible.
BIOLOGICAL CONSTRAINTS: Special restrictions should be identified for areas where foot traffic and equipment operation should be limited, such as rich intertidal communities. Operations in wetlands are to be very closely monitored, with a site-specific list of restrictions.
ENVIRONMENTAL EFFECTS:
Intertidal — Minimal impacts if used properly and minimal substrate is removed.
Subtidal — None.

Treatment Methods Requiring RRT Approval

The following methods of treatment and recovery require approval of the Regional Response Team (RRT) prior to initiating the method.

13. Cutting Vegetation

OBJECTIVE: Removal of oiled vegetation to prevent oiling of wildlife.
DESCRIPTION: Manual cutting of oiled vegetation using weed eater, and removal of cut vegetation with rakes. The cut vegetation is bagged immediately for disposal.
APPLICABLE SHORELINE TYPES: Marshes composed of emergent, herbaceous vegetation.
WHEN TO USE: Use when the risk of oiled vegetation contaminating wildlife is greater than the value of the vegetation that is to be cut, and there is no less destructive method to remove or reduce the risk to acceptable levels.
BIOLOGICAL CONSTRAINTS: Strict monitoring of the operations must be conducted to minimize the degree of root destruction and mixing of oil deeper into the sediments. Access to bird nesting areas should be restricted during nesting season.
ENVIRONMENTAL EFFECTS:
Intertidal — Removal of the vegetation will result in loss of habitat for many animals. Cut areas will have reduced plant growth for up to two years. Along exposed section of shoreline, the vegetation may not regrow, resulting in erosion and permanent loss of the habitat. Trampled areas (which is inevitable) will recover much slower.
Subtidal — Long term impacts would be increased sediment load in the subtidal area as a result of increased erosion in the intertidal area.

14 a. Chemical Oil Stabilization with Elastomizers

OBJECTIVE: Solidify or gelatinize oil on the water surface or a beach to keep it from spreading or escaping.
DESCRIPTION: Chemical agent enhancing polymerization of the hydrocarbon molecules applied by semi-liquid spray or as a dry chemical onto the oil in the proper dosage. Depending on the nature and concentration of the polymerizing agent, the oil can be rendered viscoelastic, but still fluid, gelatinous, or semisolid. The primary purpose is to stabilize the oil keeping it from spreading or escaping, causing oiling elsewhere. May reduce the solubility of the light (and more toxic) fractions, by locking them into the polymer. This reduces both air and water exposure. Depending on the beach type and equipment used, recovery may be enhanced. Elastol is an example of an oil stabilizing agent.
APPLICABLE SHORELINE TYPES: Suitable on shorelines of low permeability where heavy oil has pooled on the surface, except vegetated shorelines.
WHEN TO USE: When heavy concentrations of liquid oil are on the substrate and adjacent water body, and physical removal cannot be completed prior to the next tide so that the oil is likely to move to a more sensitive shoreline type. Should be used in conjunction with booming or other physical containment.
BIOLOGICAL CONSTRAINTS: Not suitable for vegetated or riprap shore types. Should be avoided when birds or other wildlife that may be more adversely impacted by the congealed oil cannot be kept away from the treated shoreline. The congealed oil may stick to vegetation and wildlife, increasing physical damage to both. On riprap the congealed oil may remain in crevices where it may hamper recovery and prolong the release of sheens.
ENVIRONMENTAL EFFECTS: May enhance the smothering effect of oil on intertidal organisms. Thus, the treatment should be considered only for heavily oiled beaches where smothering effects are already maximal. The congealed oil may stick to vegetation and wildlife increasing physical damage, such as impaired flight in birds or impaired thermoregulation in mammals and birds whose feathers or fur become oiled.

14 b. Chemical Protection of Beaches

OBJECTIVE: Pretreat shoreline to prevent oil from adhering to the substrate.
DESCRIPTION: Certain types of water-based chemicals, some of which are similar in composition to dispersants, are applied to beaches in advance of the oil.
APPLICABLE SHORELINE TYPES: Coarse- and fine-grained sand beaches, seawalls and piers (particularly piers or waterfront facilities that are of historical significance), eroding bluffs, wavecut platforms, and riprap.
WHEN TO USE: When oil is projected to impact an applicable shoreline, particularly those which have high recreational or aesthetic value.
BIOLOGICAL CONSTRAINTS: May not be suitable for nutrient-rich environments, particularly in confined waters. The toxicity of shoreline treatment products is reportedly much less than that of oil, but the toxicity of each product should be evaluated prior to consideration for use.
ENVIRONMENTAL EFFECTS:
The long-term environmental effects of these procedures are unknown. A toxic effect of the chemical can be anticipated. Additionally, the nutrient load to nearshore and interstitial waters may lead to eutrophication. Whether the predicted reduced residence time of the oil on the beach will increase the survival rate for sessile and interstitial organisms is unknown.

14 c. Chemical Cleaning of Beaches

OBJECTIVE: To increase the efficiency of oil removal from contaminated areas.
DESCRIPTION: Special formulations which can be characterized as weak dispersants are applied to the substrate, as a presoak and/or flushing solution, to soften weathered or heavy oils to aid in the efficiency of flushing treatment methods. The intent is to be able to lower the temperature and pressure required to mobilize the oil from the substrate.
APPLICABLE SHORELINE TYPES: On any shoreline where deluge and water flushing procedures are applicable
WHEN TO USE: When the oil has weathered to the point where it will not flow using warm to hot water. This approach may be most applicable where flushing decreases in effectiveness as the oil weathers.
BIOLOGICAL CONSTRAINTS: Will required extensive biological testing for toxicity and water quality sampling prior to receiving approval for use. The concern is that the treated oil will be dispersed in the water column, and thus impact water column and subtidal organisms. Field tests will be required to show that use of a beach cleaner does not reduce overall recoverability of the oil. Use may be restricted where suspended sediment concentrations are high, adjacent to wetlands and tidal flats, and near sensitive subtidal resources.
ENVIRONMENTAL EFFECTS:
If more oil is dispersed into the water column, there could be more oil sorbed onto suspended sediments and transfered to subtidal habitats, particularly along sheltered shorelines. Intertidal habitats might survive better, if cooler water temperatures are possible.

15. In Situ Burning

OBJECTIVE: Removal of oil from the shoreline by burning.
DESCRIPTION: Oil on the shoreline is burned, usually when it is on a combustible substrate such as vegetation, logs, and other debris. Oil can be burned off of nonflammable substrates with the aid of a burn promoter.
APPLICABLE SHORELINE TYPES: On any shoreline type except tidal flats.
WHEN TO USE: Early in the spill event, after ensuring that the product is ignitable.
BIOLOGICAL CONSTRAINTS: Should only be considered for use in the upper intertidal or supratidal zones since destruction of plants and animals from heat and burn promoters will be extensive. This technique is subject to restrictions and permit requirements established by federal, state and local laws. It should not be used to burn PCB's, wastes containing more than 1,000 ppm of halogenated solvents, or other substances regulated by EPA.
ENVIRONMENTAL EFFECTS:
Little is known about the relative effects of burning oiled wetlands compared to other techniques or natural recovery. Burning may cause significant air pollution, which must be considered when weighing the potential benefits and risks of the technique. The combustion products may travel great distances before deposition.

16. Nutrient Enhancement

OBJECTIVE: To speed the rates of natural microbial degradation of oil by addition of nutrients (specifically nitrogen and phosphorus). Microbial biodegradation is the conversion by microorganisms of dissolved and dispersed hydrocarbons into oxidized products via various enzymatic reactions. Some hydrocarbons are converted to carbon dioxide and cell material, while others are partially oxidized and/or left untouched as a residue.

DESCRIPTION: Nutrients are applied to the shoreline in one of several methods: soluble inorganic formulations which are dissolved in water and applied as a spray at low tide, requiring frequent applications; slow-release formulations which are applied as a solid to the intertidal zone and designed to slowly dissolve; and oleophilic formulations which adhere to the oil itself, thus they are sprayed directly on the oiled areas.

APPLICABLE SHORELINE TYPES: Could be used on any shoreline type where safe access is allowed.

WHEN TO USE: On moderately to heavily oiled shorelines, after other techniques have been used to remove as much oil as possible; on lightly oiled shorelines where other techniques are not effective; and where nutrients are a limiting factor in natural degradation.

BIOLOGICAL CONSTRAINTS: Not applicable in shallow water, restricted embayments where nutrient overloading may lead to eutrophication, or where toxicity of nutrients, particularly ammonia, is of concern. There must be no risk of oxygen depletion. Use is to be restricted adjacent to stream mouths, tide pools, etc. Contact toxicity of oleophilic formulations may restrict areas of direct application. Bioassay test results should be carefully evaluated, as other chemicals in the formulations could be toxic to aquatic organisms.

ENVIRONMENTAL EFFECTS:

Tests in Alaska showed that interstitial oxygen concentrations did not decrease to such an extent that it limited the supply of oxygen available to the bacteria. The fertilizer applications that increased nutrient concentrations and microbial activity did not harm the nearshore environment. About 99 percent of butoxyethanol, a toxic component of the Inipol formulation, (the fertilizer commonly used in Alaska) degraded to nontoxic compounds within 24 hours after Inipol treatments of cobble shorelines. Researchers also found no evidence that the nutrients released from the treated shorelines stimulated algal blooms.

17. Microbial Addition

OBJECTIVE: To speed the rates of natural microbial degradation of oil by addition of nutrients and microbial products. Microbial biodegradation is the conversion by microorganisms of dissolved and dispersed hydrocarbons into oxidized products via various enzymatic reactions. Some hydrocarbons are converted to carbon dioxide and cell material, while others are partially oxidized and/or left untouched as a residue.

DESCRIPTION: Formulations containing hydrocarbon-degrading microbes and fertilizers are added to the oiled area. The argument is made that indigenous organisms will be killed by the oil, so new microbial species need to be added to being the process of biodegradation.

APPLICABLE SHORELINE TYPES: Could be used on any shoreline type where safe access is allowed.

BIOLOGICAL CONSTRAINTS: Not applicable in shallow water, restricted embayments where nutrient overloading may lead to eutrophication, or where toxicity of nutrients, particularly ammonia, is of concern. There must be no risk of oxygen depletion. Use is to be restricted adjacent to stream mouths, tide pool communities, etc. Bioassay test results should be carefully evaluated, as other chemicals in the formulation could be toxic to aquatic organisms.

ENVIRONMENTAL EFFECTS:

Yet to be evaluated for full-scale field applications.

18. Sediment Reworking

OBJECTIVE: Rework oiled sediments to break up the oil deposits, increase its surface area, and mix deep subsurface oil layers, which will expose the oil to natural removal processes and enhance the rate of oil degradation.

DESCRIPTION: Beach sediments are rototilled or otherwise mechanically mixed, with the use of heavy equipment on gravel beaches. The oiled sediments in the upper beach area may also be relocated lower on the beach to enhance natural cleanup during reworking by wave activity (berm relocation).

APPLICABLE SHORELINE TYPES: Should be used only on beaches exposed to significant wave activity. Tillingtype activities work best on beaches with a significant sand fraction; large equipment can be used to relocate sediments up to boulder size.

WHEN TO USE: On beaches with significant amounts of subsurface oil, where sediment removal is unfeasible (due to erosion concerns or disposal problems); also where surface oil deposits have started to form pavements or crusts.

BIOLOGICAL CONSTRAINTS: Could not be used on beaches near shellfish-harvest or fish-spawning areas, or near bird nesting or concentrations areas because of the potential for constant release of oil and oiled sediments. Sediment reworking should be restricted to the upper part of the beach, to prevent disturbance of the biological communities in the lower intertidal area.

ENVIRONMENTAL EFFECTS:

Intertidal — Due to the mixing of oil into sediments, this process could further expose organisms which live below the original layer of oil. Repeated mixing over time could delay the reestablishment of organisms. Relocated sediments would bury and kill organisms. There may be a period of beach unstability as the relocated sediments are redistributed.

Subtidal — There is a potential for release of contaminated sediments to the nearshore subtidal habitats.

19. Shoreline Excavation, Cleansing and Replacement

OBJECTIVE: To remove and clean oiled sediments, then place them on the beach.

DESCRIPTION: Oiled sediments are excavated using heavy equipment on the beach at low tide. The sediments are loaded into a container for washing. Cleansing methods include hot water wash or physical agitation with a cleansing solution. After the cleansing process, the rinsed materials are returned to the original area. Cleaning equipment must be placed close to beaches in order to reduce transportation problems.

APPLICABLE SHORELINE TYPES: Sand- to boulder-sized beaches, depending on the limitations of the cleanup equipment. The beaches must be exposed to wave activity, so that the replaced sediments can be reworked into a natural distribution.

WHEN TO USE: Applicable on beaches with large amounts of subsurface oil, where permanent removal of sediment is undesired and other cleanup techniques are likely to be ineffective.

BIOLOGICAL CONSTRAINTS: Excavating equipment must not intrude upon sensitive habitats. Only the upper and supratidal areas should be considered. Generally restricted in spawning areas. There may be site-specific constraints limiting placement of temporary sediment storage piles. Replaced material must be free of oil and toxic substances. The washing must not change the grain size of the replaced material, either by removal of fines or excessive breakage of friable sediments.

ENVIRONMENTAL EFFECTS:

Intertidal — All resident organisms will be affected, though the need for removal of the oil may be determined to be the best overall solution. Equipment can be heavy, large, and noisy, disrupting wildlife. Transportation to site may entail aircraft, land vehicles, or barges, which contribute to environmental disruption. There may be a period of beach unstability as the replaced sediments are redistributed.

Subtidal — May release oil and fine-grained oily sediments into the water during excavation. This is a concern due to tidal flushing of beach sediments and exposed excavations.

METHODS AND EQUIPMENT USED TO MAXIMIZE EFFECTIVENESS OF ON WATER RECOVERY

In order to maximize the effectiveness and efficiency of response measures, a number of strategies may be implemented depending on the circumstances and response measures being utilized.

Primary efforts will be implemented to maximize encounter rates with recoverable product, regardless of the response strategy (i.e. mechanical recover, in-situ burning or dispersant application). For mechanical recover, "enhanced skimming" strategies may be utilized. With this methodology, two vessels each tow a long strand of containment boom from one end. The free ends are chained together to form an open apex where a skimmer would usually be placed. The vessels tow at a wide distance from each other, channeling the oil on the water to a narrower stream. A second pair of boom tow vessels, outfitted with shorter lengths of boom and a skimmer, trails the first and recovers the product in the narrowed stream, thereby increasing the efficiency of the skimming system. Additional consideration may be given to the utilization of boom vanes, which could potentially allow fewer vessels to accomplish similar results.

All offshore skimming should be augmented with additional storage capacity in the form of tank vessels or barges. Utilizing that storage capacity offshore reduces the offload time for skimming vessels by eliminating transit to a shorebase from the process.

Aerial assets, both fixed wing and rotorcraft, will be utilized as spotters for mechanical recovery, in-situ burning and dispersant application. These aircraft will observe operations from above and direct the movement of surface assets (in the case of mechanical recovery, in-situ burn and vessel-applied dispersant operations) or other aircraft (in the case of aircraft-applied dispersants). This vantage point allows better awareness of slicks than surface observation, thus increasing encounter rate and efficiency for each operation.

When approved, and under the appropriate circumstances, preference will be given to in-situ burning and dispersant application as the primary response strategies. These strategies have proven to have much higher efficiency rates than mechanical recovery. They also employ fewer assets and either eliminate or drastically reduce the need for processing and disposal of oily liquid waste. The ultimate goal is to reduce the number and severity of shoreline impacts. By focusing on the most efficient means available, more oil is taken of the surface, thereby reducing that possibility.

VESSEL TRACKING

A vessel tracking system will be utilized to better coordinate on-water resources. Enhanced coordination leads to more efficient operations, thereby freeing up vessels to be tasked elsewhere and reducing the chances of safety issues due to high vessel traffic and/or numbers of response personnel.

REMOTE SENSING TECHNOLOGIES

Remote sensing technologies such as X-Band or Aptomar systems will be utilized to monitor slicks on the water. These systems are effective at ranges of two to five miles, though that range is dependent upon the height at which the system is mounted.

While these systems can be utilized in certain situations, they are not ideal for tracking and operating at night. The systems may aid in keeping a vessel actively skimming in a slick after dark, but are less useful in locating new locations to skim during those hours.

16.0 OIL AND DEBRIS DISPOSAL PROCEDURES

WASTE MANAGEMENT

The Company has an environmental management system in place to ensure that wastes are properly characterized, evaluated, managed, and disposed of in accordance with state and federal requirements. All permits required to transport or dispose of recovered materials will be obtained by the organizations contracted for transportation or disposal.

OVERVIEW

A major oil spill response would generate significant quantities of waste materials ranging from oily debris and sorbent materials to sanitation water and used batteries. All these wastes need to be classified and separated (i.e., oily, liquid, etc.), transported from the site, and treated and/or disposed of at approved disposal sites. Each of these activities demands that certain health and safety precautions be taken, which are strictly controlled by federal and state laws and regulations. This section provides an overview of the applicable state regulations governing waste disposal, and a discussion of various waste classification, handling, transfer, storage, and disposal techniques. It is the responsibility of the Company's designated Disposal Specialist to manage waste disposal needs during an oil spill cleanup.

WASTE CLASSIFICATION

Solid Wastes

A solid waste is defined as any discarded material provided that it is not specifically excluded under the regulations. These exclusions cover materials such as domestic sewage and mixtures of sewage discharged through a sewer system or industrial wastewater point source discharges.

A discarded material is any material which is abandoned (disposed of, burned or incinerated) or accumulated, stored or treated prior to being abandoned. A discarded material is also any material recycled or any material considered inherently wastelike. Recycled material is considered solid waste when used in a manner constituting disposal, placed on land or burned for energy recovery.

A solid waste may be considered a hazardous waste. A solid waste, as defined above, may be a hazardous waste if it is not excluded from regulation and is either a listed hazardous waste or exhibits the characteristics of a hazardous waste. A solid waste exhibits the characteristics of a hazardous waste if it exceeds the thresholds established in determining the following:

1) ignitability
2) corrosivity
3) reactivity
4) toxicity

A solid waste may also become a hazardous waste if it is mixed with a listed hazardous waste or, in the case of any other waste (including mixtures), when the waste exhibits any of the characteristics identified above.

Oily - Liquid Wastes

Oily liquid wastes (i.e., oily water and emulsions) that would be handled, stored, and disposed of during response operations are very similar to those handled during routine storage and transfer operations. The largest volume of oily liquid wastes would be produced by recovery operations

WASTE CLASSIFICATION (Cont'd)

Oily - Liquid Wastes (Cont'd)

(e.g., through the use of vacuum devices or skimmers). In addition, oily water and emulsions would be generated by vehicle operations (e.g., spent motor oils, lubricants, etc.), and equipment cleaning operations.

Non-Oily - Liquid Wastes

Response operations would also produce considerable quantities of non-oily liquid wastes. Water and other non-oily liquid wastes would be generated by the storage area and stormwater collection systems, vessel and equipment cleaning (i.e., water contaminated with cleaning agents), and office and field operations (i.e., sewage, construction activities).

Oily - Solid/Semi-Solid Wastes

Oily solid/semi-solid wastes that would be generated by containment and recovery operations include damaged or worn-out booms, disposable/soiled equipment, used sorbent materials, saturated soils, contaminated beach sediments, driftwood, and other debris.

Non-Oily - Solid/Semi-Solid Wastes

Non-oily solid/semi-solid wastes would be generated by emergency construction operations (e.g., scrap, wood, pipe, and wiring) and office and field operations (i.e., refuse). Vessel, vehicle, and aircraft operations also produce solid wastes.

WASTE HANDLING

A primary concern in the handling of recovered oil and oily debris is contaminating unaffected areas or recontaminating already cleaned areas. Oily wastes generated during the response operations would need to be separated by type and transferred to temporary storage areas and/or transported to incineration or disposal sites. Proper handling of oil and oily wastes is imperative to ensure personnel health and safety.

Safety Considerations

Care would be taken to avoid or minimize direct contact with oily wastes. All personnel handling or coming into contact with oily wastes would wear protective clothing. A barrier cream can be applied prior to putting on gloves to further reduce the possibility of oily waste absorption. Safety goggles would be worn by personnel involved in waste handling activities where splashing might occur. Any portion of the skin exposed to oily waste would be washed with soap and water as soon as possible. Decontamination zones would be set up during response operations to ensure personnel are treated for oil exposure.

Waste Transfer

During response operations, it may be necessary to transfer recovered oil and oily debris from one point to another several times before the oil and oily debris are ultimately recycled, incinerated or disposed of at an appropriate disposal site. Depending on the location of response operations, any or all of the following transfer operations may occur:

WASTE HANDLING (Cont'd)

Waste Transfer (Cont'd)

- From portable or vessel-mounted skimmers into flexible bladder tanks, storage tanks of the skimming vessel itself, or a barge.
- Directly into the storage tank of a vacuum device.
- From a skimming vessel or flexible bladder to a barge.
- From a vacuum device storage tank to a barge.
- From a barge to a tank truck.
- From a tank truck to a processing system (e.g., oil/water separator).
- From a processing system to a recovery system and/or incinerator.
- Directly into impermeable bags that, in turn, are placed in impermeable containers.
- From containers to trucks.

There are four general classes of transfer systems that may be employed to affect oily waste transfer operations:

- Pumps: Rotary pumps, such as centrifugal pumps, may be used when transferring large volumes of oil, but they may not be appropriate for pumping mixtures of oil and water. The extreme shearing action of centrifugal pumps tends to emulsify oil and water, thereby increasing the viscosity of the mixture and causing low, inefficient transfer rates. The resultant emulsion would also be more difficult to separate into oil and water fractions. Lobe or "positive displacement" pumps work well on heavy, viscous oils, and do not emulsify the oil/water mixture. Double-acting piston and double acting diaphragm pumps are reciprocating pumps that may also be used to pump oily wastes.
- Vacuum Systems: A vacuum truck may be used to transfer viscous oils but they usually pick up a very high water/oil ratio.
- Belt/Screw Conveyors: Conveyors may be used to transfer oily wastes containing a large amount of debris. These systems can transfer weathered debris laden oil either horizontally or vertically for short distances (i.e., 10 feet) but are bulky and difficult to set up and operate.
- Wheeled Vehicles: Wheeled vehicles may be used to transfer liquid wastes or oily debris to storage or disposal sites. These vehicles have a limited transfer volume (i.e., 100 barrels) and require good site access.

Table 16-1 provides a comparative evaluation of 15 types of transfer systems that could be available for transfer operations.

WASTE STORAGE

Interim storage of recovered oil, oily and non-oily waste would be considered to be an available means of holding the wastes until a final management method is selected. In addition, the segregation of wastes according to type would facilitate the appropriate method of disposal. The storage method used would depend upon:

- The type and volume of material to be stored.
- The duration of storage.
- Access.

During an oil spill incident, the volume of oil that can be recovered and dealt with effectively depends upon the available storage capacity. Typical short-term storage options are summarized in Table 16-2. The majority of these options can be used either onshore or offshore. If storage containers such as bags or drums are used, the container must be clearly marked and/or color-coded to indicate the type of material/waste contained and/or the ultimate disposal option. Bladder or pillow tanks would be acceptable, if the available space can support the weight of both the container and the product.

Fuel barges may be the best option for temporary storage of oil recovered in open waters. Depending on size, these vessels may be able to hold up to 6,000 barrels of oil and water. The barge deck can be used as a platform for operating oil spill clean-up equipment and storing containment boom.

Empty barges have four to six feet draft which would increase when these barges are filled with oil or loaded with cargo. Consequently, they may not be able to enter shallow, nearshore waters.

It may be difficult to offload recovered oil stored inside barges. Due to natural forces which affect spilled oil, recovered oil may be very viscous or emulsified, rather than free-flowing. It may be necessary to use steam to heat viscous oil before pumping it from the barge.

Steel or rubber tanks can be used to store oil recovered near the shoreline. To facilitate offloading, demulsifiers may be used to break emulsions prior to placing the recovered substance into the barges or storage tanks.

Use of any site for storage is dependent on the approval of the local authorities. The following elements affect the choice of a potential storage site:

- Geology.
- Ground water.
- Soil.
- Flooding.
- Surface water.

WASTE STORAGE (Cont'd)

- Slope.
- Covered material.
- Capacity.
- Climatic factors.
- Land use.
- Toxic air emissions.
- Security.
- Access.
- Public contact.

Temporary storage sites should use the best achievable technology to protect the environment and human health. They should be set up to prevent leakage, contact, and subsequent absorption of oil by the soil. The sites should be bermed (1 to 1.5 meters high) and double lined with plastic or visqueen sheets 6-10 millimeters or greater in thickness, without joints, prior to receiving loose and bagged debris. The edges of the sheet should be weighted with stones or earth to prevent damage by wind, and the sheet should be placed on a sand layer or an underfelt thick enough to prevent piercing. A reinforced access area for vehicles at the edge of the site should be provided. In addition, the oily debris should be covered by secured visqueen or tarps and an adequate stormwater runoff collection system for the size and location of the site would be utilized. Additionally, the sites should be at least 3 meters above mean sea level.

Oily debris can be hauled to approved temporary storage sites in visqueen lined trucks or other vehicles. Burnable, non-burnable, treatable and re-usable materials can be placed in well defined separate areas at temporary storage sites.

When the last of the oily debris leaves a temporary storage site, the ground protection would be removed and disposed of with the rest of the oily debris. Any surrounding soil which has become contaminated with oil would also be removed for disposal or treatment. If the soils were removed for treatment, they may be replaced if testing proves acceptable levels have been achieved. Treatment and remediation is encouraged when feasible. The temporary storage should be returned to its original condition.

WASTE DISPOSAL

Techniques for Disposal of Recovered Oil

Recovery, reuse, and recycling are the best choices for remediation of a spill, thereby reducing the amount of oily debris to be bermed onsite or disposed of at a solid waste landfill. Treatment is the next best alternative, but incineration and burning for energy recovery have more options within the state. There are some limitations and considerations in incinerating for disposal. Environmental quality of incineration varies with the type and age of the facility. Therefore, when incineration becomes an option during an event, local air quality authorities would be contacted for advice about efficiency and emissions of facilities within their authority. Approval of the local air authorities is a requirement for any incineration option. Landfilling is the last option. Final disposal at a solid or dangerous waste landfill is the least environmentally sound method of dealing with a waste problem such as oily debris.

During an oil spill incident, the Company would consult with the federal and state On Scene Coordinator (OSC) to identify the acceptable disposal methods and sites appropriately authorized to receive such wastes. The Company maintains a list of approved disposal sites that satisfy local, state, and federal regulations and Company requirements. This identification of suitable waste treatment and disposal sites would be prepared by a Disposal Specialist of the Incident Management Team in the form of an Incident Disposal Plan which must be authorized by the U.S. Coast Guard and/or the EPA. An Incident Disposal Plan would include predesignated interim storage sites, segregation strategies, methods of treatment and disposal for various types of debris, and the locations/contacts of all treatment and disposal site selections. Onsite treatment/disposal will be preferred.

In order to obtain the best overall Incident Disposal Plan, a combination of methods should be used. There is no template or combination of methods that can be used in every spill situation. Each incident should be reviewed carefully to ensure an appropriate combination of disposal methods are employed.

The different types of wastes generated during response operations would require different disposal methods. To facilitate the disposal of wastes, they should be separated by type for temporary storage, transport and disposal. Table 16-3 lists some of the options that would be available to segregate oily wastes. The table also depicts methods that may be employed to separate free and/or emulsified water from the oily liquid waste.

The following is a brief discussion of some disposal techniques available for recovered oil and oily debris.

Recycling

This technique entails removing water from the oil and blending the oil with uncontaminated oil. Recovered oil can be shipped to refineries provided that it is exempt from hazardous waste regulations. There it can be treated to remove water and debris, and then blended and sold as a commercial product.

The Disposal Specialist is responsible for ensuring that all waste materials be disposed of at a company approved disposal site.

WASTE DISPOSAL (Cont'd)

Incineration

This technique entails the complete destruction of the recovered oil by high temperature thermal oxidation reactions. There are licensed incineration facilities as well as portable incinerators that may be brought to a spill site. Incineration may require the approval of the local Air Pollution Control Authority. Factors to consider when selecting an appropriate site for onsite incineration would include:

- Proximity to recovery locations.
- Access to recovery locations.
- Adequate fire control.
- Approval of the local air pollution control authorities.

In Situ Burning/Open Burning

Burning techniques entail igniting oil or oiled debris and allowing it to burn under ambient conditions. These disposal techniques are subject to restrictions and permit requirements established by federal, state and local laws. They would not be used to burn PCBs, waste oil containing more than 1,000 parts per million of halogenated solvents, or other substances regulated by the EPA. Permission for *in situ* burning may be difficult to obtain when the burn takes place near populated areas.

As a general rule, *in situ* burning would be appropriate only when atmospheric conditions will allow the smoke to rise several hundred feet and rapidly dissipate. Smoke from burning oil will normally rise until its temperature drops to equal the ambient temperature. Afterwards, it will travel in a horizontal direction under the influence of prevailing winds.

Landfill Disposal

This technique entails burying the recovered oil in an approved landfill in accordance with regulatory procedures. Landfill disposal of free liquids is prohibited by federal law in the United States.

With local health department approval, non-burnable debris which consists of oiled plastics, gravel and oiled seaweed, kelp, and other organic material may be transported to a licensed, lined, approved municipal or private landfill and disposed of in accordance with the landfill guidelines and regulations. Landfill designation would be planned only for those wastes that have been found to be unacceptable by each of the other disposal options (e.g., waste reduction, recycling, energy recovery). Wastes would be disposed of only at company approved disposal facilities. The Disposal Specialist is responsible for ensuring that all waste materials are disposed of at a company approved disposal site. Disposal at a non-approved facility would require approval by the Disposal Specialist prior to sending any waste to such a facility.

16-1

COMPARATIVE EVALUATION OF OIL SPILL TRANSFER SYSTEMS

CHARACTERISTICS OF TRANSFER SYSTEMS	CENTRIFUGAL PUMP	LOBE PUMP	GEAR PUMP	INTERMESCHING SCREW	VALVE PUMP	FLEXIBLE IMPELLER	SCREW/AUGER PUMP	PROGRESSING CAVITY	PISTON PUMP	DIAPHRAGM PUMP	AIR CONVEYOR	VACUUM TRUCK	PORTABLE VACUUM PUMP	CONVEYOR BELT	SCREW CONVEYOR	WHEELED VEHICLES
High Viscosity Fluids	1	5	5	5	3	2	5	5	5	3	5	4	4	5	4	5
Low Viscosity Fluids	5	2	2	2	3	4	1	3	3	4	5	5	5	1	1	5
Transfer Rate	5	2	1	1	3	4	1	2	2	3	4	5	3	2	2	2
Debris Tolerance																
° Silt/Sand	5	3	1	1	1	4	5	5	3	4	5	5	5	5	5	5
° Gravel/Particulate	5	2	1	1	1	2	5	3	2	3	5	5	4	5	4	5
° Seaweed/Stringy Matter	2	3	4	3	2	2	4	4	3	3	4	4	3	5	4	5
Tendency to Emulsify Fluids	1	4	3	3	3	3	5	5	2	5	5	5	5	5	5	5
Ability to Run Dry	5	3	2	1	2	3	4	3	3	2	5	5	5	4	3	
Ability to Operate Continuously	5	3	2	2	2	3	3	3	4	4	3	3	3	3	2	4
Self Priming	1	3	2	2	2	5	1	5	4	4	5	5	5	5	5	
Suction/Head	2	3	2	2	3	4	1	5	5	2	5	4	3			
Back Pressure/Head	1	5	5	5	4	3	4	5	2	4	1	1	1	3	3	
Portability	5	3	3	2	4	4	3	2					2	1	1	
Ease of Repair	5	3	2	2	3	4	3	2	3	5	1	1	2	3	2	3
Cost	5	B	2	2	3	3	1	2	3	5	1	1	2	2	2	3
Comments	E,J	B	B	B,J		F	A	B	B,D	A,C,D	F,G,I	F,G,I	F,G			G,H,I

KEY TO RATINGS: 5 = Best; 1 = Worst

KEY TO COMMENTS:

A. Normally require remote power sources, thus are safe around flammable fluids.
B. Should have a relief valve in the outlet line to prevent bursting hoses.
C. Air powered units tend to freeze up in sub-freezing temperatures.
D. Units with work ball valves are difficult to prime.
E. Some remotely powered types are designed to fit in a tanker's butterworth hatch.
F. Can also pump air at low pressure.
G. Transfer is batch-wise rather than continuous.
H. Waste must be in separate container for efficient transfer.
I. Transportable with its own prime mover.
J. High shear action tends to emulsify oil and water mixtures.

16-2

TEMPORARY STORAGE METHODS

CONTAINER	ONSHORE	OFFSHORE	SOLIDS	LIQUIDS	NOTES
Barrels	x	x	x	x	May require handling devices. Covered and clearly marked.
Tank Trucks	x	x		x	Consider road access. Barge-mounted offshore.
Dump/Flat Bed Trucks	x		x		May require impermeable liner and cover. Consider flammability of vapors at mufflers.
Barges		x	x	x	Liquids only in tanks. Consider venting of tanks.
Oil Storage Tanks	x	x		x	Consider problems of large volumes of water in oil.
Bladders	x	x		x	May require special hoses or pumps for oil transfer.

16-3

OILY WASTE SEPARATION AND DISPOSAL METHODS

TYPE OF MATERIAL	SEPARATION METHODS	DISPOSAL METHODS
LIQUIDS		
Non-emulsified oils	Gravity separation of free water	Incineration Use of recovered oil as refinery/production Terminal feedstock
Emulsified oils	Emulsion broken to release water by: • heat treatment • emulsion breaking • chemicals • mixing with sand • centrifuge • filter/belt press	Use of recovered oil as refinery/production Terminal feedstock
SOLIDS		
Oil mixed with sand	Collection of liquid oil leaching from sand during temporary storage Extraction of oil from sand by washing with water or solvent Removal of solid oils by sieving	Incineration Use of recovered oil as refinery/production Terminal feedstock Direct disposal Stabilization with inorganic material Degradation through land farming or composting
TYPE OF MATERIAL	**SEPARATION METHODS**	**DISPOSAL METHODS**
Oil mixed with cobbles or pebbles	Screening Collection of liquid oil leaching from materials during temporary storage Extraction of oil from materials by washing with water or solvent	Incineration Direct Disposal Use of recovered oil as refinery/production Terminal feedstock
Oil mixed with wood, seaweed and sorbents	Screening Collection of liquid oil leaching from debris during temporary storage Flushing of oil from debris with water	Incineration Direct disposal Degradation through land farming or composting for oil mixed with seaweed or natural sorbents
Tar balls	Separation from sand by sieving	Incineration Direct disposal

16-4

OFF-SITE RECEIVING FACILITIES OF RCRA HAZARDOUS WASTE

CALIFORNIA			
Company	**City**	**Phone**	**EPA ID**
Clean Harbors Wilmington, LLC	Wilmington, CA	(310) 835-9998	CAD44429835
Clean Harbors Buttonwillow, LLC	Buttonwillow, CA	(661) 762-6200	CAD980675276
Clean Harbors Westmorland, LLC	Westmorland, CA	(760) 344-9400	CAD000633164

17.0 WILDLIFE REHABILITATION PROCEDURES

The Company will work with Federal, State and local agency personnel to provide labor and transportation to retrieve clean and rehabilitate birds and wildlife affected by an oil spill, as necessary. Oversight of wildlife preservation activities and coordination with Federal, State and local agencies during an oil spill is the responsibility of the IC. Response personnel should contact their supervisor should they encounter oiled wildlife or carcasses.

Several factors should be considered at the beginning of an oil spill in regards to protecting wildlife including:

- The type of oil spilled,
- The location of the spill,
- The species of wildlife in the area,
- The timing of breeding cycles and seasonal migrations,

Endangered/Threatened Species

The U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife classify the status of various wildlife species in the potentially affected states.

Wildlife Rescue and Rehabilitation

The following items should be considered for wildlife rescue and rehabilitation during a spill response:

- Great care should be taken during an oil spill to minimize the impact to sea turtles, including:
    - Allowing response personnel to thoroughly examine burn boxes for sea turtles prior to burning oil.
    - If snare boom is utilized, it is recommended to run the boom perpendicular to shore rather than parallel placing it no closer than 250 feet apart along the beach.
    - Relocation and rehabilitation should be performed by trained personnel only.
    - Consideration should be taken to relocate turtle nests should the shoreline be threatened by an oil spill.
    - If sea turtles are encountered, notification should be given to the appropriate response personnel for relocation.

- Great care should be taken during an oil spill to minimize the impact to birds. Deterrence methods offer the best solution to minimize the potential impact including:
    - Visual stimuli, such as inflatable bodies, owls, stationary figures or helium balloons, etc.
    - Auditory stimuli, such as propane cannons, recorded sounds or shell crackers.
    - Herding with aircraft, boats, vehicles, or people (as appropriate).
    - Capture and relocation.
    - If oiled birds are encountered, notification should be given to the appropriate response personnel. Only trained personnel should handle oiled animals.

According to the National Oceanic and Atmospheric Administration (NOAA) fisheries services, response personnel will typically not respond to marine mammals during an offshore oil spill due to the logistics and equipment needed to capture and relocate animals of that magnitude. Furthermore, more damage is likely to stem from a rescue operation and will lower the survivability rate of these animals. NOAA states that issues could arise due to relocated marine mammals, especially dolphins, such as:

- Relocation could overcrowd environmental areas;
- Relocation could alter the infectious disease ecology of the population; and
- Relocation might subject marine mammals to poor quality habitats with insufficient food and shelter needs.

Wildlife Search and Rescue - Points to Consider

- Company involvement should be limited to offering assistance as needed or requested by the agencies.

- Prior to initiating any organized search and rescue plan, authorization must be obtained from the appropriate federal/state agency.

- Initial search and rescue efforts, if needed, should be left up to the appropriate agencies. They have the personnel, equipment and training to immediately begin capturing contaminated wildlife.

- With or without authorization, it must be anticipated that volunteer citizens will aid distressed/contaminated wildlife on their own. It is important to communicate that it may be illegal to handle wildlife without express authority from appropriate agencies. Provisions should be made to support an appropriate rehabilitator; however, no support should be given to any unauthorized volunteer rescue efforts.

- If oiled, or injured found contact the following:

    - (877) 823- 6926, Oiled Wildlife Care Network (OWCN)
    - (866) 945-3911, Wildlife Emergency Services
    - (877) 767-9425, Statewide Whale Rescue Team (distressed whales and dolphins)
    - (310) 548-5677, Fort MacArthur Marine Mammal Care Center (Los Angeles County Marine Wildlife Rescue)
    - (949) 494-3050, Pacific Marine Mammal Center (Orange County Marine Wildlife Rescue)
    - (310) 514-2573, International Bird Rescue Los Angeles Center (Sick or dead birds)
    - (562) 980-4017, National Marine Fisheries Service (Dead seals, sea lions and sea turtles)
    - (323) 585-5015, Los Angeles County Museum of Natural History (Dead whales and dolphins)

Further contact information can be found in Section 9.

18.0 DISPERSANT USE PLAN

18.a DISPERSANTS INVENTORY

Dispersants Inventory			
Dispersant Type	**Quantity**	**City**	**State**
COREXIT EC9500A	12,870 gallons	Long Beach (Berth 85)	California
COREXIT EC9500A	250 gallons	Long Beach (Berth 57)	California
COREXIT EC9527A	17,900 gallons	Carpinteria	California
COREXIT EC9500A	8,650 gallons	Carpinteria	California
COREXIT EC9500A	3,330 gallons	Mesa	Arizona
COREXIT EC9500A	9,735 gallons	Richmond	California
COREXIT EC9500A	330 gallons	Concord	California
COREXIT EC9500A	660 gallons	Eureka	California
COREXIT EC9500A	14,190 gallons	Everett	Washington
COREXIT EC9500A	3,300 gallons	Ingleside	Texas
COREXIT EC9500A	9,570 gallons	Galveston	Texas
COREXIT EC9500A	16,009 gallons	Kiln	Mississippi
COREXIT EC9500A	5,280 gallons	Tampa	Florida
COREXIT EC9500A	6,930 gallons	Savanah	Georgia
COREXIT EC9500A	330 gallons	Slaughter Beach	Maryland
COREXIT EC9500A	13,365 gallons	Chesapeake City	Maryland
COREXIT EC9500A	990 gallons	Portland	Maine
Total:	118,929 gallons		

Depending on the rate of dispersant being applied, Nalco (the manufacturer of Corexit) can be contacted to begin production of additional dispersant supplies. It is projected that Nalco requires 10 to 14 days in order to increase production and make delivery of additional resources.

COREXIT has a treatment rate of about 2 to 10 U.S. gallons per acre, or a dispersant to oil ratio of 1:50 to 1:10 depending on site conditions. Assuming a worse case ratio of 1:10, the below calculations for daily usage can be determined for Airborne Support Inc.'s current fleet. The daily usage rate below is determined using an efficiency factor of 20 percent to take into account any limitations during the recovery operation, such as, but not limited to, available daylight, sea state, temperature, viscosity, and emulsification of oil being recovered.

18.b TOXICITY DATA

COREXIT EC9527A TOXICITY		
Material Tested	SPECIES	LC50 (ppm)
COREXIT EC9527A	Menidia beryllina	25.20 96-hr
	Mysidopsis bahia	32.23 48-hr
No. 2 Fuel Oil	Menidia beryllina	10.72 96-hr
	Mysidopsis bahia	16.12 48-hr
COREXIT EC9527A & No. 2 Fuel Oil (1:10)	Menidia beryllina	2.61 96-hr
	Mysidopsis bahia	3.40 48-hr
Reference Toxicant (DSS)	Menidia beryllina	7.07 96-hr
	Mysidopsis bahia	9.82 48-hr

NOTE: This toxicity data was derived using the concentrated product and excerpted from the U.S. EPA Technical Product Bulletin #D-1.

COREXIT EC9500A TOXICITY		
Material Tested	SPECIES	LC50 (ppm)
COREXIT EC9527A	Menidia beryllina	25.20 96-hr
	Mysidopsis bahia	32.23 48-hr
No. 2 Fuel Oil	Menidia beryllina	10.72 96-hr
	Mysidopsis bahia	16.12 48-hr
COREXIT EC9500A & No. 2 Fuel Oil (1:10)	Menidia beryllina	2.61 96-hr
	Mysidopsis bahia	3.40 48-hr
Reference Toxicant	Menidia beryllina	7.07 96-hr
	Mysidopsis bahia	9.82 48-hr

NOTE: This toxicity data was derived using the concentrated product and excerpted from the U.S. EPA Technical Product Bulletin #D-4.

18.c DISPERSANT EFFECTIVENESS

Research on the effectiveness of dispersants over time has been conducted by organizations and committees such as the Committee on Understanding Oil Spill Dispersants and the International Petroleum Industry Environmental Conservation Association (IPIECA), both of which have representation of regulatory and industry representatives. Highlights of their findings include:

- Factors that influence the effectiveness of dispersant treatment include sea-state, oil properties, and dispersant brand. [1]
- On sea trials, the effectiveness of dispersants decreases with time as the oil weathers. [1]
- Dispersants do work at sea but not every time. The chances of effectiveness are higher during the early stages of the spill. [1]
- For a particular oil, the time available before dispersant stops being effective depends upon such factors as sea state and temperature, but is unlikely to be longer than a day or two. Therefore, it is important to apply dispersants during a timely or early "window of opportunity".
- After a period of time, oils which can be dispersed initially may become resistant as the viscosity increases as a result of evaporation and emulsification. [2]

1. *Committee on Understanding Oil Spill Dispersants, Conclusions from Sea Trials, presented by A. Lewis, March 2004*
2. *International Petroleum Industry Environmental Conservation Association (IPIECA), November 2001*

18.d APPLICATION EQUIPMENT

Aircraft Inventory			
Type	**Capacity**	**City**	**State**
C-130	4,125 gallons	Mesa	Arizona
King Air BE-90	250-425 gallons	Concord	California
C-130	4,125 gallons	Kiln	Mississippi
King Air BE-90	250-425 gallons	Kiln	Mississippi

18.e APPLICATION METHODS

Once the application of dispersants has been deemed possible, acceptable and feasible, dispersants can be sprayed on a spill. Since dispersant loses its effectiveness when mixed with water, it must be applied neat to the slick. The recommended treatment rate for dispersants, applied undiluted is a dispersant to oil ratio of 1 to 20. Lower treatment rates have been shown to be effective with light, freshly spilled crude oils. It is always difficult to achieve exactly the recommended treatment rate because oil slicks have large and localized variations in oil layer thickness.

18.e APPLICATION METHODS (Cont'd)

Undiluted spraying from ships or aircraft is the preferred method of using dispersants, although seawater dilution can be used from vessels if the appropriate equipment is available. Note that seawater-diluted application is efficient only on low viscosity oils; for oils with viscosity above 1,000 mPa undiluted dispersant application is necessary.[1]

Aerial Application

- Dispersant must be applied to the floating oil, not to the water around it.

- The application altitude depends on meteorological conditions and on the application system, but generally it has a range of 30 to 100 feet.

1 *From Dispersants and Their Role in Oil Spill Response, 2nd edition, November 2001, IPIECA*

- Since droplet size is important in order for dispersants to be effective, special care must be given to select the spray nozzle for the aerial dispersant application system. Although optimal droplet size is within the 250-500 μm range, it is always recommended to follow guidance from the manufacturer and the ASTM standard.

- A dispersant controller must be procured in order to fly over the spray zone(s) in a separate aircraft from the dispersant spray aircraft. The controller must be qualified and able to direct the dispersant spray aircraft in carrying out the operation. The controller must also provide direction to avoid the spraying of birds, marine mammals and turtles that may be in the spray zone(s).

- This plan incorporates by reference any manufacturer and ASTM guidance for application methods.

Boat Application

- Compliance to ASTM Guidelines F1460-93, F1413-92, and F1737-96 is required for boat dispersant systems that have spray arms or booms that extend over the edge of the boat and have fan type nozzles that spray a fixed pattern of dispersant.

- Dispersant must be applied in relatively large droplets and avoid being applied in small atomized droplets. Sufficient mixing energy should be created by normal wave action and the boat's wake.

- When applied from workboats, systems using a portable fire pump, or a fixed fire-fighting system is best. This should operate at approximately 40-80 psi depending on the requirements of the system used. This system should deliver dispersant at a rate adequate to maintain the spray pattern from the nozzles at the operating velocity of the vessel without blowing away before reaching the oil. Currently, there are no ASTM standards applicable to this fire monitor and/or fire nozzle dispersant application system.

- During boat application, using a metering pump for chemical addition.

- For slicks formed by more viscous crude or petroleum products, a hydrocarbon based (kerosene or other aliphatic solvent) dispersant is required.

18.f CONDITIONS FOR USE

CONDITIONS FOR USE (ENVIRONMENTAL)

Pre-approval is contingent upon the utilization of the dispersants listed on the most current NCP Product Schedule.

Dispersant application operations should only be conducted during daylight.

Very low water temperatures affect the dispersant's action as these tend to increase the viscosity of the oil and make dispersion more difficult.

Weathering of oil can have a negative effect on dispersion, but the amount of time to reach that point can vary widely from a few days to more than a month depending on meteorological conditions.

CONDITIONAL USE (REGULATORY)

The decision to use dispersants must be made soon after the spill occurs. Weathering of oil will increase the viscosity and decrease the capability of chemically dispersing the oil. Factors to be considered in making this decision are 1) oil type and properties, 2) environmental conditions, 3) the availability of dispersant and application equipment and 4) the probable fate of the oil without treatment.

In some cases, chemical dispersants may be the best method to control a slick. The Regional Response Team (RRT) must approve the use of dispersants at the time of a spill for all designated marine waters in offshore waters of Texas and Louisiana that are:

- Marine waters within three (3) nautical miles from the coastline, waters designated as a part of a National Marine Sanctuary, or waters that are within three miles of the borders of the Country of Mexico;

- Marine waters one (1) mile from anadromous fish streams during times of emigration and immigration.

Only dispersants listed in the most recent NCP Product Schedule may be used. Maximum dispersant spray coverage of suitable slick areas is for only one complete treatment. Suitable slick areas are those having visibly thick oil, described as black or brown and not a sheen. Suitable coverage may mean more than one sortie to complete.

18.g APROVAL PROCEDURES AND FORMS

The Company incorporates the California Dispersant Plan and Federal On-Scene Coordinator (FOSC) Checklist for California Federal Offshore Waters, October 2008" (Plan) or the most current version by reference. The Company intends to follow the procedures outlined within the Plan that pertain to actions to be undertaken by the responsible party in the event of a spill. The **Incident Commander (IC) is responsible for activating dispersant use preapproval procedures** as soon as possible during the response effort. The Planning Section Chief is responsible for collecting and submitting the necessary information. The IC alerts Logistics Section Chief and MSRC, interacts with the Coast Guard and OSPR representatives until a decision has been reached and notifies the Cleanup Supervisor to begin field application when approval is received.

California Dispersant Plan and Federal On-Scene Coordinator (FOSC) Checklist for California Federal Offshore Waters

FINAL

California Dispersant Plan and Federal On-Scene Coordinator (FOSC) Checklist

for

California Federal Offshore Waters

Fall 2008

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We relied extensively on work already completed by other authors and institutions. Leigh Stevens of Cawthron Institute, New Zealand, led the way by allowing us to use his "Oil Spill Dispersants: Guidelines for Use in New Zealand" as an extremely helpful model for our document. We also drew from various dispersant guidelines provided by Regional Response Teams throughout the U.S., dispersant guidelines published by ExxonMobil, the Cutter Information Corporation's "Oil Spill Dispersants: From Technology to Policy", the "Assessment of the Use of Dispersants on Oil Spills in California Marine Waters" by S.L. Ross, and various oil spill job aids available from the NOAA web site. Please see the References Cited section in this document for the full citations.

Beyond the use of these reports was the steadfast assistance of those we worked with in our own agencies and those on the Los Angeles Area Committee, dispersant subcommittee, dispersant workgroups, and various interested parties watching and assisting from outside the immediate working groups. Randy Imai of OSPR provided the charts in this report, Al Allen (Spilltec) provided the information, figures and formulas for dispersant dosage rates and relating those rates to dispersant application systems, and the oil spill clean-up cooperatives in California provided updated information on dispersant application resources. Members of the Los Angeles workgroups reviewed early drafts of this document, with John Day (Santa Barbara County) and Craig Ogawa (Minerals Management Service) providing especially helpful comments along the way. Ben Waltenberger (NOAA), Ken Wilson (OSPR), Melissa Boggs (OSPR) and Ellen Faurot-Daniels (CCC) pitched in to draft the Wildlife Aerial Observation Protocols, and Melissa Boggs led the workgroup addressing public outreach.

We also extend particularly heartfelt thanks our colleagues in our own agencies who supported our efforts all along the way, and to the members of the Regional IX Regional Response Team and the U.S. Coast Guard who had the first vision of a California Dispersant Plan.

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OVERVIEW

PRE-APPROVAL ZONES

Purpose and authority

This document outlines the Dispersant Use Plan for state and federal marine waters within the Region IX Regional Response Team (RRT) area of operations.

This policy authorizes and provides guidelines to allow the federally pre-designated U. S. Coast Guard (USCG) Federal On-Scene Coordinator (FOSC) and/or the Unified Command to use dispersants in a timely manner to: 1) prevent or substantially reduce a hazard to human life; 2) minimize the adverse environmental impact of the spilled oil; and 3) reduce or eliminate the economic or aesthetic losses of recreational areas. This dispersant use plan will address the use of dispersants for each of two zones: Dispersant Pre-Approval Zones; and, RRT Approval Required Zones.

Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP.

The USCG Eleventh District Commander has pre-designated the three USCG Captains of The Port (COTP) as the FOSCs for oil discharges in their respective COTP zones (as defined in 33 CFR Part 3 and subject to joint response boundary agreements with EPA described in Section 1400 of the three California Area Contingency Plans), and has delegated to each COTP the authority and responsibility for compliance with the Federal Water Pollution Control Act (FWPCA).

The Governor of the State of California has designated the Administrator of the Department of Fish and Game Office of Oil Spill Prevention and Response (CDFG-OSPR) the authority and responsibility for providing approval for the use of dispersants for control of oil spills in or affecting California waters.

The USCG, EPA, DOI, DOC/NOAA, and CDFG-OSPR agree that one of the primary methods of controlling discharged oil shall be the physical removal of the oil by mechanical means. These agencies recognize that in certain instances timely, effective physical containment, collection and removal of the oil may not be possible, and the use of dispersants, alone or in conjunction with other removal methods, may be considered to minimize substantial threat to public health or welfare, or minimize serious environmental damage. This document establishes the policy under which dispersants listed on the NCP Product Schedule may be used in Federal waters off California by FOSCs.

The response planning process

The National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan –

NCP) directs the RRTs and Area Committees to address, as part of their planning activities, the desirability of using appropriate dispersants, surface washing agents, surface collecting agents, bioremediation agents, or miscellaneous oil spill control agents listed on the NCP Product Schedule, and the desirability of using appropriate burning agents. Regional Contingency Plans and Area Contingency Plans shall, as appropriate, include applicable authorization plans and address the specific contexts in which such products should and should not be used (40 CFR § 300.910). Additional information on how this plan was directed and developed is included in Appendix I.

What is in the California Dispersant Plan (CDP)

In its current form, the CDP includes an updated Federal On-Scene Coordinator (FOSC) checklist, and a series of discussion and decision boxes to facilitate the FOSC decision. To provide the greatest likelihood that this CDP will not only train but serve the Coast Guard regardless of which personnel are in the FOSC position in the future, it includes a number of appended materials that put oil, dispersant, natural resource and response resource information close at hand in one document. The CDP also includes a number of blank forms that can be removed, duplicated as needed, and used in the field during a spill response to provide orderly and timely information to the FOSC as the spill unfolds and a decision whether or not to use dispersants becomes imminent. Other report forms document bird and mammal presence, dispersant application methods, and dispersant effectiveness.

This document is not a lengthy discussion of the relative merits of any response tool, of dispersant or dispersed oil toxicity, or the details of Net Environmental Benefit Analyses (although key points on several of these topics is embedded in the Discussion Notes on the FOSC checklist, or in the appendices). It is not a primer on oil spill response in general, or the Incident Command System. All this information is available from other resources, much of which was considered in developing the zone recommendations and CDP. This CDP instead assumes that an oil spill has occurred and all agency notifications have been made, various response agencies are on scene and using the Incident Command System to structure the response, and that dispersant use is under active consideration by the FOSC. This CDP takes over from there, offering tools to the FOSC to guide that decision.

This CDP primarily focuses on the federal offshore waters that have been designated as "pre-approved" for dispersant use. To date, this includes the waters 3 – 200 nautical miles from shore, not within a National Marine Sanctuary, and not within 3 miles of the California-Mexico border. This CDP also addresses waters closer than 3 miles from shore, within a National Marine Sanctuary, and within 3-miles of the California-Mexico borders, under the RRT Approval Process.

This CDP is a central, portable repository of all information that will guide the FOSC in a dispersant-use decision for pre-approval areas in federal offshore waters, regardless of which COTP pre-approval area the spill occurs and for which dispersants are being considered.

Quick Guide to Forms, Worksheets and Checklists

The CDP is designed primarily to assist the FOSC in making a dispersant use decision at the time of an incident. Many forms, worksheets, and checklists are included as a part of the CDP to facilitate information gathering, decision-making and providing supporting documentation, as necessary. These worksheets and forms should assist the Unified Command in making a dispersant use decision, not hinder the process with unnecessary paperwork.

As a part of the dispersant pre-approval zone decision-making process, please use the quick guide to forms, worksheets and checklists outlined below.

1) Dispersant Assessment Worksheet — Not Required by RRT

This document was designed to assist in the gathering and organization of pertinent information necessary to make a dispersant use decision.

2) Pre-Approval Zone Dispersant Use Checklist — Required by RRT

This checklist was designed to provide an overview of the pre-approval decision-making process and to provide a "dispersant decision summary" for the Incident, detailing the decisions made. Once this form is completed and the FOSC decides to use dispersants, the checklist should be faxed to the RRT as soon as feasible.

3) Dispersant Pre-approval Record of Decision — Required by RRT

This form was designed to provide a record of decision regarding the evaluation and authorization of dispersant use, consistent with the pre-approval criteria provided in the "pre-approval zone dispersant use checklist." The record of decision is to be signed by all members of the Joint Unified Command and should be faxed with the dispersant use checklist to the RRT as soon as feasible.

4) Checklist Documentation and Support Form Boxes #1 - #12 — Not Required by RRT

This form was designed as a support tool to evaluate the information required in the pre- approval zone dispersant use checklist. This form guides the user through each decision- making point, allowing evaluation of each question that is a part of the dispersant use decision-making process. This form also cross-references the appendices, as needed, where additional information can be found.

DISPERSANT ASSESSMENT WORKSHEET

(Two pages)

Information gathered to complete this form will facilitate the dispersant pre-approval use determination; complete as much as possible without inadvisably delaying a dispersant use decision.

This report made by: ____________________ Organization: ________________ Date: __________ Time: __________
Phone: (   )____________Fax: (   )______________ Mobile: (   )________________ Pager: (   )________________

On-Scene Commander: ____________________ Agency: ____
Phone: (   )____________ Fax: (   )______________ Mobile: (   )________________ Pager: (   )________________

Caller: _______________________________ Organization: ________________ Date: __________ Time: __________
Phone: (   )____________ Fax: (   )______________ Mobile: (   )________________ Pager: (   )________________
Street: _______________________________ City ______________________ State _______ Zip Code __________

OES Control #_________________________ **NRC #** ____________________

SPILL

Date of spill: _______________(month/day/year) Time of spill: ___________________________(PST, 24-hr clock)
Location: Latitude: ____________________N Longitude: ______________________________________W

Spill source and cause: ____
____

Amount spilled: _____________(gal or bbl) Type of release: ☐ Instantaneous ☐ Continuous
Flow rate if continuous flow (estimate): ___________
Oil name: _________________________________ API: ________ Pour point: __________ (ºF)

Information source: ____

ON-SCENE WEATHER, CURRENTS AND TIDES

(If not immediately available contact NOAA Scientific Support Coordinator (206-321-3320) or other resources noted in Appendix A).

Wind (from) direction: __________________ Next low tide: ______ (ft) at _______ (hrs)
Wind speed: __________________________ (knots) Next high tide: ______ (ft) at _______ (hrs)

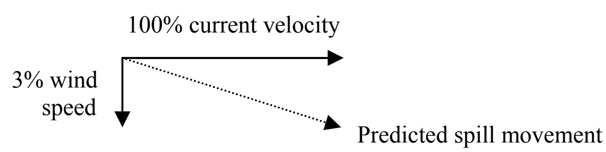
Current velocity: _________ (kts) Current (to) direction: _________ (ºtrue/magnetic)
Predicted slick speed: _________ (kts) Predicted slick direction: _________ (ºtrue magnetic)

Visibility: _____________ (nautical miles) Ceiling: ________ (feet) Sea state:________ (wave height in feet)

Information source:____

PREDICTING SPILL MOVEMENT

Plot spill movement on appropriate nautical chart. Using the information from the box above, predict slick direction and speed using 100% of current velocity and 3% of wind speed.



Estimated distance to shore/sensitive area: _________ (nm)
Estimated time to shore/sensitive area: _________ (hrs)

ESTIMATING OIL SPILL VOLUME

Extent of spill:

(a) Length of spill ______(nm) x Width of spill ______(nm) = Total spill area _________(nm^2)

(b) Estimate what proportion (%) of the total spill area is covered by oil: _______ (Express as decimal, % x 100)

(c) Estimate slick area: _______________ x _______________ = _________________

Total slick area (a) % oil cover (b) Estimated slick area

Estimated spill volume:

You can make this estimate using any of the following approaches:

- Get a thickness estimate from the ADIOS oil weathering model (call the NOAA SSC (**206-321-3320**) for assistance);
- Generate your own volume estimate of spilled oil and the area it covers (convert both volume and area to metric units and then divide the volume by the area to estimate the thickness. Use the unit conversions found in Appendix K). Convert thickness to millimeters to use Appendix D.1).
- Use your knowledge of the approximate number of barrels of oil or emulsion per acre of slick.

POTENTIAL RESOURCE IMPACTS

Using the predictive spill and weather information from the boxes above, ADIOS, the NOAA SSC, other RRT trustee agencies, aerial wildlife observers and regional resource information noted in **Appendix B**, briefly describe potential coastal areas and resources that could be impacted from this spill.

DISPERSANT SPRAY OPERATION

Information from **Appendices C.5 – C.8 and D.1** will be helpful.

Dispersant spray contractor name: ______________________________
Dispersant name: ______________________ Quantity available: _________

Street: ____________________________
City: ____________________________
State: _______ Zip Code: ____________
Phone: ( ) ______________________

Platform: Aircraft type: ☐ Multi-engine ☐ Single-engine
Boat type: ______________________________
Other: ______________________________
Dispersant load capability (gal): ___________________

Estimate:

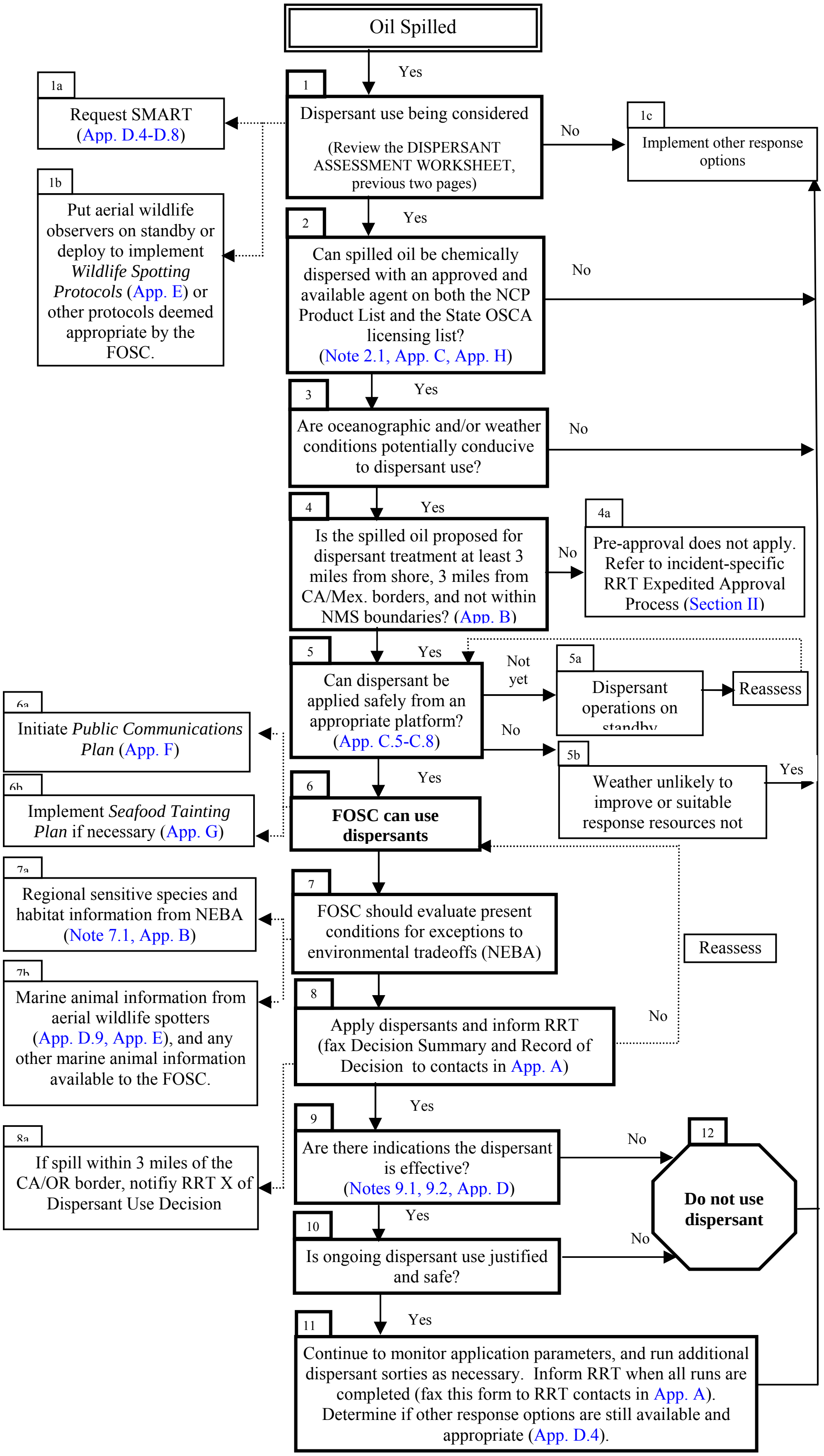
"Window of opportunity" for getting dispersant on the oil (App. C-10)_______________ (hrs from first report of spill)
Number of daylight hours available for first day of dispersant application:______________ (hrs from first report of spill)

Time to first drop on the oil: ____ (hrs from first report of spill)

Can dispersants to be effective after day one of the spill? YES / NO / Cannot determine at this time (circle one)

Note: It might be appropriate to conduct a small dispersant test before proceeding to a full application.

PRE-APPROVAL ZONE DISPERSANT USE CHECKLIST



Pre-Approval Zones

Dispersant Decision Summary

Spill location: ____________________

FOSC Name: ____________________

FOSC Signature: ____________________

Box	Decision	Time:	Date:	Initials:
1	Yes/No	____	________	________
2	Yes/No	____	________	________
3	Yes/No	____	________	________
4	Yes/No	____	________	________
5	Yes/No	____	________	________
6	Yes/No	____	________	________
7	Yes/No	____	________	________
8	Yes/No	____	________	________
9	Yes/No	____	________	________
10	Yes/No	____	________	________
11	Yes/No	____	________	________
	Run 2	____	________	________
	Run 3	____	________	________
	Run 4	____	________	________
	Run 5	____	________	________
	Run 6	____	________	________
	All done	____	________	________
12	Do not use	____	________	________

Supplemental Decisions:

1a	Yes/No	____	________	________
1b	Yes/No	____	________	________
5a	Yes/No	____	________	________
5b	Yes/No	____	________	________
6a	Yes/No	____	________	________
6b	Yes/No	____	________	________
7a	Yes/No	____	________	________
7b	Yes/No	____	________	________

Record of Decision:

If dispersant use is approved, sign and fax the Dispersant Pre-Approval Record of Decision with this Summary Sheet to the RRT.

Comments:

....
....
....
....

The following boxes and checklists are to support decision-making. Complete as appropriate given time and information constraints. Do not allow completing each check-box to inadvisably delay decision-making.

BOX 1 **IS DISPERSANT USE BEING CONSIDERED?**

Dispersant use should be considered if one or more of the situations listed below exist:

❒ Oil is likely to significantly impact birds, marine mammals, or other flora and fauna at the water surface
❒ Natural dispersion is limited
❒ Other response techniques are unlikely to be adequate, effective, or economical
❒ The oil could emulsify and form mousse or tar balls
❒ Oil is likely to significantly impact shorelines, structures and facilities (*e.g.*, marinas, wharves)
❒ Oil is likely to significantly impact economically important resources (*e.g.*, shellfish beds, tourist beaches)
❒ Other ……………………………………………………………………………………………………

Decision: Consider dispersant use?

❒ Yes Make notifications in **Box 1a**
Make notifications in **Box 1b**
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

From Cawthron, 2000

Discussion Note 1.1 **KEY BENEFITS OF DISPERSANT USE**

- Dispersant use minimizes the effects of an oil spill principally by dispersing oil before it reaches shorelines or sensitive areas (*e.g.*,wetlands, estuaries).
- Removing oil from the surface of the water reduces the potential for impacts to birds and marine mammals, and limits the action of wind on spill movement.
- Dispersants can prevent oil from sticking to solid surfaces, and enhance natural degradation.
- Dispersants can effectively treat large spills more quickly and inexpensively than most other response methods.
- Dispersants can be effective in rough water and strong currents where mechanical responses are limited.
- Effective dispersant responses can greatly reduce the quantity of oil requiring recovery and disposal.
- Dispersant use is often the only feasible response to spills that exceed mechanical response capabilities.
- Dispersant use does not generally limit other options, except oleophilic mechanical responses.
- Dispersed oil that cannot be mechanically recovered generally poses few significant environmental problems.

From Cawthron, 2000

BOX 1a **REQUEST SMART**

Immediately deploy USCG Strike Team to the spill site if dispersant use is likely. Every attempt should be made by the FOSC and the Strike Team to implement the on-water component of the SMART (Special Monitoring of Advance Response Technologies) monitoring protocols in every dispersant application. **Dispersant application should <u>not</u> be delayed should sea conditions, equipment failure, or other unavoidable circumstances preclude the positioning of SMART monitoring equipment and personnel**. However, at a minimum, Tier 1 (visual) monitoring should occur by trained observers during any dispersant operation approved in accordance with this California Dispersant Plan. Tier 2 (on-site water column monitoring) and Tier 3 (fate and transport of the dispersed oil) SMART monitoring will be deployed as appropriate. Other information on monitoring dispersant effectiveness, including additional SMART background information, tools and report forms, is presented in **Appendices D.4 – D.8**.

Decision: Deploy SMART?

❒ Yes Use contact information in Appendix A. **Estimated arrival time**: ……………………………..………..
Go to **Box 1b**.
❒ No Note reason why not deployed. ……………………………………………………………………….……

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Go to **Box 1b** or **Box 1c** as appropriate.

BOX 1b **PUT AERIAL WILDLIFE OBSERVERS ON STANDBY OR DEPLOY TO IMPLEMENT THE *WILDLIFE SPOTTING PROTOCOLS***

Consider deploying trained wildlife spotters in initial spill overflight aircraft so that they can determine if the presence of marine animals in the spill or dispersant application zones could influence spray pattern decisions by the FOSC. The goal is to minimize over-spray onto unaffected animals. Wildlife spotters should use the forms and procedures given in the *Wildlife Spotting Protocols* (**Appendix D.9 and Appendix E**). The FOSC will decide how subsequent and systematic wildlife spotting efforts can be safely conducted with the aerial resources available.

Decision: Notify/deploy aerial wildlife spotters?

❐ Yes Use wildlife spotter contact information in **Appendix E.2**. Go to **Box 2**.
❐ No Note reason why wildlife spotters not deployed ……………………………
………………………………………………………………………………

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Reconsider under **Box 7**.

BOX 1c **IMPLEMENT OTHER RESPONSE OPTIONS**

Consider all response options to identify which option, or combination of options, is most appropriate. The following options are described in the Area Contingency Plan (Section 1640) and the Regional Contingency Plan (Section 1007.05).

❐ No action other than monitoring
❐ Mechanical containment and recovery of oil at sea
❐ Clean-up of oil from shorelines
❐ *In situ* burning

From Cawthron, 2000

BOX 2 **CAN SPILLED OIL BE CHEMICALLY DISPERSED WITH AN APPROVED AND AVAILABLE AGENT ON BOTH THE NCP PRODUCT LIST AND THE STATE OSCA LICENSING LIST?**

A NCP Product List may be found in **Appendix H**. Updated NCP Product Lists can be accessed via the EPA representative on the RRT (**Appendix A**), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) or accessing the Internet at http://www.epa.gov/oilspill/ncp/dsprsnts.htm

The State OSCA licensed dispersants may also be found in **Appendix H,** calling the State OSPR representative on the RRT (**Appendix A**) or accessing the Internet at http://www.dfg.ca.gov/ospr/reg_com/osca.html

Decision: Can this oil be dispersed with an approved and available agent?

❐ Yes Go to **Box 3.**
❐ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Taken in part from Cawthron, 2000

Discussion Note 2.1 **OIL DISPERSIBILITY (Also see App. C.10 for Window of Opportunity)**

Three types of oils are typical of those produced or transported in California offshore waters: a) crude oils produced in California Outer Continental Shelf (OCS) waters; b) oils imported from Alaska and foreign countries into California ports; and c) fuel oils that could be spilled from a variety of marine industrial activities (*e.g*., fuel tanks from ships, cargoes of small tankers). Dispersants only work if the spilled oil has a relatively low viscosity at the time of treatment.

Appendices C.1 and C.2 show the California platform-produced oils and tankered oils, respectively.

Most oils produced from offshore platforms are heavy, and border on the range of oils that are considered to be difficult or impossible to disperse. The oils transported by tanker include two-three dozen different types of oil (only the most common are listed in **Appendix C.2**). The most important is Alaska North Slope crude, which represents 50% of each annual total. Based on API gravity information, these oils appear to be dispersible when fresh.

- The most important criterion for dispersant use is whether the oil is dispersible.
- The best indication of oil dispersibility is from specific oil weathering and dispersion data from field trials (see **Appendix C.3** for some tested and modeled oils).
- Potential dispersibility can be *estimated* from physical properties of oils, under different oil weathering and spill scenarios (*e.g*., ADIOS, Table 2.1 below). The ADIOS computer database predicts oil dispersion based on physical and chemical properties of spilled oil under specified spill conditions.
- Dispersant use should not be rejected exclusively on the basis of predictive models.

Generally, if:

- Oil is able to spread on the water, it is likely to be dispersible.
- Viscosity is < 2000 cSt, dispersion is probable.
- Viscosity is >2000 cSt, dispersion is possible.
- Viscosity is >5000 cSt, dispersion is possible with concentrated dispersant (*e.g*., Corexit 9500).
- Sea temperature is <10º C or below oil pour point, dispersion is unlikely.

Potential dispersion may also be assessed using tables in Appendix C.

Limitations of predicting dispersion:

- Using generic values of viscosity and/or pour point to predict dispersion (*e.g*., ADIOS, **Appendices C.3 and C.4**) can underestimate the potential for oil to be dispersed.
- Most models are based on limited oil weathering, emulsification or dispersion data, therefore estimated windows of opportunity may be inaccurate.

Taken in part from Cawthron, 2000 and S.L. Ross, 2002

Table 2.1 **ADIOS (AUTOMATED DATA INQUIRY FOR OIL SPILLS) COMPUTER DATABASE**

Use the **DISPERSANT ASSESSMENT WORKSHEET** and the NOAA SSC (**206-321-3320**) for the information needed by ADIOS, or use the form below. The NOAA SSC should also be able to assist with ADIOS.

Copies of ADIOS are available from the NOAA website:
http://response.restoration.noaa.gov/software/adios/adios.html

Oil/product name: _____________
Amount spilled: _____________ (gal or bbl)
Type of release: Circle one
- ❑ Instantaneous
- ❑ Continuous

Wind speed: _____________ (knots)
Wave height: _____________ (m)
Water temp.: _____________ (ºC)
Water salinity: _____________ (ppt)

Important limitations on the use of ADIOS: ADIOS predicts dispersibility based on estimates of oil properties (including emulsification) under different conditions. As emulsification data are scarce, **predicted rates of dispersion may be different than actual rates of dispersion**. ADIOS is intended for use with floating oils only, and does not account for currents, beaching or containment of oil. ADIOS is unreliable for very large or very small spills. It is also unreliable when using very high or very low wind speeds in modeling the spill.

From Cawthron, 2000

BOX 3 **ARE OCEANOGRAPHIC AND/OR WEATHER CONDITIONS POTENTIALLY CONDUCIVE TO DISPERSANT USE?**

Does the available technical information indicate that the existing oceanographic (*e.g.*, surface current direction and speed, wave and chop height) and weather (*e.g.*, wind direction and speed, visibility, ceiling height) conditions are suitable for a successful dispersant application?

Use the following resources:

❒ Information on the DISPERSANT ASSESSMENT WORKSHEET
❒ Consultation with the NOAA Scientific Support Coordinator (**206-321-3320**)
❒ Information resources and web sites noted in **Appendix A**
❒ Information from aerial overflights
❒ Information from ADIOS

Decision: Are ocean and weather conditions potentially suitable for a dispersants application?

❒ Yes Go to **Box 4**.
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

BOX 4 **IS THE SPILLED OIL PROPOSED FOR DISPERSANT TREATMENT AT LEAST 3 MILES FROM SHORE, NOT WITHIN NMS BOUNDARIES, AND NOT WITHIN 3 MILES OF THE CA/MEXICO BORDER?**

A full-page statewide chart indicating the area three nautical miles from shore and the areas within National Marine Sanctuaries (Gulf of the Farallones, Cordell Banks, Monterey, Channel Islands) is in Chart 4.1 below. Regional charts, with pre-approval dispersant zones noted, are in **Appendix B**.

Decision: Is the spilled oil within a Pre-Approval zone?

❒ Yes Go to **Box 5**.
❒ No Pre-Approval does not apply. Go to **Box 4a**.

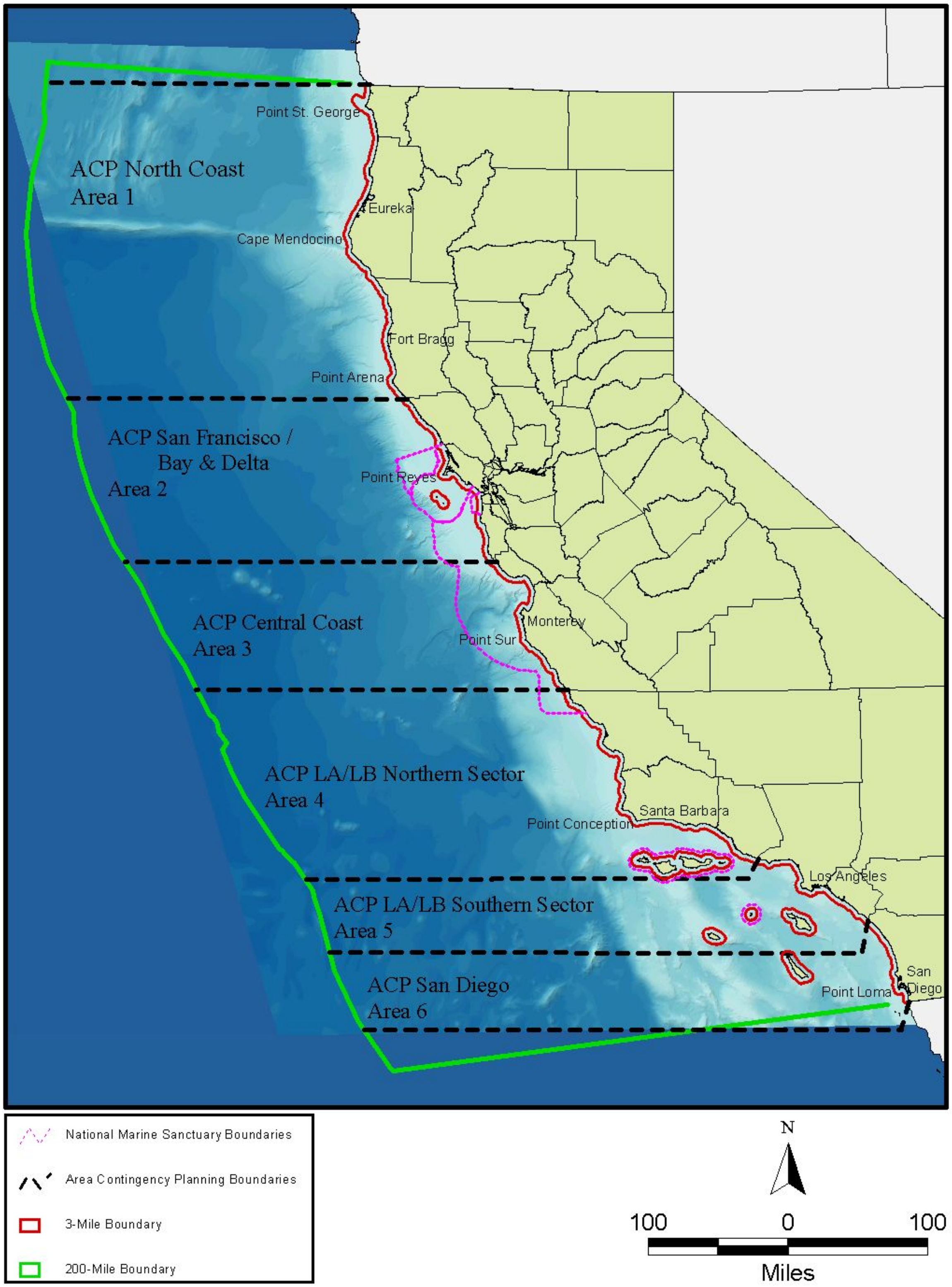
Make a note of the decision on Dispersant Use Checklist (Page I-9)

BOX 4a **PRE-APPROVAL DOES NOT APPLY; REFER TO RRT APPROVAL PROCESS.**

The request for dispersant use does not qualify under the pre-approval guidelines for the use of dispersants in RRT Regional IX. Contact the NOAA SSC (**206-321-3320**) and begin the dispersant *RRT Approval Process*, **Section II**.

Chart 4.1

California Marine Waters Pre-Approval Dispersant Zone



BOX 5 **CAN DISPERSANT BE APPLIED SAFELY FROM AN APPROPRIATE PLATFORM?**

Use the information in the **DISPERSANT ASSESSMENT WORKSHEET** to evaluate which application platform(s) will be most effective, given the following particular considerations:

- The amount of oil spilled;
- The location of the operational area;
- The volume of available dispersants;
- The timeframe in which the required equipment can be on-scene.

Assume for planning purposes that the weather information on the **DISPERSANT ASSESSMENT WORKSHEET** will remain the same during the timeframe in which this decision is operating. At the earliest opportunity, contact the NOAA SSC (**206-321-3320**) for more detailed and updated weather information, but do not delay this decision process for the NOAA SSC weather input. Weather information may also be available from resources noted in **Appendix A**. See **Appendices C.5 – C.8** for specific information on dispersant application platforms.

Decision: Is there a safe and appropriate application platform for a dispersant operation?
(See Discussion Note 5.2 below for important safety information)

	Yes	(Type)	No	(Why not appropriate?)
C-130/ADDS Pack	☐		☐	....
DC-4	☐		☐	....
Other large multi-engine airplane	☐	....	☐	....
Cessna AT-802	☐		☐	....
Other single-engine airplane	☐	....	☐	....
Helicopter	☐	....	☐	....
Work boat	☐	....	☐	....
	Go to **Box 6**		Go to **Box 5a and/or 5b**	

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Discussion Note 5.1 **CURRENT LOGISTICS FOR A CALIFORNIA DISPERSANT APPLICATION**

Use the information on the **DISPERSANT ASSESSMENT WORKSHEET** to consider the following:

- ❒ Is the selected dispersant available in the quantity needed?
- ❒ Can the estimated "window of opportunity" for getting the dispersant on the oil be met?
- ❒ Can the dispersant and application resources get to the spill scene on time?
- ❒ Will there be enough daylight hours for an effective dispersant application?

Refer to **Appendix C** for more specific regional dispersant resource information.

Discussion Note 5.2 **GENERAL SAFETY ISSUES**

- The FOSC is responsible for ensuring that health and safety requirements are adequately addressed during a response.
- Individuals should not engage in activities that they are not appropriately trained to perform.
- Individuals are expected to adhere to safety procedures appropriate to the conditions they are working under and/or are included in a dispersant-specific Site Safety Plan Annex.
- Vessel/aircraft operators are expected to define appropriate operational limits and safety and maintenance requirements for their craft.
- Vessels and response resources should be properly maintained and undergo proper decontamination procedures.
- Apply dispersants only if there is no significant risk to response personnel (*e.g.*, ignition risk, operational hazards).
- Ensure the appropriate personal protective equipment (PPE) is available.
- Ensure that application aircraft and vessels remain within standard operating limits.
- Each person involved in a response is required to take personal responsibility for his or her safety. The FOSC may appoint a Safety Officer and request development of a specific Site Safety Plan Annex. Key safety aspects to be considered in the plan may include:
  - Physical hazards (*e.g.*, waves, tides, unstable or slippery surfaces)
  - Heavy machinery and equipment
  - Chemical hazards (*e.g.*, oil and dispersant exposure)
  - Atmospheric hazards (*e.g.*, fumes, ignition risks)
  - Confined spaces
  - PPE
  - Noise
  - Fatigue
  - Heat/cold stress
  - Wildlife (bites/stings)
  - Cleanup facilities
  - Medical treatment

HUMAN SAFETY OVERRIDES ALL OTHER CONSIDERATIONS DURING A RESPONSE

From Cawthron, 2000

BOX 5a **DISPERSANT OPERATIONS ON WEATHER STANDBY**

Consult with appropriate RRT IX members (USCG/District 11 Co-Chair, EPA, DOI, DOC and OSPR (See **Appendix A** for contact information) to notify them that dispersants are being considered, but delayed due to weather.

Decision: Has the weather improved to the point where dispersants can be applied?

❒ Yes Go to **Box 6**
❒ No Continue to **reassess** (until/unless time window for successful application closed) or Go to **Box 5b**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

BOX 5b **WEATHER UNLIKELY TO IMPROVE OR SUITABLE RESPONSE RESOURCES NOT AVAILABLE**

There will be spill situations where dispersant use may be appropriate but weather conditions and available resources will not allow dispersants to get on the oil within the appropriate weather window. In these cases, dispersant use will need to be abandoned and other response options considered instead.

Go to **Box 1c**

BOX 6 **FOSC CAN USE DISPERSANTS**

DISPERSANTS APPROVED FOR USE BY THE FOSC NEED TO BE APPLIED USING THESE RRT IX GUIDELINES:

- ❒ Pre-approval zones are only in waters no closer than 3 nautical miles from the nearest shoreline, not within 3 miles of the CA/Mexico borders, and not within the boundaries of a National Marine Sanctuary.
- ❑ Dispersants cannot be applied to any diesel spill.
- ❒ The SMART controller/observer should be over the spray site before the start of the operation. If possible, a DOI/DOC-approved marine mammal/turtle and pelagic/migratory birds observation specialist (see **Appendix E.2** for list) will accompany the SMART observer. However, the operation will not be delayed for either function.
- ❒ The marine wildlife observer, or the person functioning as that observer, is strongly encouraged to use the Wildlife Observation Report Form (**Appendix D.9**) and the Wildlife Spotting Protocols (**Appendix E**). However, the operation will not be delayed for this function
- ❒ Personnel protective equipment for personnel on-site will conform to the appropriate dispersant's Material Safety Data Sheet (MSDS).
- ❒ Dispersant application aircraft will maintain a minimum 1000-foot horizontal separation from rafting flocks of birds. Caution will be taken to avoid spraying over marine mammals and marine turtles (see **Appendix A** for resource agency contact information).
- ❒ If the dispersant application platform is a boat, see Discussion Note 8.3.

BOX 6a **INITIATE *PUBLIC COMMUNICATIONS PLAN***

Once a decision to use dispersants is made, it is critical that a public communications plans be implemented (**Appendix F**). The general public as well as stakeholders must be made aware of any decision to use dispersants and a mechanism created for reliable and continuous updates.

An initial press conference should be held which outlines the decision to use dispersants, provides background and scientific information, and addresses any other environmental and safety considerations expressed by the public. A sample press release is in **Appendix F.1**, with other public meeting and risk communication tips offered throughout **Appendix F**.

A public meeting should be scheduled as soon as possible to provide a mechanism for sharing information and addressing public concerns and fears**.** **Appendix F** provides guidelines for preparing and conducting a public meeting. Areas that must be adequately addressed during the meeting include:

- Seafood tainting concerns posed by dispersants (**Appendix G**).
- Risk communication (**Appendix F.2 and Appendix G**).
- Results of net environmental benefit analyses, and species of special concern (summarized in **Appendix B**).
- Monitoring policies established for the spill (tools used from **Appendix D**).

BOX 6b **IMPLEMENT *SEAFOOD TAINTING PLAN* IF NECESSARY**

Refer to **Appendix G** for key points to consider regarding seafood tainting, as well as information on accessing NOAA and state resources for assessing the tainting risk.

BOX 7 **FOSC SHOULD EVALUATE PRESENT CONDITIONS FOR EXCEPTIONS TO ENVIROMENTAL TRADEOFFS (NEBA)**

This FOSC Checklist applies only to those California offshore waters pre-approved for dispersant use (waters 3 – 200 nautical miles from shore, not within a National Marine Sanctuary, and not within 3 miles of the CA/OR or CA/Mexico borders); see **Box 4**. However, dispersant use even in the pre-approval areas must follow certain guidelines (**Box 6)** and may be further limited by federal agencies with responsibility for endangered marine animal management (**Appendix J**).

Pre-approval dispersant zone recommendations do not presume the absence of sensitive species, other marine species, or impacts to species on the water surface or in the upper water column. It does presume that there will be impacts from the spilled oil, and from dispersant use, to some of those species. However, based on the natural resource information used in the planning stage, it was determined that there could be a net environmental benefit to the use of dispersants.

However, at the time of an actual spill and a decision to use dispersants, real-time information on marine animal presence (**Box 1b** and **Box 7b**), the potential impacts from the spill (**DISPERSANT ASSESSMENT WORKSHEET**), and important supplemental information (**Appendix B** and **Boxes 7a-b**) should all be considered and weighed by the FOSC in making a final decision to use dispersants, probable impacts, and where the net environmental benefits will occur.

The FOSC may use the regional sensitive species and habitat information from **Appendix B** for each major coastal area in which dispersant use may have an impact in order to consider:

- ❐ The type and value of habitat potentially affected.
- ❐ The sensitivity of affected resources to oil, and to different oil response strategies.
- ❐ Natural recovery rates of affected species and habitats.
- ❐ Likely oil persistence and degradation rates with and without dispersant use.
- ❐ Potential oil toxicity on surface water species compared to water column and/or seafloor species.

Dispersant use is generally not appropriate in areas with limited water circulation and flushing, near aquaculture facilities, shellfish beds and fish-spawning grounds, and around seawater intakes.

The central question to be answered in assessing Net Environmental Benefit is:

Will dispersant use significantly reduce the impact of the spilled oil?

- Rapid decisions on use are essential as dispersant must be applied quickly to be effective.
- Decision-makers must consider the various environmental, social, economic, political and cultural factors unique to each spill.
- Tradeoffs will be necessary, as no response is likely to satisfy all parties and protect all resources. The ecological impacts of oil are generally longer-lasting and more persistent than most other impacts.
- Ecological effects will be due primarily to the spilled oil. Dispersant applied at recommended rates is unlikely to cause significant adverse effects, even in multiple applications.
- Oil dispersed into water depths greater than 10m will quickly dilute to levels where acute toxic effects are unlikely.
- Few acute toxic effects have been reported for crude oil dispersed into less than 10m of well-flushed water.
- Small spills of light fuels seldom require dispersant use.

BOX 7a REGIONAL SENSITIVE SPECIES AND HABITAT INFORMATION FROM NEBA

At the time of an actual oil spill or a decision to use chemical dispersants on the oil, marine species are expected to be on the water surface or in the upper water column. Before using chemical dispersants, the FOSC will have decided that there may be a net environmental benefit from dispersant use. Information on regional sensitive species and habitat information from the Net Environmental Benefit Analyses (NEBA), summarized for each region in **Appendix B**, can help the FOSC determine which species might actually be in the area and scouted for by the aerial observers (**Box 1b** and **Box 7c**). This additional information can provide further validation and justification to a FOSC that impacts of chemical dispersant application will be minimized wherever possible, and net environmental benefit maximized.

BOX 7b MARINE ANIMALS INFORMATION FROM AERIAL WILDLIFE SPOTTERS

The FOSC can take additional information and advantage from the Aerial Wildlife Observers if they have been deployed (**Box 1b**), or information from the Wildlife Aerial Survey Form (**Appendix D.9**) available from other aerial spotters, or information from wildlife spotters (**Appendix E.2**) available to the FOSC from other data collection forms or notes used by those spotters. Any of these resources will provide real-time or near real-time information on marine seabird and mammal presence, and can guide the FOSC on dispersant application parameters that may minimize impacts to those resources.

BOX 8 APPLY DISPERSANTS AND INFORM RRT

❑ Use the information on estimated oil spill volume from the DISPERSANT ASSESSMENT WORKSHEET and Discussion Note 8.1 below to:

- Determine the dispersant application ratio (usually 1:20), and
- Calculate the volume of dispersant required (**Appendices D.1 and D.2**).

❑ Record the details on the Dispersant Application Summary Form (**Appendix D.4**);
❑ Mobilize application team;
❑ If not already done, mobilize SMART. Some blank SMART forms are included in **Appendix D** for use by other trained
professionals, if appropriate and when approved by the FOSC.
❑ Inform RRT (see **Appendix A** for contact information).

Decision: Dispersants applied?

❑ Yes Go to **Box 9**
❑ No Explain.

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Reassess as necessary and appropriate.

Discussion Note 8.1 **GENERAL APPLICATION INFORMATION**

- The FOSC has final responsibility for operational aspects of dispersant applications.
- Dispersant must only be applied by experienced spray applicators and in accordance with manufacturer instructions.
- The persons applying dispersant are responsible for the calibration and operation of the spraying system, and the safety and maintenance of the application platform.
- Droplet size is the key variable influencing dispersant effectiveness. Undersized droplets (*e.g*., fog or mist) will be lost through drift and evaporation. Oversized droplets will punch through the oil and be lost in the water column.
- Dispersants pre-diluted in water are less effective than undiluted dispersant.
- Only undiluted concentrate dispersant is applied from aircraft. Dispersant should, where possible, be applied into the wind and parallel with the slick.
- Dispersant should be applied in a methodical and continuous manner to ensure the entire target area is treated.
- Spraying effort should concentrate on the thickest sections, and/or the leading edges, of oil that threaten sensitive areas.
- Thick portions of the slick may require several applications.
- Oil sheen should not be sprayed with dispersant.

Regarding the relationship between Dispersant-to-Oil Ratio (DOR) and the concentration of oil being treated:

- Regardless of DOR ratios suggested by dispersant manufacturers, there are many factors that influence dispersibility (*e.g*., oil characteristics, degree of weathering, water salinity, sea state) that may make it very difficult to select an appropriate DOR for the conditions faced on the day of a specific spill
- The variability of slick thickness (or oil concentration) is such that one can never really characterize the actual oil concentration for more than a few seconds within the speed and swath constraints of a particular application system.
- With most application systems, one is usually overdosing and underdosing as the system moves through light, heavy and sometimes "no" oil on the water surface.
- The best estimate of the average oil thickness (or average volume of oil per unit are) must be used.
- Given that precise spray parameters are extremely difficult to achieve, dispersant applicators generally use about 5 gallons of dispersant per acre on their first run.
- Area, volume and thickness can be related with the following expression:

10^4 x Area (hectare) x Thickness (mm) = Volume (liters)
or
Volume (liters/Area (hectares) = 10^4 x Thickness (mm)

►To convert liters/hectare to gallons/acre, multiply by 0.107. To convert liters/hectare to gallons/square kilometer, multiply by 26.42.
►These values (in any units) multiplied by the DOR (as a fraction, *e.g*., 1:5 = 1/5 or .2) will then yield the Desired Dosage (in those units) for that value of DOR.
►Refer to Appendix D.1 for some pre-calculated values.

From Cawthron, 2000 and Al Allen (Spilltec), 2003 personal communication

Discussion Note 8.2 **AERIAL APPLICATION**

This general aerial application guide is intended simply to highlight key issues. The FOSC will coordinate and oversee operational aspects of aerial dispersant applications.

- Aircraft applications should always include pump-driven spray units.
- Dispersant droplet size should be between 400 and 1000 microns.
- Commercial aircraft spray nozzles generally range between 350 and 700 microns.
- 1000-micron spray nozzles may be needed for use on viscous oils.
- Nozzles should achieve an application rate of 5.3 gallons per acre if using a 1:20 ratio.
- Spray nozzles should be installed to discharge directly aft.
- Underslung buckets on helicopters should be mounted so the pilot can see the ends of the spray booms in flight.
- The altitude of the aircraft should be as low as possible.

From Cawthron, 2000

Discussion Note 8.3 **BOAT APPLICATION**

- Spray booms should be mounted as far forward as possible to prevent oil being moved aside by the bow wave before being sprayed. This then uses the mixing energy of the bow wave to break up the oil.
- Spraying systems should be set so that the spray pattern is flat, striking the water in a line perpendicular to the direction of the boat's travel.
- The fan-shaped sprays from adjacent nozzles should be set as low as possible, overlapping just above the oil/water surface, with the inboard spray striking the hull just above the waterline.

Undiluted dispersants

- Air blast sprayers and modified spray pumps can be used to apply undiluted concentrated dispersants and conventional dispersants.
- Treatment rate is usually constant and determined by nozzle size and spray pressure.
- Calibration and use of an appropriate droplet size is critical to effective applications.

Pre-diluted dispersants

- Concentrated dispersants can be applied after pre-dilution in seawater, but will be less effective.
- The dispersant : water ratio should be equal to, or greater than, 10%
- Applications through ship's fire-fighting equipment are controlled by opening or closing the dispersant supply. Vessel speed is used to control the treatment rate.
- Dual pump systems for dispersant and seawater-supplying spray booms allow the dilution rate to be adjusted.
- Boat speed is the main determinant of dispersant dose rate (reduce boat speed to increase the dose rate).
- Boat speed should be in the order of 5 knots for fresh spills of liquid crude or fuel oil, which assumes that the oil has spread to 0.1 mm thick.
- With reduced boat speeds, the required application rate per acre or km^2 can be maintained by reducing pump speed.

The following ASTM standards apply to systems involving spray arms or booms that extend over the edge of the boat and have fan-type nozzles that spray dispersant in a fixed pattern:

- ASTM F 1413-92: Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems
- ASTM F-1460-93: Standard Practice for Calibrating Oil Spill Dispersant Application Equipment Boom and Nozzle Systems
- ASTM F 1737-96: Standard Guide for use of Oil Spill Dispersant Application Equipment During Spill Response: Boom and Nozzle Systems.

Boat-based systems using a fire monitor and/or fire nozzle shall avoid a straight and narrow "firestream" flow of dispersant directly into the oil. There are no applicable ASTM standards for these systems at this time (December 2003).

In part from Cawthron, 2000

BOX 8a **NOTIFICATION OF RRT IX OF DISPERSANT USE WITHIN 3 MILES OF THE OR/CA BORDER**

The FOSC can approve the use of dispersants within the 3 miles zone of the California/Oregon border. Once a dispersant use decision is made, the FOSC should contact the RRT IX-X Liaison of the decision as soon a possible and should also endeavor to fax the Dispersant Record of Decision as well. Contact information can be found in **Appendix A.**

BOX 9 **ARE THERE INDICATIONS THE DISPERSANT IS EFFECTIVE?**

- ❑ Acquire information from dispersant monitoring team (SMART team or other FOSC-designated monitors).
- ❑ Review dispersant monitoring results after each dispersant application.
- ❑ Determine if chemical dispersion is significantly greater than natural dispersion.
- ❑ Assess whether changing application parameters could make the application more effective.

Decision: Are there indications the dispersant is effective?

- ❑ Yes Go to **Box 10**
- ❑ No See Discussion Note 9.2 and return to **Box 8**, or Go to **Box 12**

Make a note of the decision on Dispersant Use Checklist (Page I-9) *From Cawthron, 2000*

Discussion Note 9.1 ASSESSING DISPERANT EFFECTIVENESS

- Dispersant applications must be monitored to confirm whether or not dispersant use is effective, and to determine the fate and transport of treated oil.
- Dispersant applications should not be delayed simply because monitoring is not in place.
- Visual observation is the minimum level of monitoring. Observations teams may use the forms in **Appendix D**.
- There will be very few instances where a dispersant application is possible but visual monitoring is not.
- Because dispersed oil plumes are often highly irregular in shape and thickness, it can be difficult to accurately estimate dispersant efficiency.
- The appropriate dispersant application dose depends on the oil thickness (see **Appendices D.1 and D.2** for common dose rates based on oil thickness). Slicks are generally not of uniform thickness, and it is not always possible to distinguish among thicker and thinner portions of the same slick. It is therefore possible to apply too much or too little dispersant to some parts of a slick. Because over- and under-dosing can lead to variations in effectiveness, these variations should be noted.
- On-site monitoring of oil dispersed in the water column should support visual monitoring whenever possible. See **Appendix D** for additional information and forms.
- Decisions to terminate operations due to poor effectiveness should ideally be based on on-site monitoring results.
- A visible coffee-colored cloud in the water column indicates the dispersant is working.
- A milky-white plume in the water column can indicate excessive dispersant application.
- When dispersant is working, oil remaining on the water surface may also change color.
- A difference in the appearance of treated and untreated slicks indicates dispersion is likely.
- Absence of a visible cloud in the water column makes it difficult to determine whether the dispersant is working. When the water is turbid, you may not be able to see a plume. Oil remaining at the surface and sheens can also obscure an ability to see oil dispersing under the slick.
- Successful dispersion can occur with no visible indication of dispersion.
- A subsurface plume may not form instantly once dispersant has been applied. In some cases (*e.g.*, emulsified oil) it can take several hours for a plume to form. In other cases, a visible plume may not form, and you may wish to use sampling to learn whether dispersion has occurred.
- Boat wakes may physically part oil, falsely indicating successful dispersion. Mechanically dispersed oil will re-coalesce and float to the surface.
- Dispersants sometimes have a herding effect on oil after initial applications, making a slick appear to be shrinking when, in fact, the dispersant is "pushing" the oil together. The effect results from the surfactants in the dispersant, which causes a horizontal spreading of thin oil films. This can cause parts of a slick to seem to disappear from the sea surface for a short time.

From Cawthron 2000 and NOAA Oil Spill Job Aids

Discussion Note 9.2 WHEN DISPERSANT IS NOT EFFECTIVE

If monitoring shows dispersion does not appear effective, review all aspects of the application and monitoring for possible reasons why. Aspects to consider include:

- Dispersant formulation
- Application ratios (increase or decrease oil: dispersant ratio)
- Application methods
- Monitoring methods
- Interpretation of monitoring results
- Oil weathering
- Weather conditions

From Cawthron, 2000

BOX 10 **IS ONGOING DISPERSANT USE JUSTIFIED AND SAFE?**

All of the following must apply to justify ongoing dispersant use:

- ❑ The spill can be chemically dispersed with an approved and available agent (see **Box 2** and **Appendix H**); Oceanographic and weather conditions are potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The spilled oil is at least 3 nautical miles from shore, not within the boundaries of a National Marine Sanctuary (see **Box 4**), and not within 3 miles of the CA/OR of CA/Mexico borders;
- ❑ The dispersant will have a net environmental benefit (see **Box 7a**);
- ❑ The dispersant can be applied safely (see **Box 5**), with suitable weather (**Box 5a**) and available resources (**Box 5b**);
- ❑ There are indications the dispersant continues to be effective (see **Box 9**).

Decision: Continue with dispersant use?

- ❑ Yes Go to **Box 11**
- ❑ No Go to **Box 12**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

THERE WILL BE A POINT WHEN DISPERSANTS ARE NO LONGER EFFECTIVE.

BOX 11 **CONTINUE TO MONITOR APPLICATION PARAMETERS AND RUN ADDITIONAL DISPERSANT SORTIES AS NECESSARY**

More than one dispersant sortie (run) may be necessary to effectively treat the oil spill. Continue to monitor information on the spill extent, dispersant effectiveness, continued availability of suitable weather “windows” and dispersant application equipment and personnel, and perform addition applications as necessary.

- ❐ Record information from each sortie on the Dispersant Decision Summary.
- ❐ Inform RRT when all runs are completed (fax Dispersant Decision Summary form to RRT contacts in **Appendix A**).

THERE WILL BE A POINT WHEN DISPERSANTS ARE NO LONGER EFFECTIVE.

BOX 12 **DO NOT USE DISPERSANT**

Pre-approval to use dispersants does not apply if **any** of the following occur:

- ❑ The spill cannot be chemically dispersed with an approved and available agent (see **Box 2** and); Oceanographic and weather conditions are not potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The spilled oil is closer than 3 nautical miles from shore, within the boundaries of a National Marine Sanctuary (see **Box 4**), or within 3 miles of the CA/OR or CA/Mexico borders. Approval to use dispersants within 3 miles of landfall or CA borders, or within a National Marine Sanctuary, does not fall within the Pre-Approval guidelines, and will instead need to be considered under the RRT Approval Process (see **Box 4a** and **Appendix I**);
- ❑ The dispersant will not have a net environmental benefit (see **Box 7a**);
- ❑ The dispersant cannot be applied safely (see **Box 5**), with suitable weather (**Box 5a**) or available resources (**Box 5b**);
- ❑ The dispersant is not significantly more effective than natural dispersion or other response options (see **Box 9**).

IF DISPERSANT USE IS CONSIDERED INAPPROPRATE, CONSIDER OTHER RESPONSE OPTIONS.

Go to **Box 1a**.

DISPERSANT PRE-APPROVAL

RECORD OF DECISION

Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP.

The Region IX, Regional Response Team has established dispersant pre-approval zones within waters 3 – 200 miles along the California coast, as designated and has provided policies and procedures for a FOSC to authorize the use dispersants consistent with these pre-approval zones. For purposes of this record of decision, the designated FOSC has completed the "Pre-Approval Zone Dispersant Use Checklist" and has determined that the oil spill, *Name of Oil Spill Incident*, meets the pre-approval criteria as outlined and that dispersant use is authorized.

________________ ________________

Federal On-Scene Coordinator Date
United States Coast Guard

California statute requires that emergency response operations utilize the Incident Command System. For marine oil spill response, a joint Unified Command Structure is implemented consisting of the Federal On-Scene Coordinator, the State On-Scene Coordinator and the Response Party and outlined in the Memorandum of Understanding between the United States Coast Guard and the California Department of Fish and Game, Office of Spill Prevention and Response. For purposes of this record of decision, the authorization of dispersant use as delegated by the Region IX RRT to the designated FOSC was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party. The Joint Unified Command has completed the "Pre-Approval Zone Dispersant Use Checklist" and has determined that the oil spill, *Name of Oil Spill Incident*, meets the pre-approval criteria as outlined and that dispersant use is authorized.

____________________________ ____________________________

State On-Scene Coordinator
Office of Spill Prevention and Response
State of California

Responsible Party Representative

________________ ________________

Date Date

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State of California, Office of Emergency Services. 2001. Risk communication Guide for State and Local Agencies. 17pp.

Stevens, Leigh. 2000. Oil Spill Dispersants: Guidelines for use in New Zealand. Prepared for Maritime Safety Authority of New Zealand.

Wildlife Response Plan Appendices of the California Area Contingency Plan. Version 2, October 2003.

Yender,R., J. Michel, and C. Lord. 2002. Managing Seafood Safety After an Oil Spill Seattle: Hazardous Materials Response Division., Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

Resources from Internet World Wide Web sites:

NOAA Oil Spill Job Aids	http://response.restoration.noaa.gov/job_aid/glossary.html
(web links of 12/18/03)	http://resposne.restoration.noaa.gov/oilaids/spiltool
	http://response.restoration.noaa.gov/disp_aid/remember.html
	http://response.restoration.noaa.gov/disp_aid/checklist.html
	http://response.restoration.noaa.gov/oilaids/OilatSea.pdf
	http://response.restoration.noaa.gov//oilaids/SMART/SMART.html

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SECTION II: RRT Expedited Approval Zones

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OVERVIEW
RRT EXPEDITED APPROVAL ZONES

Protocols for dispersant use

The FOSC shall arrive at a decision to use dispersants using the information-gathering and decision-making process outlined below, and, using the checklists and procedures attached to this document, forward this information to the RRT for approval. These protocols presume that the FOSC has previously determined that a proposed dispersant use does not meet the criteria of pre-approval, but that dispersant use under a case-by-case RRT approval authority is being pursued.

RRT approval required for dispersant use

For those spill situations that are not addressed by the pre-approval process, FOSC authorization to use dispersants requires the concurrence of the RRT Co-Chairs (the U.S. Coast Guard and U.S. EPA) and State representatives to the RRT and in consultation with the DOI and DOC representatives. The RRT must approve the use of dispersants at the time of a spill for all scenarios within the designated marine waters:

- Marine waters within 3 nautical miles from the coastline, waters designated as a part of a National Marine Sanctuary, or waters that are within three miles of the borders of the Country of Mexico;

- Marine waters one mile from anadromous fish streams during times of emigration and immigration.

Once an FOSC determines to pursue the use of dispersants in a non-pre-approval zone, a formal evaluation of the trade-offs associated with this proposed dispersant use must be conducted. The forms and checklists found in the **DISPERSANT ASSESSMENT WORKSHEET** and **DISPERSANT USE CHECKLIST** below are designed to assist the FOSC or his/her designee in making this determination. The following is an overview of pertinent decision-making points:

- The spilled oil must be amenable to chemical dispersion. Diesel is strictly prohibited from dispersant-use;
- Oceanographic conditions allow for the effective and safe use of dispersants;
- The use of dispersants provides a net environmental benefit. Of special concern are kelp beds and marine waters less than 60 feet deep;
- Appropriate dispersants, dispersant application equipment and personnel are available.

Once the FOSC has filled out the checklists and forms and has determined dispersant use would be a viable and appropriate response option, the FOSC must put in a formal request for approval to the RRT. A spill-specific RRT conference call will be conducted in which all aspects of the dispersant-use request will be evaluated. The RRT will provide the FOSC with an answer regarding the dispersant approval request within 2 hrs of the formal request. The decision to use dispersants will be with approval of the RRT co-chairs and the representative of the State of California with consultation from the DOI and DOC. It is likely that the RRT will address similar stipulations as outlined in the pre-approval process, such as the following;

- Dispersants should not be applied directly to marine mammals within or outside of an oil slick;
- Dispersants will be applied in such a way as to avoid, to the maximum extent practicable, the spraying of seabirds outside the oil slick being treated;
- During the actual dispersant application operations, the sea surface area designated for dispersant application should be assessed by trained wildlife observers in the spotter aircraft for the presence of marine birds and mammals to avoid inadvertent spraying.
- The effectiveness of the dispersant application should be monitored at a minimum by observers trained is dispersant use and if possible with the Special Monitoring of Applied Response Technologies (SMART) monitoring program.

Quick Guide to Forms, Worksheets and Checklists

The CDP is designed primarily to assist the FOSC in making a dispersant use decision at the time of an incident. Many forms, worksheets, and checklists are included as a part of the CDP to facilitate information gathering, decision-making and providing supporting documentation, as necessary. These worksheets and forms should assist the Unified Command in making a dispersant use decision, not hinder the process with unnecessary paperwork.

As a part of the dispersant pre-approval zone decision-making process, please use the quick guide to forms, worksheets and checklists outlined below.

1) Dispersant Assessment Worksheet — Not Required by RRT

This document was designed to assist in the gathering and organization of pertinent information necessary to make a dispersant use decision.

2) Pre-Approval Zone Dispersant Use Checklist — Required by RRT

This checklist was designed to provide an overview of the pre-approval decision-making process and to provide a "dispersant decision summary" for the Incident, detailing the decisions made. Once this form is completed and the FOSC decides to use dispersants, the checklist should be faxed to the RRT as soon as feasible.

3) Dispersant Request Record of Decision — Required by RRT

This form was designed to provide a record of decision regarding the evaluation and request for dispersant use, consistent with the criteria provided in the "expedited dispersant use zone checklist." The record of decision is to be signed by all members of the Joint Unified Command and should be faxed with the dispersant use checklist to the RRT.

3) Checklist Documentation and Support Form — Not Required by RRT
Boxes #1 - #12

This form was designed as a support tool to evaluate the information required in the pre- approval zone dispersant use checklist. This form guides the user through each decision- making point, allowing evaluation of each question that is a part of the dispersant use decision-making process. This form also cross-references the appendices, as needed, where additional information can be found.

DISPERSANT ASSESSMENT WORKSHEET

Information gathered to complete this form will facilitate the RRT dispersant use determination; complete as much as possible without inadvisably delaying RRT decision-making.

This report made by: ____________ Organization: ____________ Date: ________ Time: ________
Phone: ( ) ________ Fax: ( ) ________ Mobile: ( ) ________ Pager: ( ) ________

On-Scene Commander: ____________ Agency: ____________
Phone: ( ) ________ Fax: ( ) ________ Mobile: ( ) ________ Pager: ( ) ________

Caller: ____________ Organization: ____________ Date: ________ Time: ________
Phone: ( ) ________ Fax: ( ) ________ Mobile: ( ) ________ Pager: ( ) ________
Street: ____________ City ____________ State ______ Zip Code ________

OES Control # ____________ **NRC #** ____________

SPILL

Date of spill: ____________(month/day/year) Time of spill: ____________(PST, 24-hr clock)
Location: Latitude: ____________N Longitude: ____________W

Spill source and cause: ____

Amount spilled: ____________(gal or bbl) Type of release: ❑ Instantaneous ❑ Continuous
Flow rate if continuous flow (estimate): ________
Oil name: ____________ API: ________ Pour point: ________ (ºC)

Information source: ____

ON-SCENE WEATHER, CURRENTS AND TIDES

(If not immediately available contact NOAA Scientific Support Coordinator (206-321-3320) or other resources noted in Appendix A).

Wind (from) direction: ____________ Next low tide: ______ (ft) at ______ (hrs)
Wind speed: ____________ (knots) Next high tide: ______ (ft) at ______ (hrs)

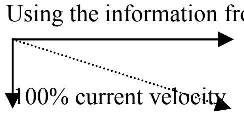
Current velocity: ________ (kts) Current (to) direction: ________ (°true/magnetic)
Predicted slick speed: ________ (kts) Predicted slick direction: ________(°true/magnetic)

Visibility: ________ (nautical miles) Ceiling: ________ (feet) Sea state:________ (wave height in feet)

Information source:____

PREDICTING SPILL MOVEMENT

Plot spill movement on appropriate nautical chart. Using the information from the box above, predict slick direction and speed using 100% of current velocity and 3% of wind speed.



Estimated distance to shore/sensitive area: ________ (nm)
Estimated time to shore/sensitive area: ________ (hrs)

ESTIMATING OIL SPILL VOLUME

Extent of spill:

(a) Length of spill ______(nm) x Width of spill ______(nm) = Total spill area _________(nm^2)

(b) Estimate what proportion (%) of the total spill area is covered by oil: _______ (Express as decimal, % x 100)

(c) Estimate slick area: ________________ x ________________ = ___________________

Total slick area (a) % oil cover (b) Estimated slick area

Estimated spill volume:

You can make this estimate using any of the following approaches:

- Get a thickness estimate from the ADIOS oil weathering model (call the NOAA SSC (**206-321-3320**) for assistance);
- Generate your own volume estimate of spilled oil and the area it covers (convert both volume and area to metric units and then divide the volume by the area to estimate the thickness. Use the unit conversions found in Appendix K). Convert thickness to millimeters to use Appendix D.1).
- Use your knowledge of the approximate number of barrels of oil or emulsion per acre of slick.

DISPERSANT SPRAY OPERATION

Dispersant spray contractor name: ______________________________________
Dispersant name: _______________________ Quantity available: _________

Street: _____________________________
City: _____________________________
State: ________ Zip Code: _____________
Phone: ( )________________________

Platform: Aircraft type: ❑ Multi-engine ❑ Single-engine
Boat type: __________________________________
Other: __________________________________
Dispersant load capability (gal): _____________________

FOSC Complete:

"Window of opportunity" for getting dispersant on the oil (App. C 10): ______________________ (hrs from first report of spill)

Number of daylight hours available for first day of dispersant application:_________________ (hrs from first report of spill)

Time to first drop on the oil: ____ (hrs from first report of spill)

Can dispersants to be effective after day one of the spill? YES / NO / Cannot determine at this time (circle one)

Note: It might be appropriate to conduct a small dispersant test before proceeding to a full application.

POTENTIAL BIOLOGICAL RESOURCE IMPACTS

Using the predictive spill and weather information from the boxes above, ADIOS, the NOAA SSC, other RRT trustee agencies, aerial wildlife observers and regional resource information noted in **Appendix B**, briefly describe potential coastal areas and resources that could be impacted form this spill.

When the spill is in a National Marine Sanctuary, Sanctuary representatives can assist with valuable resource information.

On-Water Resources:____________________

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Shallow Subtidal Resources ____________________

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Intertidal Resources:

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Anadromous Resources:

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Significant Water Column Resources: ____________________

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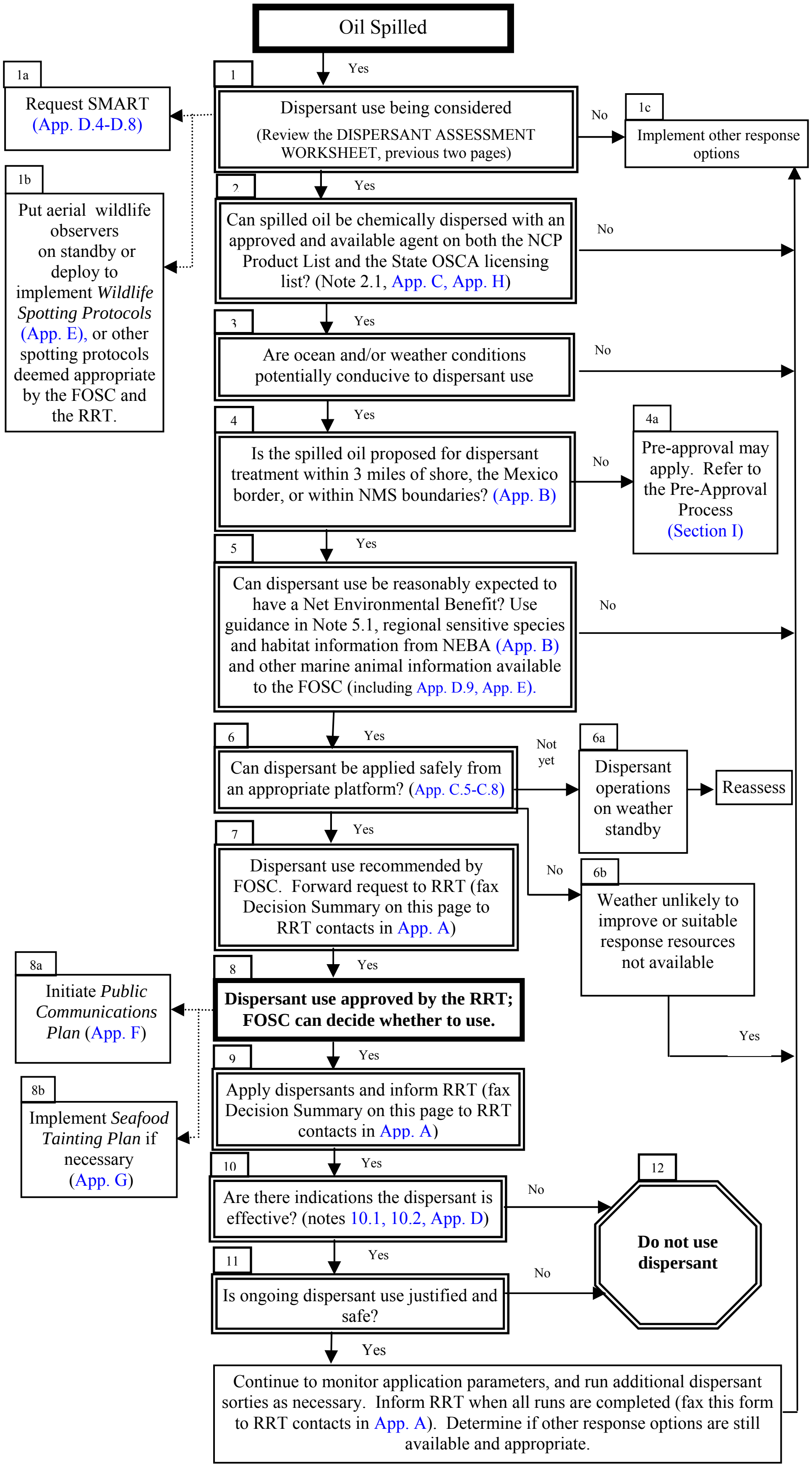
DISPERSANT USE CHECKLIST: RRT EXPEDITED APPROVAL REQUIRED ZONES



RRT Approval Zones

Dispersant Decision Summary

Spill location: ____________________

Decisions approved by: ________________

Box	Decision	Time:	Date:	Initials:
1	Yes/No	____	________	________
2	Yes/No	____	________	________
3	Yes/No	____	________	________
4	Yes/No	____	________	________
5	Yes/No	____	________	________
6	Yes/No	____	________	________
7	Yes/No	____	________	________
8	Yes/No	____	________	________
9	Yes/No	____	________	________
10	Yes/No	____	________	________
11	Yes/No	____	________	________
	Run 2	____	________	________
	Run 3	____	________	________
	Run 4	____	________	________
	Run 5	____	________	________
	Run 6	____	________	________
	All done	____	________	________
12	Do not use	____	________	________

Supplemental Decisions:

1a	Yes/No	____	________	________
1b	Yes/No	____	________	________
4a	Yes/No	____	________	________
6a	Yes/No	____	________	________
6b	Yes/No	____	________	________
8a	Yes/No	____	________	________
8b	Yes/No	____	________	________

Comments:

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The following boxes and checklists are to support decision-making. Complete as appropriate given time and information constraints. Do not allow completing each check-box to inadvisably delay an RRT decision.

BOX 1 **IS DISPERSANT USE BEING CONSIDERED?**

Dispersant use should be considered if:

- ❒ Oil is likely to significantly impact birds, marine mammals, or other flora and fauna at the water surface
- ❒ Natural dispersion is limited
- ❒ Other response techniques are unlikely to be adequate, effective, or economical
- ❒ The oil could emulsify and form mousse or tar balls
- ❒ Oil is likely to significantly impact shorelines, structures and facilities (*e.g*., marinas, wharves)
- ❒ Oil is likely to significantly impact economically important resources (*e.g*., shellfish beds, tourist beaches)
- ❒ Other ……………………………………………………………………………………………………

Decision: Consider dispersant use?

❒ Yes Make notifications in **Box 1a**
Make notifications in **Box 1b**
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

From Cawthron, 2000.

Discussion Note 1.1 **KEY BENEFITS OF DISPERSANT USE**

- Dispersant use minimizes the effects of an oil spill principally by dispersing oil before it reaches shorelines or sensitive areas (*e.g*.,wetlands, estuaries).
- Removing oil from the surface of the water reduces the potential for impacts to birds and marine mammals, and limits the action of wind on spill movement.
- Dispersants can prevent oil from sticking to solid surfaces, and enhance natural degradation.
- Dispersants can effectively treat large spills more quickly and inexpensively than most other response methods.
- Dispersants can be effective in rough water and strong currents where mechanical responses are limited.
- Effective dispersant responses can greatly reduce the quantity of oil requiring recovery and disposal.
- Dispersant use is often the only feasible response to spills that exceed mechanical response capabilities.
- Dispersant use does not generally limit other options, except oleophilic mechanical responses.
- Dispersed oil that cannot be mechanically recovered generally poses few significant environmental problems.

From Cawthron, 2000

BOX 1a **REQUEST SMART**

Immediately deploy USCG Strike Team SMART to the spill site if dispersant use is likely. Every attempt should be made by the FOSC and the Strike Team to implement the on-water component of the SMART monitoring protocols in every dispersant application. **Dispersant application should <u>not</u> be delayed should sea conditions, equipment failure, or other unavoidable circumstances preclude the positioning of monitoring equipment and personnel.** However, at a minimum, Tier 1 (visual) monitoring should occur by trained observers during any dispersant operations approved in accordance with the California Dispersant Plan. Tier 2 (on-site water column monitoring) and Tier 3 (fate and transport of the dispersed oil) SMART monitoring will be deployed as appropriate. Other information on monitoring dispersant effectiveness, including additional SMART background information, tools and report forms, is presented in **Appendices D-4 – D.8**.

Decision: Deploy SMART?

❒ Yes Use contact information in **Appendix A**. Go to **Box 1b**. **Estimated arrival time**: ____________
❒ No Note reason why not deployed. ………………………………………………………..……………
Go to **Box 1b** or **Box 1c** as appropriate.

Make a note of the decision on Dispersant Use Checklist (Page II-10)

BOX 1b **PLACE AERIAL WILDLIFE OBSERVERS ON STANDBY OR DEPLOY THEM TO IMPLEMENT THE *WILDLIFE SPOTTING PROTOCOLS***

Consider deploying trained wildlife spotters in initial spill overflight aircraft so that they can determine if the presence of marine animals in the spill or dispersant application zones could influence spray pattern decisions by the FOSC. The goal is to minimize over-spray onto unaffected animals. Wildlife spotters should use the forms and procedures given in the *Wildlife Spotting Protocols* (**Appendix E** and **Appendix D.9**). The FOSC will decide how subsequent and systematic wildlife spotting efforts can be safely conducted with the aerial resources available.

Decision: Notify/deploy aerial wildlife spotters?

❒ Yes Use wildlife spotter contact information in **Appendix E**. Go to **Box 2**.
❒ No Note reason why wildlife spotters not deployed ....
....

Make a note of the decision on Dispersant Use Checklist (Page II-10)

Reconsider under **Box 8**.

BOX 1c **IMPLEMENT OTHER RESPONSE OPTIONS**

Consider all response options to identify which option, or combination of options, is most appropriate. The following options are described in the Area Contingency Plan (Section 1640) and the Regional Contingency Plan (Section 1007.05).

❒ No action other than monitoring
❒ Containment and recovery of oil at sea
❒ Clean-up of oil from shorelines
❒ *In situ* burning

From Cawthron, 2000

BOX 2 **CAN SPILLED OIL BE CHEMICALLY DISPERSED WITH AN APPROVED AND AVAILABLE AGENT ON BOTH THE NCP PRODUCT LIST AND THE STATE OSCA LICENSING LIST?**

A NCP Product List may be found in **Appendix H**. Updated NCP Product Lists can be accessed via the EPA representative on the RRT (**Appendix A**), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) OR ACCESSING THE Internet at http://www.epa.gov/oilspill/ncp/dsprsnts.htm

The State OSCA licensed dispersants may also be found in **Appendix H** , by calling the State OSPR representative on the RRT (**Appendix A**) or) or accessing the Internet at http://www.dfg.ca.gov/ospr/reg_com/osca.html

Decision: Can this oil be dispersed with an approved and available agent?

❒ Yes Go to **Box 3.**
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

Taken in part from Cawthron,

Discussion Note 2.1 **OIL DISPERSIBILITY (Also see App. C.10 for Window of Opportunity)**

Three types of oils are typical of those produced or transported in California offshore waters: a) crude oils produced in California Outer Continental Shelf waters; b) oils imported from Alaska and foreign countries into California ports; and c) fuel oils that could be spilled from a variety of marine industrial activities (*e.g.*, fuel tanks from ships, cargoes of small tankers). Dispersants only work if the spilled oil has a relatively low viscosity at the time of treatment.

Appendices C.1 and C.2 show the California platform-produced oils and tankered oils, respectively.

Most oils produced from offshore platforms are heavy, and border on the range of oils that are considered to be difficult or impossible to disperse. The oils transported by tanker (1999-2001 data) include two-three dozen different types of oil (only the most common are listed in Appendix C.2). The most important is Alaska North Slope crude, which represents 50% of each annual total. Based on API gravity information, these oils appear to be dispersible when fresh.

- The most important criterion for dispersant use is whether the oil is dispersible.
- The best indication of oil dispersiblity is from specific oil weathering and dispersion data from field trials.
- Potential dispersibility can be *estimated* from physical properties of oils, under different oil weathering and spill scenarios (*e.g.*, ADIOS, Table 2.1 below). The ADIOS computer database predicts oil dispersion based on physical and chemical properties of spilled oil under specified spill conditions.
- Dispersant use should not be rejected exclusively on the basis of predictive models

Generally, if:

- Oil is able to spread on the water, it is likely to be dispersible.
- Viscosity is 2000 cSt, dispersion is probable.
- Viscosity is >2000 cSt, dispersion is possible.
- Viscosity is >5000 cSt, dispersion is possible with concentrated dispersant (*e.g.*, Corexit 9500).
- Sea temperature is >10º C below oil pour point, dispersion is unlikely.

Potential dispersion may also be assessed using tables in Appendix C.

Limitations of predicting dispersion:

- Using generic values of viscosity and/or pour point to predict dispersion (*e.g.*, ADIOS, Appendix tables C.3 and C.4) can underestimate the potential for oil to be dispersed.
- Most models are based on limited oil weathering, emulsification or dispersion data, therefore estimated windows of opportunity may be inaccurate.

Taken in part from Cawthron, 2000 and S.L. Ross, 2002

Table 2.1 **ADIOS (AUTOMATED DATA INQUIRY FOR OIL SPILLS) COMPUTER DATABASE**

Use the **DISPERSANT ASSESSMENT WORKSHEET** and the NOAA SSC (206-321-3320) for the information needed by ADIOS, or use the form below. The NOAA SSC should also be able to assist with ADIOS.

Copies of ADIOS are available from the NOAA website: http://response.restoration.noaa.gov/software/adios/adios.html

Oil/product name:	_____________	Wind speed: _____________ (knots)
Amount spilled:	_____________ (gal or bbl)	Wave height: _____________ (m)
Type of release:	Circle one	Water temp.: _____________ (ºC)
❑ Instantaneous		Water salinity: _____________ (ppt)
❑ Continuous		

Important limitations on the use of ADIOS: ADIOS predicts dispersibility based on estimates of oil properties (including emulsification) under different conditions. As emulsification data are scarce, **predicted rates of dispersion may be different than actual rates of dispersion**. ADIOS is intended for use with floating oils only, and does not account for currents, beaching, or containment of oil. ADIOS is unreliable for very large or very small spills. It is also unreliable when using very high or very low wind speeds in modeling the spill.

BOX 3 **ARE OCEANOGRAPHIC AND/OR WEATHER CONDITIONS POTENTIALLY CONDUCIVE TO DISPERSANT USE?**

Does the available technical information indicate that the existing oceanographic (*e.g*., surface current direction and speed, wave and chop height) and weather (*e.g*., wind direction and speed, visibility, ceiling height) conditions are suitable for a successful dispersant application?

Use the following resources:

❒ Information on the DISPERSANT ASSESSMENT WORKSHEET
❒ Consultation with the NOAA Scientific Support Coordinator (206-321-3320)
❒ Information resources and web sites noted in **Appendix A**
❒ Information from aerial overflights
❒ Information from ADIOS

Decision: Are ocean and weather conditions suitable for a dispersants application?

❒ Yes Go to **Box 4**.
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

BOX 4 **IS THE SPILLED OIL WITHIN 3 MILES FROM SHORE, A FEDERAL BOUNDARY OR WITHIN NMS BOUNDARIES?**

A full-page statewide nautical chart indicating the area three nautical miles from shore and the areas within National Marine Sanctuaries (Gulf of the Farallones, Cordell Banks, Monterey, Channel Islands) is in Chart 4.1 below. Regional charts, with dispersant approval zones noted, are in Appendix B.

Plot the position of the spill on the appropriate nautical chart, draw a circle around the spill source with a 10 nautical mile radius as a worst-case scenario for surface movement. Hash mark any area within the circle that is in waters 3 nautical miles from shore or within a National Marine Sanctuary. This is considered the dispersant operational area.

Decision: Is the spilled oil within an RRT Expedited Approval Required zone?

❒ Yes Go to **Box 5**.
❒ No Pre-Approval may apply. Go to **Box 4a**.

Make a note of the decision on Dispersant Use Checklist (Page II-10)

BOX 4a **PRE-APPROVAL MAY APPLY; REFER TO THE PRE-APPROVAL PROCESS.**

The request for dispersant use may not require a case-by-case RRT approval and may fall within the parameters of the pre-approval guidelines for the use of dispersants in RRT Regional IX. Review the Pre-Approval Guidelines and begin the pre-approval process if appropriate (see Section I).

NEW CHART FOR RRT EXPEDITED APPROVAL ZONES IS BEING DEVELOPED

BOX 5 **CAN DISPERSANT BE REASONABLY EXPECTED TO HAVE A NET ENVIRONMENTAL BENEFIT?**

Use the regional sensitive species and habitat information from the Net Environmental Benefit Analyses for each major coastal area in which dispersant use may have an impact.

Consider:

- ❒ The type and value of habitat potentially affected.
- ❒ The sensitivity of affected resources to oil, and to different oil response strategies.
- ❒ Natural recovery rates of affected species and habitats.
- ❒ Likely oil persistence and degradation rates with and without dispersant use.
- ❒ Potential oil toxicity on surface water species compared to water column and/or seafloor species.

Dispersant use is generally not appropriate in areas with limited water circulation and flushing, near aquaculture facilities, shellfish beds and fish-spawning grounds, and around seawater intakes.

Decision: Will the dispersant use have a net environmental benefit?

❒ Yes Go to **Box 6**.
❒ No Go to **Box 1c**.

Make a note of the decision on Dispersant Use Checklist (Page II-10)

Discussion Note 5.1 **ASSESSING NET ENVIRONMENTAL BENEFIT**

The most important question to answer is: **Will dispersant use significantly reduce the impact of the spilled oil**?

- Rapid decisions on use are essential as dispersant must be applied quickly to be effective.
- Decision-makers must consider the various environmental, social, economic, political and cultural factors unique to each spill.
- Tradeoffs will be necessary, as no response is likely to satisfy all parties and protect all resources. The ecological impacts of oil are generally longer-lasting and more persistent than most other impacts.
- Ecological effects will be due primarily to the spilled oil. Dispersant applied at recommended rates is unlikely to cause significant adverse effects, even in multiple applications.
- Oil dispersed into greater than 10m or water will quickly dilute to levels where acute toxic effects are unlikely.
- Few acute toxic effects have been reported for crude oil dispersed into less than 10m of well-flushed water.
- Small spills of light fuels seldom require dispersant use.

BOX 6 **CAN DISPERSANT BE APPLIED SAFELY FROM AN APPROPRIATE PLATFORM?**

Use the information in the **DISPERSANT ASSESSMENT WORKSHEET** to evaluate which application platform(s) will be most effective, given the following particular considerations:

- The amount of oil spilled;
- The location of the operational area;
- The volume of available dispersants;
- The timeframe in which the required equipment can be on-scene.

Assume for planning purposes that the weather information on the **DISPERSANT ASSESSMENT WORKSHEET** will remain the same during the timeframe in which this decision is operating. At the earliest opportunity, contact the NOAA SSC (206-321-3320) for more detailed and updated weather information, but do not delay this decision process for the NOAA SSC weather input. Weather information may also be available from resources noted in **Appendix A.** See **Appendix C** for specific information on dispersant application platforms.

Decision: Is there an appropriate application platform for a dispersant operation?

	Yes	(Type)	No
C-130/ADDS Pack	☐		☐
DC-4	☐		☐
Other large multi-engine airplane	☐	……………………	☐
Cessna AT-802	☐		☐
Other single-engine airplane	☐	…………………	☐
Helicopter	☐	…………………	☐
Work boat	☐	…………………	☐
	Go to **Box 7**		Go to **Box 6a**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

Taken in part from Cawthron, 2000 and S.L. Ross, 2002

Discussion Note 6.1 **CURRENT LOGISTICS FOR A CALIFORNIA DISPERSANTS APPLICATION**

Use the information on the **DISPERSANT ASSESSMENT WORKSHEET** to consider the following:

❒ Is the selected dispersant available in the quantity needed?
❒ Can the estimated "window of opportunity" for getting the dispersant on the oil be met?
❒ Can the dispersant and application resources get to the spill scene on time?
❒ Will there be enough daylight hours for an effective dispersant application?

Refer to **Appendix C** for more specific regional dispersant resource information.

Discussion Note 6.2 **GENERAL SAFETY ISSUES**

- The FOSC is responsible for ensuring that health and safety requirements are adequately addressed during a response.
- Individuals should not engage in activities that they are not appropriately trained to perform.
- Individuals are expected to adhere to safety procedures appropriate to the conditions they are working under and/or are included in a dispersant-specific Site Safety Plan Annex.
- Vessel/aircraft operators are expected to define appropriate operational limits and safety and maintenance requirements for their craft.
- Vessels and response resources should be properly maintained and undergo proper decontamination procedures.
- Apply dispersants only if there is no significant risk to response personnel (*e.g.*, ignition risk, operational hazards).
- Ensure the appropriate personal protective equipment (PPE) is available.
- Ensure that application aircraft and vessels remain within standard operating limits.
- Each person involved in a response is required to take personal responsibility for his or her safety. The FOSC may appoint a Safety Officer and request development of a specific Site Safety Plan Annex. Key safety aspects to be considered in the plan may include:

  - Physical hazards (e.g., waves, tides, unstable or slippery surfaces)
  - Heavy machinery and equipment
  - Chemical hazards (e*.g*., oil and dispersant exposure)
  - Atmospheric hazards (*e.g*., fumes, ignition risks)
  - Confined spaces\PPE
  - Nose
  - Fatigue
  - Heat/cold stress
  - Wildlife (bites/stings)
  - Cleanup facilities
  - Medical treatment

HUMAN SAFETY OVERRIDES ALL OTHER CONSIDERATIONS DURING A RESPONSE

From Cawthron, 2000

BOX 6a **DISPERSANT OPERATIONS ON WEATHER STANDBY**

Consult with appropriate RRT IX members (USCG/District 11 Co-Chair, EPA, DOI, DOC and OSPR (See **Appendix A** for contact information) to notify them that dispersants are being considered, but delayed due to weather.

Decision: **Has the weather improved to the point where dispersants can be applied?**

		Date	Time
❒ Yes	Go to **Box 7**	……….	……….
❒ No	Continue to **reassess** (until/unless time window for successful application closed) <u>or</u> Go to **Box 6b**	……….	……….

BOX 6b **WEATHER UNLIKELY TO IMPROVE OR SUITABLE RESPONSE RESOURCES NOT AVAILABLE**

There will be spill situations where dispersant use may be appropriate but weather conditions and available resources will not allow dispersants to get on the oil within the appropriate weather window. In these cases, dispersant use will need to be abandoned and other response options considered instead.

	Date	Time
Go to **Box1c**	……….	……….

BOX 7 DISPERSANT USE RECOMMENDATION FORWARDED BY THE FOSC TO THE RRT FOR REVIEW AND APPROVAL

Once the FOSC has completed as much as possible of the DISPERSANT ASSESSMENT WORKSHEET and the DISPERSANT USE CHECKLIST and completed the dispersant decision summary, the FOSC will forward a request, along with any other requested data, to the RRT via a phone conference. Based on the information provided, the RRT will provide an approval/disapproval decision for dispersant use within 2 hours of the request.

A dispersant use approval will be made with the concurrence of the U.S. Environmental Protection Agency and the U.S. Coast Guard representatives to the RRT and the State of California, and in consultation with the U.S. Department of Commerce and U.S. Department of the Interior natural resource trustees.

BOX 8 DISPERSANT USE APPROVED BY THE RRT

DISPERSANTS APPROVED FOR USE BY THE FOSC NEED TO BE APPLIED USING THESE RRT IX GUIDELINES AS WELL AS ANY CASE-SPECIFIC GUIDELINES ISSUED BY THE RRT AS PART OF THE APPROVAL:

- ❒ The SMART controller/observer should be over the spray site before the start of the operation. If possible, a DOI/DOC-approved marine mammal/turtle and pelagic/migratory birds observation specialist will accompany the SMART observer, but in any event, operations will not be delayed for these individuals.
- ❑ Dispersants cannot be applied to any diesel spill in the San Diego Area Contingency Plan area.
- ❒ Personnel protective equipment for personnel on-site will conform to the appropriate dispersant's Material Safety Data Sheet (MSDS).
- ❒ Dispersant application aircraft will maintain a minimum 1000-foot horizontal separation from rafting flocks of birds. Caution will be taken to avoid spraying over marine mammals and marine turtles (see Appendix A for resource agency contact information).
- ❒ If the dispersant application platform is a boat:
  - The following ASTM standards apply to systems involving spray arms or booms that extend over the edge of the boat and have fan-type nozzles that spray dispersant in a fixed pattern:
    - ASTM F 1413-92: Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems
    - ASTM F-1460-93: Standard Practice for Calibrating Oil Spill Dispersant Application Equipment Boom and Nozzle Systems
    - ASTM F 1737-96: Standard Guide for use of Oil Spill Dispersant Application Equipment During Spill Response: Boom and Nozzle Systems.
  - Boat-based systems using a fire monitor and/or fire nozzle shall avoid a straight and narrow "firestream" flow of dispersant directly into the oil. There are no applicable ASTM standards for these systems at this time (December 2003).

BOX 8a **INITIATE *PUBLIC COMMUNICATIONS PLAN***

Once a decision to use dispersants is made, it is critical that a public communications plans be implemented (**Appendix F**). The general public as well as stakeholders must be made aware of the decisions to utilize dispersants and a mechanism must be put into to for reliable and continuous updates (**Appendix F.3**).

An initial press conference should be held which outlines the decision to utilize dispersants, provides background and scientific information as well as any environmental and safety considerations. Press packet information can be found in **Appendix F.1**.

A town hall meeting should be scheduled as soon as to provide a mechanism for sharing of information as well as addressing public concerns and fears. **Appendix F.2** provides guidelines for preparation of a town hall meeting. Areas that must be adequately addressed include the following;

- Seafood tainting concerns posed by the use is dispersants (**Appendix G**).
- Risk communication (**Appendix F.2**)
- Net environmental benefit analysis conducted and species of special concern.
- Monitoring policies established for the spill.

BOX 8b **CONSULT SEAFOOD TAINTING PLAN**

- Refer to **Appendix G** for key points to consider regarding Seafood tainting, as well as information on accessing NOAA and State of California resources for assessing the tainting risk

BOX 9 **APPLY DISPERSANTS AND INFORM RRT**

❒ Using the information on <u>estimated oil spill volume</u> from the **DISPERSANT ASSESSMENT WORKSHEET** and Discussion Note 9.1 below to:

- Determine the dispersant application ratio (usually 1:20), and
- Calculate the volume of dispersant required (**Appendix D.1**).

❒ Record the details on the Dispersant Application Summary Form (**Appendix D.2**);
❒ Mobilize application team;
❒ If not already done, mobilize SMART. Some blank SMART forms are included in **Appendix D** for use by other trained professionals, if appropriate and when approved by the FOSC.
❒ Inform RRT (see **Appendix A** for contact information).

Decision: Dispersants applied?

❒ Yes Go to **Box 10**.
❒ No Explain.

Make a note of the decision on Dispersant Use Checklist (Page II-10)

In part from Cawthron, 2000

Discussion Note 9.1 **GENERAL APPLICATION INFORMATION**

- The FOSC has final responsibility for operational aspects of dispersant applications.
- Dispersant must only be applied by experienced spray applicators.
- Dispersant must be applied in accordance with manufacturer instructions, unless approved otherwise by the FOSC.
- The persons applying dispersant are responsible for the calibration and operation of the spraying system, and the safety and maintenance of the application platform.
- Droplet size is the key variable influencing dispersant effectiveness. Undersized droplets (*e.g*., fog or mist) will be lost through drift and evaporation. Oversized droplets will punch through the oil and be lost in the water column.
- Dispersants pre-diluted in water are less effective than undiluted dispersant.
- Only undiluted concentrate dispersant is applied from aircraft. Dispersant should, where possible, be applied into the wind and parallel with the slick.
- Dispersant should be applied in a methodical and continuous manner to ensure the entire target area is treated.
- Spraying effort should concentrate on the thickest sections, and/or the leading edges, of oil that threaten sensitive areas.
- Thick portions of the slick may require several applications.
- Oil sheen (oil less than approximately .001 inch or .02 mm thick) should not be sprayed with dispersant.

Regarding the relationship between Dispersant-to-Oil Ratio (DOR) and the concentration of oil being treated:

- Regardless of DOR ratios suggested by dispersant manufacturers, there are may factors that influence dispersibility (*e.g*., oil characteristics, degree of weathering, water salinity, sea state) that may make it very difficult for any "user" to select an appropriate DOR for the conditions faced on the day of a specific spill
- he variability of slick thickness (or oil concentration) is such that one can never really characterize the actual oil concentration for more than a few seconds within the speed and swath constraints of a particular application system.
- With most application systems, one is usually overdosing and underdosing as the system moves through light, heavy and sometimes "no" oil on the water surface.
- The best estimate of the average oil thickness (or average volume of oil per unit are) must be used.
- Crude oil that is dark in color and thick enough to merit any response is generally between .001 inch (.017 mm) thick and .01 inch (0.25 mm). Crude oil emulsion begins to form at .01 inch (0.25 mm), and tar balls at .1 inch (2 mm). See Appendix D.1 for more information.
- Given that precise spray parameters are extremely difficult to achieve, dispersant applicators generally use about 5 gallons of dispersant per acre on their first run. This is a "middle-of-the-road" concentration in most situations of 2 to 3 barrels of oil per acre (or ~ 100 gallons per acre) following the initial rapid spreading phase. With a common accepted DOR of 1:20, the recommended dosage would be 1/20 x 100, or 5 gallons of dispersant per acre.
- Area, volume and thickness can be related with the following expression:

10^4 x Area (hectare) x Thickness (mm) = Volume (liters)

or

Volume (liters/Area (hectares) = 10^4 x Thickness (mm)

►To convert liters/hectare to gallons/acre, multiply by 0.107
►To convert liters/hectare to gallons/square kilometer, multiply by 26.42

►These values (in any units) multiplied by the DOR (as a fraction, e.g., 1:5 = 1/5 or .2) will then yield the Desired Dosage (in those units) for that value of DOR.

- Refer to **Appendix D.1** for some pre-calculated values.

From Cawthron, 2000 and Al Allen (Spilltec), 2003 personal communication

Discussion Note 9.2 **AERIAL APPLICATION**

This general aerial application guide is intended simply to highlight key issues. The FOSC will coordinate and oversee operational aspects of aerial dispersant applications.

- Aircraft applications should always include pump driven spray units.
- Dispersant droplet size should be between 400 and 1000 microns.
- Commercial aircraft spray nozzles generally range between 350 and 700 microns.
- 1000 micron spray nozzles may be needed for use on viscous oils.
- Nozzles should achieve an application rate of between 5.3 gallons per acre (1:20 ratio)
- Spray nozzles should be installed to discharge directly aft.
- Underslung buckets on helicopters should be mounted so the pilot can see the ends of the spray booms in flight.
- The altitude of the aircraft should be as low as possible.

From Cawthron, 2000

Discussion Note 9.3 **BOAT APPLICATION**

- Spray booms should be mounted as far forward as possible t prevent oil being moved aside by the bow wave before being sprayed. This then utilizes the mixing energy of the bow wave to break up the oil.
- Spraying systems should be set so that the spray pattern is flat, striking the water in a line perpendicular to the direction of the boat's travel.
- The fan-shaped sprays from adjacent nozzles should be set as low as possible, overlapping just above the oil/water surface, with the inboard spray striking the hull just above the waterline.

Undiluted dispersants

- Air blast sprayers and modified spray pumps can be used to apply undiluted concentrated dispersants and conventional dispersants.
- Treatment rate is usually constant and determined by nozzle size and spray pressure.
- Calibration and use of an appropriate droplet size is critical toe effective applications.

Pre-diluted dispersants

- Concentrated dispersants can be applied after pre-dilution in seawater, but will be less effective.
- The dispersant : water ratio should be equal to, or greater than, 10%
- Applications through ship's fire-fighting equipment are controlled by opening or closing the dispersant supply. Vessel speed is used to control the treatment rate.
- Dual pump systems for dispersant and seawater supplying spray booms allow the dilution rate to be adjusted.
- Boat speed is the main determinant of dispersant dose rate (reduce boat speed to increase the dose rate).
- Boat speed should be in the order of 5 knots for fresh spills of liquid crude or fuel oil, which assumes that the oil has spread to 0.1 mm thick.
- With reduced boat speeds, the required application rate per acre or km^2 can be maintained by reducing pump speed.

From Cawthron, 2000

BOX 10 ARE THERE INDICTIONS THE DISPERSANT IS EFFECTIVE?

- ❑ Acquire information from dispersant monitoring team (SMART team or other FOSC-designated monitors).
- ❑ Review dispersant monitoring results after each dispersant application.
- ❑ Determine if dispersant application is effective.
- ❑ Determine if chemical dispersion is significantly greater than natural dispersion.
- ❑ Assess whether changing application parameters could make the application more effective.

Decision: Is the dispersant effective?

- ❑ Yes Go to **Box 11**
- ❑ No See Discussion Note 10.2 and return to **Box 9**, or Go to **Box 12**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

From Cawthron, 2000

Discussion Note 10.1 ASSESSING DISPERANT EFFECTIVENESS

- Dispersant applications must be monitored to confirm whether or not dispersant use is effective, and to determine the fate and transport of treated oil.
- Dispersant applications should not be delayed simply because monitoring is not in place.
- Visual observation is the minimum level of monitoring. Observations teams may use the forms in **Appendix D**.
- There will be very few instances where a dispersant application is possible but visual monitoring is not.
- Because dispersed oil plumes are often highly irregular in shape and thickness, it can be difficult to accurately estimate dispersant efficiency.
- The appropriate dispersant application dose depends on the oil thickness (see **Appendix D.1** for common dose rates based on oil thickness). Slicks are generally not of uniform thickness, and it is not always possible to distinguish among thicker and thinner portions of the same slick. It is therefore possible to apply too much or too little dispersant to some parts of a slick. Because over- and under-dosing can lead to variations in effectiveness, these variations should be noted.
- On-site monitoring of oil dispersed in the water column should support visual monitoring whenever possible. See **Appendix D** for additional information and forms.
- Decisions to terminate operations due to poor effectiveness should ideally be based on on-site monitoring results.
- A visible coffee-colored cloud in the water column indicates the dispersant is working.
- A milky-white plume in the water column can indicate excessive dispersant application.
- When dispersant is working, oil remaining on the water surface may also change color.
- A difference in the appearance of treated and untreated slicks indicates dispersion is likely.
- Absence of a visible cloud in the water column makes it difficult to determine whether the dispersant is working. When the water is turbid, you may not be able to see a plume. Oil remaining at the surface and sheens can also obscure an ability to see oil dispersing under the slick.
- Successful dispersion can occur with no visible indication of dispersion.
- A subsurface plume may not form instantly once dispersant has been applied. In some cases (*e.g.*, emulsified oil) it can take several hours for a plume to form. In other cases, a visible plume may not form, and you may wish to use sampling to learn whether dispersion has occurred.
- Boat wakes may physically part oil, falsely indicating successful dispersion. Mechanically dispersed oil will re-coalesce and float to the surface.
- Dispersants sometimes have a herding effect on oil after initial applications, making a slick appear to be shrinking when, in fact, the dispersant is "pushing" the oil together. The effect results from the surfactants in the dispersant, which causes a horizontal spreading of thin oil films. This can cause parts of a slick to seem to disappear from the sea surface for a short time.

From Cawthron 2000 and NOAA Oil Spill Job Aids

Discussion Note 10.2 **WHEN DISPERSANT IS NOT EFFECTIVE**

If monitoring shows dispersion does not appear effective, review all aspects of the application and monitoring for possible reasons why. Aspects to consider include:

- Dispersant formulation
- Application rations (increase or decrease oil: dispersant ratio)
- Application methods
- Monitoring methods
- Interpretation of monitoring results
- Oil weathering
- Weather conditions

From Cawthron, 2000

BOX 11 **IS ONGOING DISPERSANT USE JUSTIFIED AND SAFE?**

All of the following must apply to justify ongoing dispersant use:

- ❑ The spill can be chemically dispersed with an approved and available agent (see **Box 2** and **Appendix H**);
- ❑ Oceanographic and weather conditions are potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The dispersant will have a net environmental benefit (see **Box 5**);
- ❑ The dispersant can be applied safely (see **Box 6**), with suitable weather (**Box 6a**) and available resources (**Box 6b**);
- ❑ The dispersant is effective (see **Box 10**).

Decision: Continue with dispersant use?

- ❑ Yes Go to **Box 9**
- ❑ No Go to Box 12

There will be a point when dispersants are no longer effective.

BOX 12 **DO NOT USE DISPERSANT**

Dispersants should not be used if **any** of the following apply:

- ❑ The spill cannot be chemically dispersed with an approved and available agent (see **Box 2** and);
- ❑ Oceanographic and weather conditions are not potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The dispersant will not have a net environmental benefit (see **Box 5**);
- ❑ The dispersant cannot be applied safely (see **Box 6**), with suitable weather (**Box 6a**) or available resources (**Box 6b**);
- ❑ The dispersant is not significantly more effective than natural dispersion or other response options (see **Box 10**).

IF DISPERSANT USE IS CONSIDERED INAPPROPRATE, CONSIDER OTHER RESPONSE OPTIONS.

DISPERSANT EXPEDITED APPROVAL REQUEST
RECORD OF DECISION

Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP.

The Region IX, Regional Response Team has established dispersant expedited approval zones within waters of the State, any waters within a marine sanctuary waters and all waters within three miles of landfall. Any dispersant use within these zones requires that the designated Federal On-Scene Coordinator request approval by the RRT. For purposes of this record of decision, the designated FOSC has completed the "Expedited Dispersant Use Checklist" and has determined that the oil spill, *Name of Oil Spill Incident*, meets the criteria outlined within the checklist and formally requests a dispersant use decision from the RRT.

________________	_______________
Federal On-Scene Coordinator United States Coast Guard	Date

California statute requires that emergency response operations utilize the Incident Command System. For marine oil spill response, a joint Unified Command Structure is implemented consisting of the Federal On-Scene Coordinator, the State On-Scene Coordinator and the Response Party and outlined in the Memorandum of Understanding between the United States Coast Guard and the California Department of Fish and Game, Office of Spill Prevention and Response. For purposes of this record of decision, request for the use of dispersants is formally requested by FOSC and the dispersant use checklist was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party.

____________________________	______________________________
State On-Scene Coordinator Office of Spill Prevention and Response State of California	Responsible Party Representative
________________	________________
Date	Date

REFERENCES CITED

Etkin, Dagmar Schmidt. 1999. Oil Spill Dispersants: From Technology to Policy. Cutter Information Corp, Arlington, MA.

ExxonMobil Dispersant Guidelines. 2000. ExxonMobil Research and Engineering Company.

Mearns, A.J. & R.Yender, 1997. A summary of a NOAA workshop on management of seafood issues during an oil spill response. Proc. Arctic and Marine Oil Spill Program Technical Seminar. Environment Canada, Vancouver, pp. 203-214.

Reilly, T.I. and R.K York. 2001. Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill. NOAA Technical Memorandum NOS OR&R 9.107pp.

Ross, S.L. 2002. Assessment of the Use of Dispersants on Oil Spills in California Marine Waters. S.L. Ross Environmental Research, Ltd. for Minerals Management Service, Herndon, VA.

State of California, Office of Emergency Services. 2001. Risk communication Guide for State and Local Agencies. 17pp.

Stevens, Leigh. 2000. Oil Spill Dispersants: Guidelines for use in New Zealand. Prepared for Maritime Safety Authority of New Zealand.

Wildlife Response Plan Appendices of the California Area Contingency Plan. Version 2, October 2003.

Yender,R., J. Michel, and C. Lord. 2002. Managing Seafood Safety After an Oil Spill Seattle: Hazardous Materials Response Division., Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

Resources from Internet World Wide Web sites:

NOAA Oil Spill Job Aids	http://response.restoration.noaa.gov/job_aid/glossary.html
(web links of 12/18/03)	http://resposne.restoration.noaa.gov/oilaids/spiltool
	http://response.restoration.noaa.gov/disp_aid/remember.html
	http://response.restoration.noaa.gov/disp_aid/checklist.html
	http://response.restoration.noaa.gov/oilaids/OilatSea.pdf
	http://response.restoration.noaa.gov//oilaids/SMART/SMART.html

APPENDIX A

CONTACT NUMBERS AND RELEVANT WEB SITES

A.1 Agencies and Institutions

	Web Address	Phone
To Report Marine Pollution/Spills		800-424-8802
California Office of Emergency Services		800-852-7550
U.S. Coast Guard		
Marine Safety Offices		
San Francisco	http://homeport.uscg.mil/sanfrancisco	510-437-2956
Los Angeles-Long Beach	http://homeport.uscg.mil/lalb	310-732-2000
San Diego	http://homeport.uscg.mil/sandiego	619-683-6500
Weather and surf		619-289-1212
National Oceanic and Atmospheric Administration & NOAA National Weather Service		
Scientific Support Coordinator for California (Jordan Stout)		206-321-3320
Pager		800-759-8888 pin 5798818
Mobile		206-321-3320
Ocean Prediction Center	http://www.opc.ncep.noaa.gov or http://tidesandcurrents.noaa.gov/	
Tide Predictions and Coastal Water Temperature Guide	http://tidesandcurrents.noaa.gov/	
Nautical Charts	http://www.nauticalcharts.noaa.gov	
Physical, Chemical and Geological Ocean Data	http://www.ngdc.noaa.gov or http://www.ncddc.noaa.gov	
NOAA Trajectories, ESI maps, Job aids, etc.	http://response.restoration.noaa.gov	
National Weather Service – Local Offices and Forecasts		
Eureka	http://www.wrh.noaa.gov/eka/	707-443-6484
SF/Monterey	http://www.wrh.noaa.gov/mtr	831-656-1725
Oxnard/Los Angeles	http://www.nwsla.noaa.gov/buoy.html	805-988-6610
San Diego	http://www.wrh.noaa.gov/sgx	858-675-8700

APPENDIX A, continued

	Web Address	Phone
Other Measured Currents and Wind Data Sources		
UC San Diego	http://sdcoos.org/index.php	
Scripps	http://facs.scripps.edu/surf/weatherbody.html	
Regional Response Team (Region 9)	http://www.rrt9.nrt.org/ (tentatively will change in 2009)	
Coast Guard:	http://www.uscg.mil/D11/	
Command Center		510-437-3700
Captain Douglas Kaup: (RRT 9 Co-Chair)		510-437-5754
Susan Krala: Coast Guard RRT Coordinator		
Environmental Protection Agency:		
Daniel Meer (RRT 9 Co-Chair)		415-972-3132
Kay Lawrence (EPA alternate)		
Bill Robberson (EPA RRT Coordinator)		415-972-3072
Pager		800-759-8888 pin 2832870
Department of Interior:	http://www.doi.gov/	
Patricia Port (DOI representative)		510-817-1476
John Perez (alternate)		510-817-1477
Department of Commerce:	http://response.restoration.noaa.gov/	
Jordan Stout (primary representative)		206-321-3320
Doug Helton (alternate)		206-890-7760
State Office of Spill Prevention and Response	http://www.dfg.ca.gov/ospr/	
Yvonne Addassi (primary representative – Marine)		916-324-7626
Office		916-864-4906
Mobile		916-956-1162
National Marine Sanctuaries		
Channel Islands	http://channelislands.noaa.gov/	
24-hour pager		877-982-2617
Sanctuary Office		805- 966-7107
Ben Waltenberger		805-729-3082
Chris Mobley, Sanctuary Superintendent		805-259-6540
Andrea Hrusovsky		805-729-2388

APPENDIX A, continued

	Web Address	Phone
Monterey Bay	http://montereybay.noaa.gov/	
24-hr pager		888-902-2778
Main office phone		831-647-4201
Gulf of the Farallones & Cordell Bank	http://farallones.noaa.gov/	
Main office phone		415-561-6622
Superintendent: Maria Brown		415-561-6622 x 301
NMS Washington, D.C.		
Lisa Symons (pager)		800-218-1232

RRT10 – Contact through the Command Center 206-220-7001.

California Department of Health Services http://www.dhs.ca.gov/home/contactinfo/programcontacts.html

Division of Drinking Water and Environmental Management	916-449-5577
Environmental Health Investigations Branch	510-622-4500

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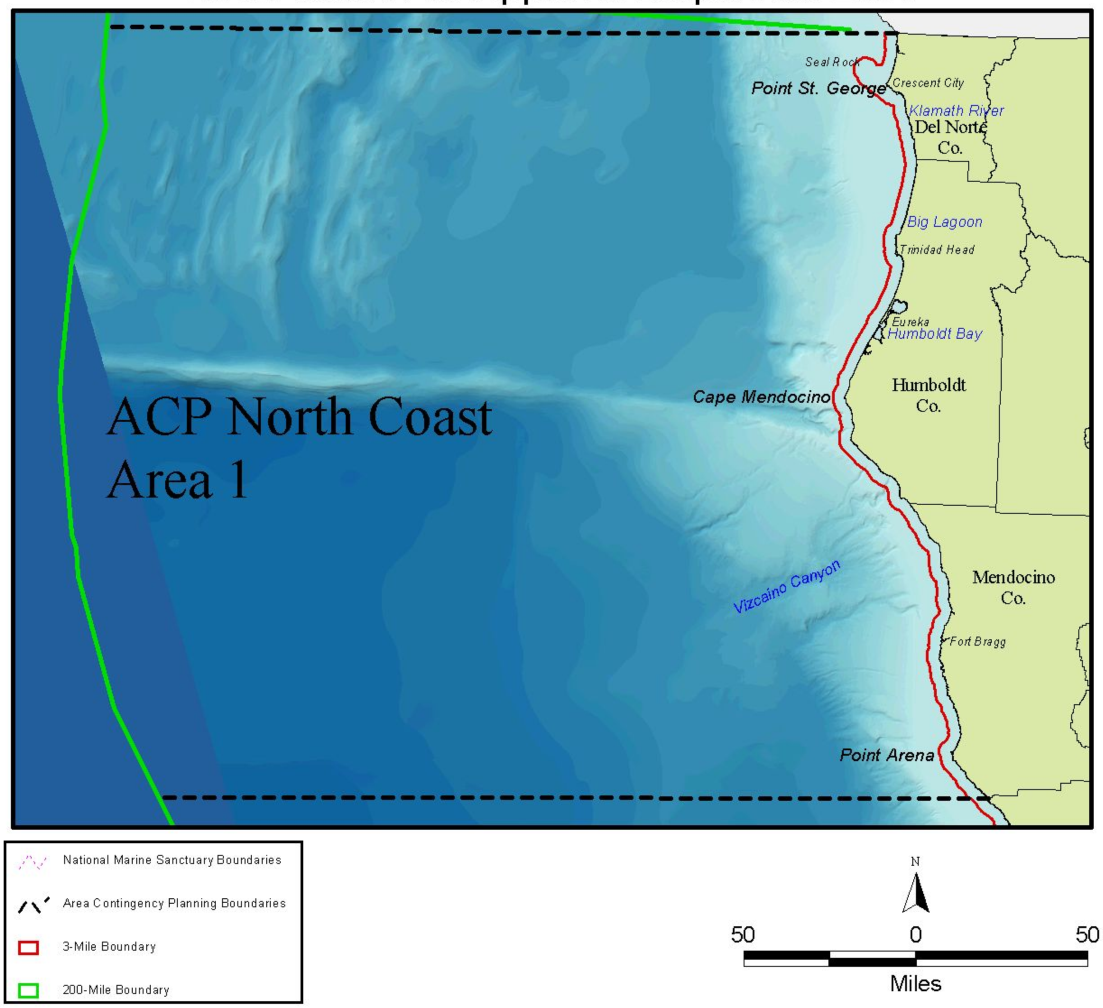
APPENDIX B

DISPERSANT ZONE CHARTS AND REGIONAL WILDLIFE RESOURCE SUMMARIES

B.1 North Coast

North Coast Pre-Approval Dispersant Zone



The North Coast dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red) and shoreward of the 200-mile line (shown in green). Areas inside state waters or within 3 miles of the California-Oregon border are "RRT Approval Required"; RRT approval will be case-specific.

Offshore sea birds are seasonally concentrated in the areas off Point Arena, Cape Mendocino and Point St. George. These include phalaropes, auklets, petrels, shearwaters, fulmars, gulls and murres. Loons, grebes, endangered brown pelicans and marbled murrelets commonly occur inshore. Recent oil spills in the Humboldt Bay region have demonstrated that common murres and marbled murrelets are very susceptible to spilled oil. Shore birds, including the endangered western snowy plover, are also at risk should spilled oil reach the shore.

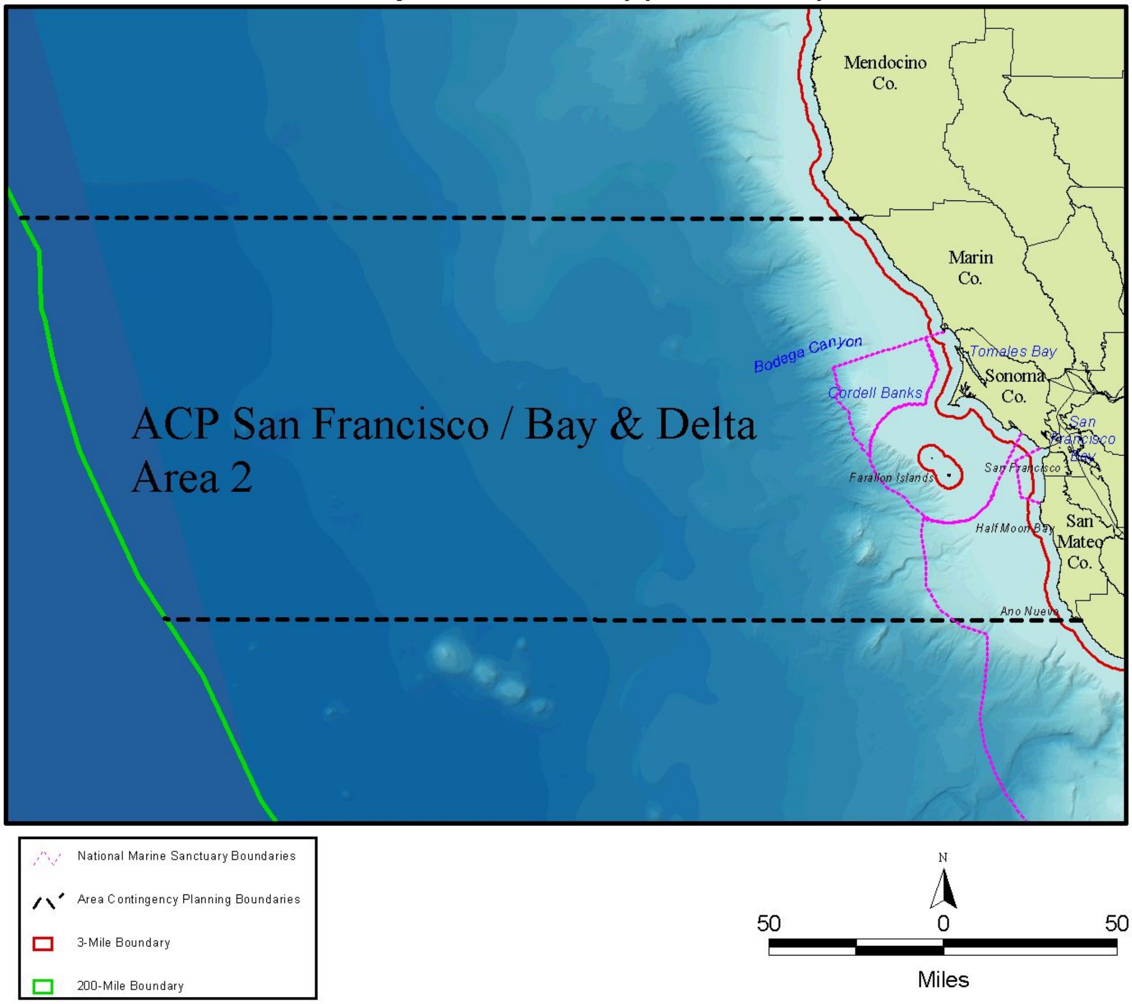
Many marine mammal species are potentially at risk, including several species of cetaceans (whales, dolphins, porpoises) and pinnipeds (seals and sea lions). Endangered cetaceans include blue, fin, humpback and sperm whales. Heavy oiling of the intertidal and upland areas of the coast can threaten harbor seal, Stellar sea lion and elephant seal pups.

Sensitive marine mammal areas include the slopes and offshore waters over Mendocino Ridge, the Vizcaino Canyon fan (used seasonally by northern fur seals), the Stellar sea lion rookeries at Cape Mendocino and Seal Rock, and the sea lion and harbor seal haul outs on St. George Reef and Trinidad Head. In addition, the waters near St. George Reef, the Klamath River mouth, and Big Lagoon near Trinidad Head support year-round populations of gray whales.

As oil comes ashore, the rocky intertidal habitat, as well as wetlands and mud flats adjacent to river mouths, are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the marsh/wetland areas are the many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon and steelhead trout.

B.2 San Francisco-Bay Delta

San Francisco-bay Delta Pre-Approval Dispersant Zone



The San Francisco-Bay Delta dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Gulf of the Farallones, Cordell Banks, and Monterey Bay National Marine Sanctuaries (shown in magenta). Areas inside state waters or a National Marine Sanctuary are "RRT Approval Required"; RRT approval will be case-specific.

The offshore regions of the area are some of the most productive along the entire west coast. At least 11 species of sea birds are known to breed in the area including common murres, two species of auklets, storm petrels, tufted puffins, pigeon guillemots, and two species of cormorants. In addition, an additional 35 species of sea birds are seasonal visitors to the region (USGS, 2000). Several species of birds occur inshore, including the endangered marbled murrelet.

Recent oil spills in the San Francisco region have demonstrated that both common murres and marbled murrelets are very susceptible to spilled oil. Shore birds, including the endangered western snowy plover, are also at risk should spilled oil reach the shore.

The offshore area is also a haven for marine mammals. At least 33 species of marine mammals have been reported for the region, many of which are federally listed as endangered or threatened. Endangered species include the blue, humpback, fin, sei, right and sperm whales; threatened species include the Stellar sea lion, Guadalupe fur seal and the California sea otter.

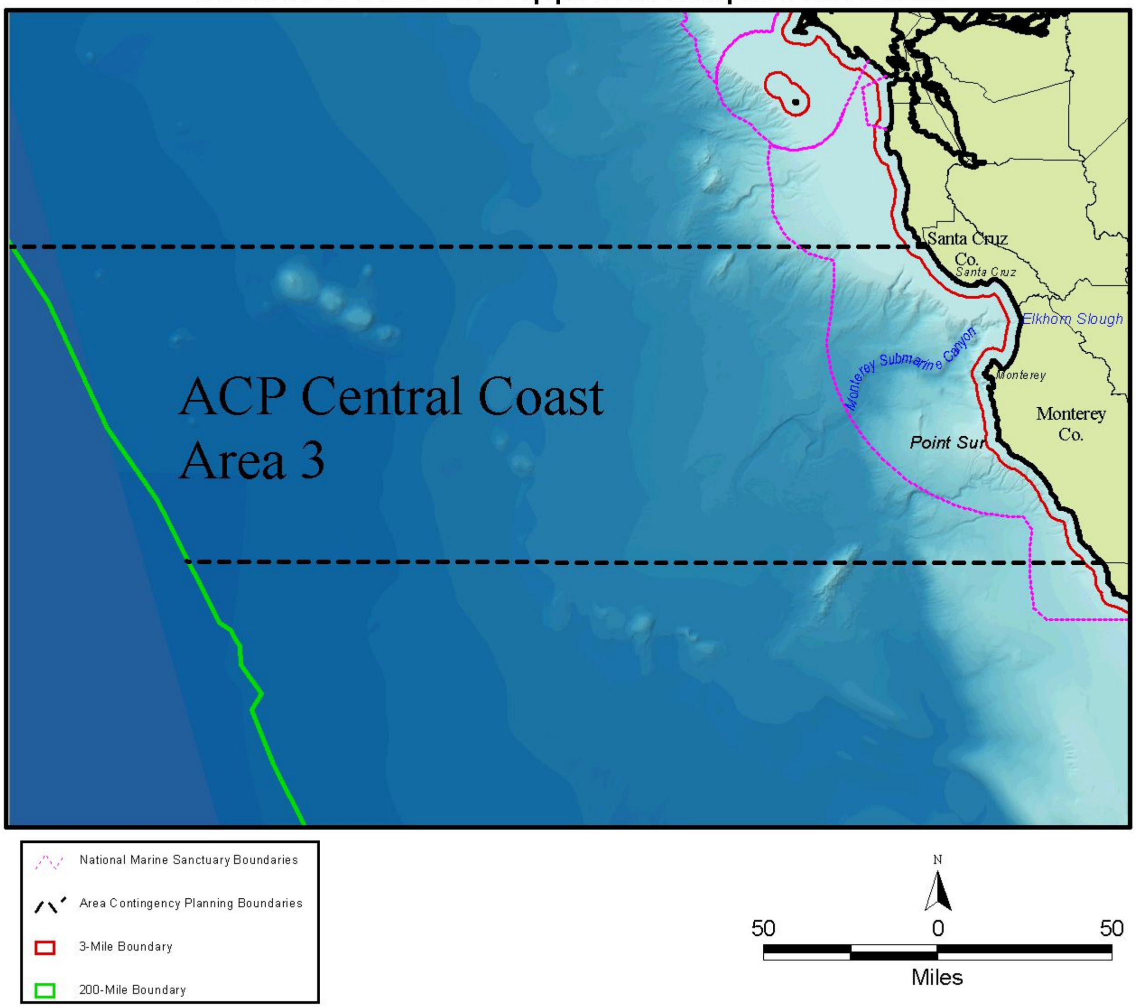
Most of the marine mammals are potentially at risk from spilled oil. In addition, heavy oiling of the intertidal and upland areas of the coast and Farallon Islands will threaten harbor seal, Stellar sea lion, northern elephant seal and northern fur seal pups.

The most sensitive regions of the waters off the San Francisco Area are the highly productive upwelling zones and shelf areas where both sea birds and marine mammals congregate in the spring and summer months to feed. These regions include Bodega Canyon, Cordell Banks, the region between Point Reyes and the Farallon Islands, and the shelf break off the most northern of the Farallon Islands.

As oil comes to shore, the rocky intertidal habitat, as well as wetlands and mud flats adjacent to river mouths, are at significant risk not only from the beached oil, but also from most of the cleanup procedures used to remove the oil. Of special concern in the marsh/wetland are many species of birds and mammals that inhabit these areas, as well as the potential for impacts to the young-of-the-year of the endangered Coho salmon and steelhead trout that may be residing in the area.

B.3 Central Coast

Central Coast Pre-Approval Dispersant Zone



The Central Coast dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Monterey Bay National Marine Sanctuary (shown in magenta). Areas inside state waters or National Marine Sanctuaries are "RRT Approval Required"; RRT approval will be case-specific.

Oil spills within the offshore region of the Central Coast initially threaten all sea birds and marine mammals that frequent the area. If the spilled oil is driven on shore by the sea conditions and prevailing winds, additional resources (*e.g.*, shore birds, intertidal organisms, seal and sea lion pups) are at risk for oiling.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. High concentrations of seabirds occur in nearshore waters off Santa Cruz and Monterey counties, although seabird abundance drops south of Pt. Sur due to low water column productivity. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Sea bird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, sea bird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Over 100 species of sea birds have been reported from the region; about 70 of these species occur regularly. In the offshore (water depth > 200m) waters, common sea bird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmars, black-legged kittiwake, herring, Bonaparte's, western and California gulls, Cassin's and rhinoceros auklets, and common murres. In Monterey Bay proper, a significant segment of the world's ashy storm-petrel population is present during the autumn. Near shore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western grebes, and western, California and Bonaparte's gulls. In addition, endangered species including brown pelicans, marbled murrelets (northern area of region), western snowy plovers, and least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Of all the sea birds occurring in the region, the common murre appears to be one of the species most frequently involved in oil spills. Data collected by the Office of Oil Spill Prevention and Response indicate that common murres are the most frequently oiled bird collected during recent central and northern California spill responses (Monterey Bay Mystery Oil Spill, 1997; Pt. Reyes tar ball incidents, 1997-98; T/V *Command* spill, 1999; San Mateo Mystery Spill (*Jacob Luckenbach*), 2001-03).

Shorebirds are another important component of the avifauna of the Central Coast area. More than 40 shorebird species have been recorded in central California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores. Common shorebird species in the area include black-bellied plover, willet, whimbrel, marbled godwit, black turnstone, sanderling, western sandpiper, least sandpiper, dunlin and dowitchers. Breeding shorebirds are limited to black oystercatcher, black-necked stilt, American avocet, killdeer, and the threatened western snowy plover, which nests and winters on sandy beaches.

Because of their migratory nature and the fact that few breed in the area, shorebirds are most abundant from fall through spring; comparatively few shorebirds remain during the summer months

A number of marine mammal species are potentially at risk from spilled oil in this region of the coast. At least 34 species of marine mammals inhabit or visit California waters. These include six species of pinnipeds (seals and sea lions), 27 species of cetaceans (whales, porpoises and dolphins) and the sea otter. Cetaceans, including a number of endangered species (blue, humpback, fin, sei, right and sperm whales), use area waters as year-round habitat and calving grounds, important seasonal foraging grounds or annual migration pathways. Neither of the two threatened or endangered pinniped species occasionally seen in the area (Guadalupe fur seal, Stellar sea lion) breed here, but a large breeding population of northern elephant seals occurs at Año Nuevo, directly to the north and adjacent to the Central Coast planning area. California sea lions, harbor seals and sea otters also occur here. Harbor seals breed on offshore rocks and isolated beaches of the central coast. Aside from the breeding locations (Año Nuevo, the central coast) thousands of pinnipeds (elephant seals, California sea lions, harbor seals, Guadalupe fur seals, northern fur seals, Stellar sea lions) feed in and move through the area as either resident or migrating populations. The sea otter, a year-round resident of mainland central coast nearshore waters (generally within 6 miles of shore), is an endemic population of limited range and numbers currently experiencing population stress.

Marine mammals vary in their susceptibility to the effects of oiling. Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation against the cold are among the most sensitive marine mammals to the effects of oil contamination. Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat. Cetaceans, which rely on layers of body fat and vascular control rather than pelage to retain body heat, are considered less vulnerable to the effects of oiling than pinnipeds.

Sea otters would be at high risk from an oil spill if oil were to reach nearshore waters of the region where most of the population is concentrated. Depending on the time of year, heavy oiling of intertidal and upland areas of the mainland coast could also threaten harbor seal and northern elephant seal pups.

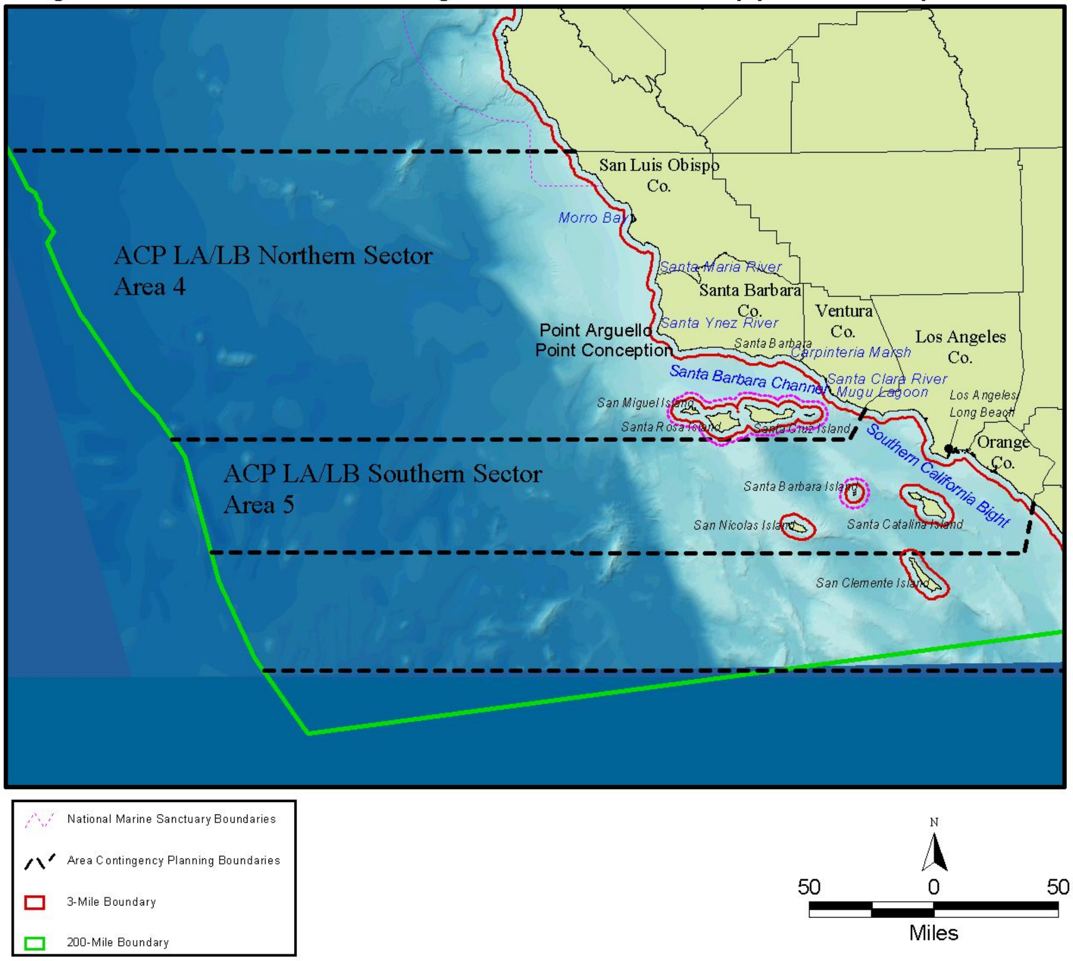
At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses and changeable environmental conditions. The Monterey Submarine Canyon is an extremely important topographical feature in the central coast region, to which the area's large faunal species diversity and density is attributed. The fish represent a mix of permanent residents and periodic visitors. The important fish species of central California include northern anchovy, albacore tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardine, Pacific whiting, Pacific herring, salmon, steelhead trout and sharks. Most of these species are widely distributed in the area, and it is unlikely that an oil spill will harm enough individuals, their prey or habitat to significantly decrease these populations. However, northern anchovy are of concern since their restricted distributions during parts of their life cycle make them vulnerable to impacts from spilled oil. Another species that is abundant in the epipelagic zone and vulnerable to impacts is the market squid. Although squid are widely distributed offshore during most of their life cycle, they congregate inshore in very large numbers during spawning. Monterey Bay is one of the most important spawning areas in the state.

Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Various species of abalone are, where they occur, especially at-risk members of the shallow rocky habitat. Currently, all major species of abalone in the central California area are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil.

As oil comes on shore, the rocky intertidal habitat as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon, and steelhead trout.

B.4 Los Angeles (north and south)

Los Angeles-North and Los Angeles-South Pre-Approval Dispersant Zone



The Los Angeles (north and south) dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Channel Islands National Marine Sanctuary (shown in magenta). Areas inside state waters or National Marine Sanctuaries are "RRT Approval Required"; RRT approval will be case-specific.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. High concentrations of seabirds occur in nearshore waters from Morro Bay to Point Arguello and the Santa Barbara Channel. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Seabird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, seabird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Although over 100 species of seabirds have been reported from the region, the majority of individuals are composed of about 30 species. In the offshore waters (water depth > 200m), common seabird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmar, black-legged kittiwake, gulls (herring, Bonaparte's, western and California), auklets (Cassin's and rhinoceros) and common murres. Nearshore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western grebes and western, California and Bonaparte's gulls. In addition, endangered species including brown pelicans, marbled murrelets (northern area of region), western snowy plovers, and least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Breeding seabirds are especially vulnerable to oil spills. Seabird colonies occur on the Channel Islands and along the mainland from Pt. Conception north; few, if any, seabirds nest on the mainland south of Pt. Conception. The most common breeding species in this area include storm petrels (Leach's, ashy, and black), California brown pelican, cormorants (Brandt's, double-crested, and pelagic), western gulls and alcids (pigeon guillemot, Cassin's auklet, rhinoceros auklet). Although breeding seasons also vary from species to species, one or more species is generally conducting some aspect of reproduction (nest building, egg laying, chick rearing, etc.) from April through August. In 1989-1991, the total breeding seabird population of the project area was estimated at over 100,000 birds, representing about 16 percent of the total California seabird population.

Shorebirds are another important component of the avifauna of the Los Angeles-Long Beach area. More than 40 shorebird species have been recorded in central and southern California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Almost all shorebirds migrate to the area from northern breeding sites; very few shorebirds breed in this area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores. Common shorebird species in the area include black-bellied plover, willet, whimbrel, marbled godwit, black turnstone, sanderling, western sandpiper, least sandpiper, dunlin, and dowitchers. Breeding shorebirds are limited to black oystercatcher, black-necked stilt, American avocet, killdeer, and the threatened western snowy plover, which nests and winters on sandy beaches.

Because of their migratory nature and the fact that few breed in the area, shorebirds are most abundant from fall through spring; comparatively few shorebirds remain during the summer months. Important shorebird use areas include Mugu Lagoon, Santa Clara River mouth, Carpinteria Marsh, Goleta Slough, the Santa Ynez River mouth, and the Santa Maria River mouth. Shorebird densities are not available for these areas, but they are generally considered to be lower than heavily used areas, such as the San Francisco Bay. Although densities are not available, shorebirds occupying sandy beaches in nearby Ventura County averaged about 44 birds per linear kilometer of beach.

A number of marine mammal species are potentially at risk from spilled oil in this region of the coast. At least 34 species of marine mammals inhabit or visit California waters. These include six species of pinnipeds (seals and sea lions), 27 species of cetaceans (whales, porpoises, and dolphins), and the sea otter. Pinnipeds breed on the Channel Islands and on offshore rocks and isolated beaches along the mainland coast; thousands also move through the area during their annual migrations. Cetaceans, including a number of endangered species, use area waters as year-round habitat and calving grounds, important seasonal foraging grounds, or annual migration pathways. The sea otter, a year-round resident of the mainland coast north of Point Conception, is appearing in increasing numbers in the western Santa Barbara Channel and around the northern Channel Islands.

The threatened or endangered marine mammal species found in southern California waters include six whales (blue, humpback, fin, sei, right, and sperm whales), two pinnipeds (Guadalupe fur seal and Steller sea lion), and the southern sea otter. The two threatened pinniped species do not breed in the area and presently are uncommon in southern California waters.

Marine mammals vary in their susceptibility to the effects of oiling. Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation are most likely to suffer mortality from exposure. Sea otters, which rely almost entirely on maintaining a layer of warm, dry air in their dense underfur as insulation against the cold, are among the most sensitive marine mammals to the effects of oil contamination. Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat. Cetaceans, which rely on layers of body fat and vascular control rather than pelage to retain body heat, are considered less vulnerable to the effects of oiling than pinnipeds.

Sea otters would be at high risk from an oil spill if oil were to reach nearshore waters of the region. Depending on the time of year, heavy oiling of intertidal and upland areas of the mainland coast could also threaten harbor seal and northern elephant seal pups. Similar contact to the northern Channel Islands, particularly San Miguel Island, could have significant impacts on California sea lion, northern fur seal, northern elephant seal, and harbor seal pups, and possibly on adult fur seals as well.

At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses, and changeable environmental conditions. Point Conception is widely recognized as a faunal boundary with mostly cold-water species found to the north and warm-water species found to the south, though extensive migrations do occur as a result of fluctuating environmental conditions. In fact, warm- and cool-water events in the Southern California Bight (SCB) affect fish recruitment and can alter the composition of some fish assemblages for years. The SCB is located in the transition area between Pacific subarctic, Pacific equatorial, and North Pacific central water masses, and the fish fauna contains representatives from each of these sources. Of the 554 species of California marine fishes, 481 species occur in the SCB.

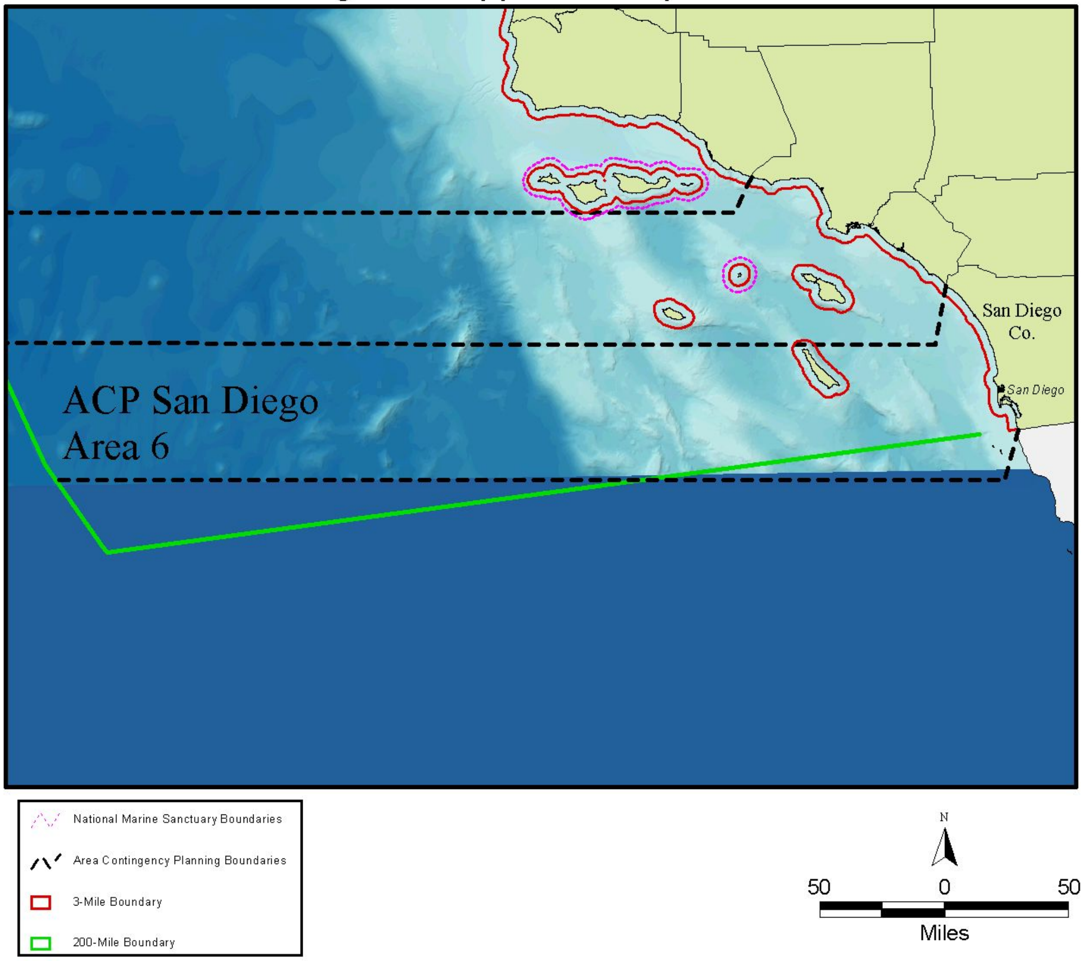
The pelagic realm is the largest habitat in the SCB and the home of 40 percent of the species and 50 percent of the families of fish. The pelagic zone includes the water column covering the shelf and the upper 150 to 200 m of water overlying the slope and deep basins. The fish from this zone represent a mix of permanent residents and periodic visitors. The important pelagic species of southern and central California include northern anchovy, albacore tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardines, Pacific whiting, Pacific herring, salmon, steelhead trout, swordfish, and thresher shark. Most of these species are widely distributed in the SCB, and it is unlikely that an oil spill will harm enough individuals, their prey, or habitat to significantly decrease the population of a given species. However, northern anchovy are of concern since their restricted distribution during parts of their life cycle make them vulnerable to impacts from spilled oil. Another species that is abundant in the epipelagic zone and is vulnerable to impact is the market squid. Although during most of their life cycle squid are widely distributed offshore, squid congregate inshore in very large numbers during spawning. Monterey Bay and the northern Channel Islands are the most important spawning areas, but large spawning aggregations are known to occur along the entire coast from San Diego to Monterey.

Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Abalone are an especially at-risk gastropod species of the shallow rocky habitat. Currently, all major species of abalone in central and southern California are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil.

As oil comes on shore, the rocky intertidal habitat, as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon, and steelhead trout.

B.5 San Diego

San Diego Pre-Approval Dispersant Zone



The San Diego dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), and shoreward of the 200-mile line (shown in green). Areas inside state waters or within 3 miles of the California-Mexico border are "RRT Approval Required"; RRT approval will be case-specific.

Oil spills within the offshore region initially threaten all seabirds and marine mammals that frequent the area. If the spilled oil is driven on shore by the sea conditions and prevailing winds, additional resources (*e.g.*, shorebirds, intertidal organisms, seal and sea lion pups) and their shoreline haulout, roosting, and nesting habitats are also at risk for oiling.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Seabird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, seabird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Although over 100 species of seabirds have been reported from the region, the majority of individuals are composed of about 30 species. In the offshore (water depth > 200m) waters, common seabird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmar, black-legged kittiwake, gulls (herring, Bonaparte's, western and California), auklets (Cassin's and rhinoceros) and common murres. Nearshore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western grebes and western, California and Bonaparte's gulls. In addition, endangered species including the brown pelicans, marbled murrelets (northern area of region), western snowy plovers, and least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Shorebirds are another important component of the avifauna of the San Diego area. More than 40 shorebird species have been recorded in central and southern California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Almost all shorebirds migrate to the project area from northern breeding sites; very few shorebirds breed in this area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores.

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The threatened or endangered marine mammal species found in southern California waters include six whales (blue, humpback, fin, sei, right, and sperm whales) and two pinnipeds (Guadalupe fur seal and Steller sea lion). The two threatened pinniped species do not breed in the area and presently are uncommon in southern California waters.

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At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses, and changeable environmental conditions. Point Conception is widely recognized as a faunal boundary with mostly cold-water species found to the north and warm-water species found to the south, though extensive migrations do occur as a result of fluctuating environmental conditions. In fact, warm- and cool-water events in the Southern California Bight (SCB) affect fish recruitment and can alter the composition of some fish assemblages for years. The SCB is located in the transition area between Pacific subarctic, Pacific equatorial, and North Pacific central water masses, and the fish fauna contains representatives from each of these sources. Of the 554 species of California marine fishes, 481 species occur in the SCB.

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Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Abalone are an especially at-risk gastropod species of the shallow rocky habitat. Currently, all major species of abalone in central and southern California are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil.

As oil comes on shore, the rocky intertidal habitat, as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon, and steelhead trout.

APPENDIX C

DISPERSANT EFFICACY AND AVAILABLE RESOURCES

C.1 Oils produced from California offshore platforms

Oil Field Name	Platform Name	Pacific Outer Continental Shelf Study	Minerals Management Service/EC Catalog	
		API Gravity	Name	API Gravity
Beta	Ellen Elly Eureka Edith	17.3 – 18.3	Beta	13.7
Carpinteria	Hogan Houchin Henry	24.2	Carpinteria	22.9
Dos Cuadras	Hillhouse A B C	24.3	Dos Cuadras	25.6
Hondo	Hondo Harmony	21.5	Hondo	19.6
Hueneme	Gina	20.9	Port Hueneme	
Pescado	Heritage	21.5		
Pitas Point	Habitat		Pitas Point	38
Point Arguello	Hidalgo Harvest Hermosa	22.2	Point Arguello Commingled Point Arguello Heavy Point Arguello Light	21.4 18.2 30.3
Point Pedernales	Irene	21.1	Platform Irene	11.2
Sacate				
Santa Clara	Gilda Grace	20.9	Santa Clara	22.1
Sockeye	Gail	21.6	Sockeye Sockeye Commingled Sockeye Sour Sockeye Sweet	26.2 19.8 18.8 29.4
			Platform Holly	11

From S.L. Ross, 2002

C.2 Some fresh oil properties of top ten oils shipped to California by tank ship, 1999-2001

Oil Type	**Identifying Properties**			
	API gravity	Sulfur content (%)	Viscosity at 15º C, cP	Pour point, ºC
Alaska North Slope	26.8	1.15	17	-15
Arab Medium	30.8	2.4	29	-10
Maya	21.8	3.3	299	-20
Arabian Light	33.4	1.77	14	-53
Oriente	29.2	1.01	85	-4
Basrah Light	33.7	1.95	20	-15
Escalante/Canadon Seco	24.1	0.19	?	?
Arabian Extra Light	37.9	1.2	?	?
FAO Blend	31.0	3.0	?	?
Yemen	31.0	0.6	?	?

C.3 Pacific OCS and imported California oils that have undergone spill-related testing and modeling

Crude oil name	API gravity	Fresh oil pour point (ºC)	Oil viscosity @ 15 ºC at various weathered states			Emulsion formation tendency	Dispersant "Window of Opportunity"
HIGHLY EMULSIFIABLE OILS (Emulsion forms at 0 to 10% oil evaporation)							
Arab Medium	29.5	-10	29	91	275	Yes @ 0%	Very narrow
Arab Light	31.8	-53	14	33	94	Yes @ 0%	Narrow
Hondo	19.6	-15	735	9583	449700	Yes @ 0%	Very narrow
Hueneme	14.8	-9	4131	20990		Yes @ 0%	Very narrow
Maya	21.8	-20	299	99390		Yes @ 0%	Very narrow
Oriente	25.9	-4	85		6124	Yes @ 0%	Very narrow
Pt. Arguello Commingled	21.4	-12	533	41860	2266000	Yes @ 0%	Very narrow
Pt. Arguello Heavy	18.2	-4	3250		4953000	Yes @ 0%	Very narrow
Pt. Arguello Light	30.3	-22	22	183	671	Yes @ 0%	Very narrow
Santa Clara	22.1	-3	304	1859	22760	Yes @ 0%	Very narrow
Sockeye	26.2	-12	45	163	628	Yes @ 0%	Very narrow
Sockeye Sour	18.8	-22	821	8708	475200	Yes @ 0%	Very narrow
MEDIUM EMULSIFIABLE OILS (Emulsion forms at 11 to 29% oil evaporation)							
Alaska North slope	26.8	-15	17	110	650	Yes @ 26%	Narrow
Carpinteria	22.9	-21	164	3426		Yes @ 11%	Narrow
Dos Cuadras	25.6	-30	51	187	741	Yes @ 11%	Narrow
Sockeye Sweet	29.4	-20	20	39	321	Yes @ 17%	Narrow
OILS THAT DO NOT EMULSIFY							
Diesel	39.5	-30	8	25	100	No	Very wide
Pitas Point	38.0	<-60	2		2	No	Very wide

Crude oil name	Hours for oil to reach specified viscosity in 10 kt winds and 15ºC water temperature					
	(Modeled) 1000 barrel batch spill (*i.e.*, from tank ship)			(Modeled) 10,000 barrel batch spill (*i.e.*, from tank ship)		
	2000 cP	5000 cP	20,000 cP	2000 cP	5000 cP	20,000 cP
HIGHLY EMULSIFIABLE OILS (Emulsion forms at 0 to 10% oil evaporation)						
Arab Medium	4.2	6.4	22.0	4.9	7.7	39.0
Arab Light	10.0	36.0	Disp @ 41 hrs	13.3	68.8	Disp @ 68 hrs
Hondo	2.0	3.0	5.5	2.4	3.7	6.2
Hueneme	0.0	0.5	1.9	0.0	0.5	1.9
Maya	1.6	2.3	4.8	1.8	2.6	5.1
Oriente	2.2	3.2	5.2	2.8	3.8	6.4
Pt. Arguello Commingled	1.6	2.6	4.3	1.7	2.9	4.9
Pt. Arguello Heavy	0.0	0.5	1.7	0.0	0.5	1.9
Pt. Arguello Light	4.4	6.9	23.0	5.1	8.1	42.0
Santa Clara	2.6	3.8	6.6	2.9	4.4	7.9
Sockeye	3.9	5.6	13.2	4.3	6.4	20.4
Sockeye Sour	1.1	1.9	3.1	1.3	2.0	3.5
MEDIUM EMULSIFIABLE OILS (Emulsion forms at 11 to 29% oil evaporation)						
Alaska North slope	37.9	39.7	43.3	60.7	62.2	66.7
Carpinteria	5.6	6.6	8.9	8.3	9.5	12.0
Dos Cuadras	5.4	7.0	11.0	7.4	8.9	14.3
Sockeye Sweet	8.6	10.6	28.8	11.6	14.1	47.8
OILS THAT DO NOT EMULSIFY						
Diesel	60.0	Disp @ 69 hrs		101.0	Disp @ 111 hrs	
Pitas Point	Disp @ 2.3 hrs			Disp @ 3.5 hrs		

The opportunity for using dispersants effectively on most oils listed above is limited. Only a few of the produced oils appear amenable to dispersion. However, if spill circumstances are right and response is very rapid, some success might be possible. The situation is different for the imported oils. Alaska North Slope crude, which represents about 50% of the oil spill risk from tankers in California, appears to be quite amenable to dispersion. Diesel oil, which is ubiquitous and therefore tends to be spilled relatively frequently, is also a good candidate.

From S.L. Ross, 2002

C.4 Description of general oil characteristics based on oil type

Type	Description	Characteristics	Crude oil examples	Refined product examples
I	**Light distillates** No need to disperse; oil will dissipate rapidly**.**	Specific gravity: <0.80 API gravity: >45 Viscosity: 0.5-2.0 cSt @ 15º C Non-persistent, very volatile, highly flammable, high evaporation rates, rapid spreading rates, highly toxic to biota, little if any emulsification, high penetration of substrate.	Algerian blend	Maui and Kapuni distillate, gasoline blendstocks, motor spirit (RMS/PMS), Avgas, Jet A1, kerosene
II	**Light crudes** Relatively non-persistent. Easily dispersed if pour point under 41º F; probably difficult to disperse if water temperature is below pour point (behaves like a Group IV oil).	Specific gravity: 0.80-0.85 API gravity: 35-45 Viscosity: 4 cSt to solid @ 15º C Non-persistent, moderate to high volatility, low to moderate viscosity, moderate to high toxicity, can form stable emulsions, moderate to high penetration of substrates.	Pour point <41º F: Brent, Ekofisk, Forties, Murban, Seria Light Pour point >41º F: Ardjuna, Beatrice, Camar, Lucina, Palanca, Angola, Pennington	Unfinished oils; automotive gas oil, marine gas oil, Navy gas oil
III	**Medium – heavy crudes, fuel oils** Fairly persistent, easily dispersed if treated promptly.	Specific gravity: 0.80-0.95 API gravity: 17.5-35 Viscosity: 8 cSt to solid @ 15º C Persistent, moderate volatility, moderate viscosity, variable acute toxicity, can form stable emulsions, low to moderate penetration of substrates.	Pour point < 41º F: Alaskan, Arabian light, Basrah, Dubai, Iranian heavy, Kuwaiti, Maya, Oriente Pour point > 41º F: Bonny light, Coban blend, Gamba, LSWR, Minas, Santa Cruz, Taching, Zaire	
IV	**Heavy crudes and residues** Fairly persistent, probably difficult to disperse if water temperature is below pour point of material.	Specific gravity: 0.9501.00 API gravity: 10.0-17.5 Viscosity: 1500 cSt to solid @ 15º C Persistent, low to moderate volatility, moderate to high viscosity, variable acute toxicity, can form stable emulsions, low to moderate penetration of substrates.		Heavy fuel oil, residues, Fletcher blend, Maui F sands < pour point, lube oils, lube oil blendstocks
V	**Non-spreading oils** Persistent, generally not dispersible	Specific gravity: >1.00 API gravity: <10.0 Viscosity: Solid unless heated Persistent, very low volatility, little if any evaporation, very high viscosity, very low acute toxicity, can form stable emulsions, little if any penetration of substrate.		Heavy bunker fuel oil, bitumen, very heavy fuel oil, asphalt, paraffins, waxes, residual fuels

In part from Cawthron, 2000

C.5 General California dispersant application platform information (information in this section is being updated)

Application method	Weather limitations	Advantages	Disadvantages
C-130/ADDS Pack	Winds: 30 – 35 kts Waves: 17 – 23 ft	Suitable for very large spills with longer (several day) time windows to accommodate the minimum 24-hour startup time. Greatest delivery capacity; might be capable of fully treating all of the oil spilled in a blowout spill and all oil in a 10,000 bbl batch spill.	At present the nearest ADDS Pack units are outside the state; start-up times may be lengthy; spraying not likely to begin until the second day of the spill; very expensive; requires runway.
DC-4		Suitable for very large spills with longer (several day) time windows to accommodate the minimum 24-hour startup time. The platform modeled is owned by Airborne Support Incorporated of Houma, LA; delivery capacity is approximately one-half that of the C-130 ADDS Pack.	Earliest this aircraft can begin spraying dispersant in California is probably the morning of the second day.
Single-engine planes (*e.g.*, Cessna AT-802 "Agtruck")	Winds: 17 – 21 kts Waves: 6 – 9 ft Ceiling: ≥1000 ft Visibility: ≥ 3 nm	Suitable for small- to mid-sized spills that occur at considerable distance from the response centers provided the time window is long enough to accommodate their slower startup time. Purpose-built for aerial spraying; capable of fairly short start-up time; a number of Agtrucks available for use in a large spill; other small planes may be relatively inexpensive.	Smaller payload; more limited range; not yet available in California, although one AZ operator may be under contract to CA OSRO; platform may not be available until beginning of the second day; limited to smaller spills; uses neat dispersant only
Medium-size helicopter	Winds: 17 – 27 kts Waves: 6 – 17 feet	Available; highly maneuverable; capable of being re-supplied near spill site; good operational efficiency; lands almost anywhere. Above sea blowouts from oil platforms (of oils with a medium emulsification rate) are good candidates for treatment by ship and helicopter platforms because they can remain on-scene and deliver dispersants constantly when needed. May be adequate to deal with small tanker spills close to their re-supply bases; could also respond to mid-sized spills provided the time window is long enough.	Limited by small payload and range; two are available in southern CA; use neat dispersant only. Blowouts of high emulsification rate oils will not be good candidates for dispersion from any platform type. Ship-based delivery may be limited by slow transit speed and small payload. These platforms are limited for spills at a distance from their base of operations, either because of slow transit speed or limited operating range. These limitations can be overcome in some circumstances by re-supplying them at or near the spill site.
Work boat	Winds: 7 – 21 kts Waves: 1 – 9 feet	Good control; mixes water. Above-sea blowouts from oil platforms (of oils with a medium emulsification rate) are good candidates for treatment by ship and helicopter platforms because they can remain on-scene and deliver dispersants constantly when needed. May be adequate to deal with small tanker spills close to their re-supply bases; could also respond to mid-sized spills provided the time window is long enough.	Moderate transit speed; only two ship-based systems (high-speed crew-cargo vessels) available in CA; limited to small spills; limited swath width. Blowouts of high emulsification rate oils will not be good candidates for dispersion from any platform type. Ship-based delivery may be limited by slow transit speed and small payload. These platforms are limited for spills at a distance from their base of operations, either because of slow transit speed or limited operating range. These limitations can be overcome in some circumstances by re-supplying them at or near the spill site.

From S.L. Ross, 2002

C.6 Characteristics of dispersant spraying platforms available to operators in California

Application system	Payload (gallons)	Pump rate (gpm)	Swath width (feet)	Average transit speed (knots)	Average Start-up time (hours)	Average Spray speed (knots)	Average Repositioning time (minutes)	Average Resupply time (hours)	Average Range
C-130/ADDS-pack	5500	600	100	214	24	140	2	1	7 hours
DC-4 [a]	2000-2500	500	100	214	1	157	2	1	
Agtruck AT-802	800	120	80	200	4	140	0.5	1	200 miles
Agtruck AT-502	500	120	80	200	4	140	0.5	1	200 miles
Helicopter	150	79	80	90	1	50	0.5	0.25	1.75 miles
Vessel A [b]	1000	10	120	7	1	7	2	1	
Vessel D [c]	20,000	60	175	25	1	25	2	1	

[a] Values reported in the literature for aircraft logistic characteristics such as payload are somewhat variable. For the DC-4 payload, values range from 2000 to 2500 gallons. The value used in calculations is at the upper end of this range, 2500 gallons. It must be recognized that the payload of the existing DC-4 platform in the Gulf of Mexico area is somewhat lower than this at 2000 gallons.

[b] Modeled after Clean Seas boom type vessel spray system.

[c] Modeled after new portable single-nozzle spray system developed by National Response Corporation (NRC) and mounted on one of NRC's crew-cargo vessels. System characteristics are as follows:

- Payload: capacity is up to 20,000 gallons in the form of up to 10 2000-gallon DOT marine-portable tanks
- Pump rates: variable at 12, 25, 40 and 60 gallons per minute
- Swath width: range of nozzle varies with pump rate up to 70 feet @ 60 gpm, with one system on each side. Allowing for the 35' beam of the vessel, swath width is 140'
- Vessel speed: maximum speed is 25 knots

From S.L. Ross, 2002

C.7 Dispersant spraying capacity of platforms as a function of distance [a]

Platform	Operating distance (miles)	Number of sorties per day	Payload (barrels)	Volume of dispersant sprayed per day (barrels)	Volume of oil dispersed per day (barrels) [b]
C-130/ADDS Pack [c]	10	4	130.8	523.2	10464
	30	4	130.8	523.2	10464
	100	3	130.8	39234	7848
	200	3	130.8	392.4	7848
DC-4 [d]	10	6	47.6	285.6	5712
	30	5	47.6	238.1	4761
	100	4	47.6	190.4	3808
	200	3	47.6	142.8	2856
AT-802	10	8	18.9	151.2	3024
	30	7	18.9	132.1	2642
	100	5	18.9	94.4	1887
	200	3	18.9	56.6	1132
Helicopter	1	30	5.7	169.8	3396
	10	21	5.7	119.7	2394
	30	11	5.7	62.3	1245
Vessel [e]	1	3	23.8	71.4	1428
	10	2	23.8	47.6	952
	30	1	23.8	23.8	476
	100	1	23.8	23.8	476

[a] Based on response to a batch spill of 3180 m^3 (20,000 barrels).
[b] Assuming 20 volumes of oil are dispersed per 1 volume of dispersant sprayed.
[c] ADDS Pack specifications as per Biegert Aviation: Maximum reservoir capacity = 5500 gallons (20.8 m^3 = 130.8), recommended capacity = 5500 gallons (18.9 m^3).
[d] Values reported in literature for payload of DC-4 range from 2000 to 2500 gallons (7.5 to 9.5 m^3); value used here is 2000 gallons (= 47.6 barrels) as per ASI, Houma, LA.
[e] Modeled after Clean Seas boom type vessel spray system.

From S.L. Ross, 2002

C.8 Stockpiles of dispersant application resources in California and North America (This section is currently being updated)

MSRC OWNED AND CONTROLLED DISPERSANT INVENTORY

March 2008*

Prepared by the Marine Spill Response Corporation

#	Dispersant Owner/Controller	Location of Dispersant	Method of Storage (# of Containers)	Amount (gallons) Corexit 9500	Corexit 9527	TOTAL AMOUNTS (Gallons)
1	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	Slaughter Beach, DE	330 gallon Tote (1)		330	330
2	Marine Spill Response Corporation Edison, NJ John Sweeney - (732) 346-2450 Pager - (800) 218-6261	Edison, NJ Linden Warehouse	330 gallon Totes (16) 55 gallon Drums (91)		4,605 5,005	9,610
3	Marine Spill Response Corporation Edison, NJ John Sweeney - (732) 346-2450 Pager - (800) 218-6261	Portland, ME - OSRV Perth Amboy, NJ - OSRV Chesapeake City, MD - OSRV Virginia Beach, VA - OSRV	350 gallon Tote (1) 350 gallon Tote (1) 350 gallon Tote (1) 350 gallon Tote (1)		330 330 330 330	1,320
4	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	San Juan, Puerto Rico	330 gallon Totes (3)		900	900
5	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	Stennis International Airport, MS	330 gallon Totes (58) ISO 5,000 gallons (1)		17,400 5,000	22,400
6	Marine Spill Response Corporation Mike Walker - (337) 475-6425 Pager - (888) 276-4246 Fax - (337) 475-6401	Miami, FL - OSRV Pascagoula, MS - OSRV Fort Jackson, LA - OSRV Lake Charles, LA - OSRV Galveston, TX - OSRV Corpus Christi, TX - OSRV	330 & 550 g Tote (1 ea) 330 & 550 g Tote (1 ea) 330 & 550 g Tote (1 ea) 330 & 550 g Tote (1 ea) 330 & 550 g Tote (1 ea) 350 gallon Tote (1)		880 880 880 880 880 330	4,730
7	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	Oil Mop Inc. Houston, TX	330 gallon Tote (74)	22,200		22,200
8	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	Coolidge Airport Coolidge, AZ	5,000 gallon ISO (1)		3,300	3,300
9	Marine Spill Response Corporation Long Beach, CA Ray Nottingham - (562) 981-7610 Pager - (954) 462-6467	Tesoro Marine Terminal Long Beach, CA Terminal Island, CA - OSRV	330 gallon Totes (36) 330 gallon Totes (2)	10,800	 605	11,405

Organization	Equipment types	Type of dispersant	Dispersant storage location	Quantity of dispersant (gallons)
	Within California [a]			
Clean Seas Cooperative [c] 1180 Eugenia Place, Suite 204 Carpinteria, CA 93013 24-hr phone: 805-684-3838 Contacts: Jim Caesar Phone: 805-684-4392	Boats Mr. Clean & Mr. Clean III: 1000 gallons Corexit 9527 on board each vessel. Swath width for Mr. Clean is 105 ft, for Mr. Clean III is 115 ft; vessel calibration and dosage rate vary from speeds of 3 to 10 knots and dosage rates from 2 – 10 gal/acre. Aerial (helicopter) Storage 150 gal max; pumping rate 50 – 100 gal per minute; boom length 32 ft, swath 50 – 60 ft depending on speed; speed 50 – 100 kts; dosage rate 2, 3 or 5 gal per acre. Yard Inventory (Corexit 9527) (2) 5000 gal tankers = 10,000 (13) 550 gal tanks = 7150 (20) 55 gal barrels = 1100 (1) 500 gal tank = 500 Clean Seas also has 880 gals of shoreline dispersant (Corexit 7664) stored at yard.	Corexit 9527	Carpinteria, CA	20,750

C.8, continued Stockpiles of dispersants application resources in California and North America

Organization	Equipment types	Type of dispersant	Dispersant storage location	Quantity of dispersant (gallons)
Other North American Dispersant Stockpiles [e]				
Alyeska Pipeline Service Company P.O. Box 196660 Anchorage, AK 99519-6660 Phone: 907-278-1611		Corexit 9527 Corexit 9527	Anchorage, AK Valdez, AK	56,000 4,000
Clean Islands Council/State of Hawaii 179 Sand Islands Access Road Honolulu, HI 96819 Phone: 808-845-8465		Corexit 9527 Corexit 9500	Honolulu, HI Honolulu, HI	3,080 34,180
Clean Caribbean Cooperative 2381 Stirling Road Fort Lauderdale, FL 33312 Phone: 954-983-9880		Corexit 9527 Corexit 9500	Pt. Everglades, FL Pt. Everglades, FL	4,070 25,300
LOOP, Inc. 1 Seine Court New Orleans, LA 70114 Phone: 504-368-5667		Corexit 9527	Houma, LA	33,600
Clean Gulf Associates 1450 Poydras Street, Suite 1625 New Orleans, LA 70112 Phone: 888-242-2007		Corexit 9527 Corexit 9500	Houma LA Sugarland, TX	5,665 28,985
CISPRI (CIRO) 1392 Ocean Drive Homer, AK 99603 Phone: 907-235-6785		Corexit 9527 Corexit 9527	Niski, AK Anchorage, AK	9,295 11,275

C.8, continued Stockpiles of dispersants application resources in California and North America

Organization	Equipment types	Type of dispersant	Dispersant storage location	Quantity of dispersant (gallons)
Marine Spill Response Corporation Clean Gulf Associates 396 Roland Road Houma, LA 70363 Phone: 985-580-0924		Corexit 9527	Houma, LA	16,000
Airborne Support, Inc. 3626 Thunderbird Road Houma, LA 70363 Phone: 985-851-6391		Corexit 9527 Corexit 9500	Houma, LA Houma, LA	2,000 4,470
National Response Corporation 11200 Westheimer Road Houston, TX 77042 Phone: 713-977-9951 Houston, TX		Corexit 9527 Corexit 9500	Cameron, LA Morgan City, LA	1,540 220
Clean Sound Cooperative 1105 13th Street Everett, WA 98201 Phone: 425-783-0908		Corexit 9527	Blaine, WA	6,270
Delaware Bay & River Cooperative 700 Pilottown Road Lewes, DE 19958 Phone: 302-645-7861		Corexit 9527	Slaughter Beach, DE	1,650
Clean Harbors Cooperative 4601 Tremley Point Road Linden, NJ 07036 Phone: 908-862-7500		Corexit 9527	Lyndon, NJ	1,375
Nalco Exxon Energy Chemicals Hwy 42 North Kilgore, TX 75662 Phone: 903-984-1695		Corexit 9527 Corexit 9500	Sugarland, TX Sugarland, TX	Producer

[a] The amount of dispersant currently (2003) available in California is 42,310 gallons (1007 barrels), sufficient to treat 20,140 barrels of oil, assuming a 1:20 (dispersant:water) dilution ratio.
[b] Email communication, Steve Ricks (Clean Bay) to Ellen Faurot-Daniels (California Coastal Commission), 12/12/03.
[c] Email communication, Jim Caesar (Clean Seas) to Ellen Faurot-Daniels (California Coastal Commission), 11/25/03.
[d] mail communication, Ray Nottingham (Clean Coastal Waters) to Ellen Faurot-Daniels (California Coastal Commission), 12/02/03.
[e] Substantively from S.L. Ross, 2002. North American stockpile values are approximate because quantities change constantly. A portion of the 273,615 gallons (6514 bbls) could be made available for use on spills in California. Assuming a 1:20 dilution ratio, this quantity is sufficient for a spill of approximately 150,000 barrels.

Updated from Cawthron, 2000

C.9 Manufacturers of dispersant spray systems for boats, helicopters and fixed-wing aircraft

Dispersant spray equipment for boats, helicopters and fixed-wing aircraft are available from various manufacturers throughout the world. Table C.9 is a partial representative listing. Publications such as the *International Oil Spill Control Directory* and the *World Catalog of Oil Spill Response Products* have more complete listings that are periodically updated.

Dispersant application systems differ in design, capability, versatility, size, weight, ease of handling and control of dosage. Their suitability depends in part on the type of dispersant used. Concentrated dispersants such as Corexit 9500 and Corexit 9527 are generally most appropriate for modern spray equipment. A detailed description of application equipment requirements is presented in the 1997/1998 *World Catalog of Oil Spill Response Products*.

	Boats	Helicopters	Fixed-wing aircraft
ABASCO 363 West Canino Houston, Texas 77037 Phone: 800-242-7745	X	X	X
Ayles Fernie International, Ltd. Unit D5 Chaucer Business Park Kemsing, Seven Oaks, Kent TN15 6YU England Phone: 44/1732762962	X		
Biegert Aviation, Inc. 22022 South Price Road Chandler, Arizona 85245 Phone: 602-796-2400			X
CECA S.A. (Subsidiary of Elf Aquitane Group) Avenue Alfred Nobel – 64000 PAU France Phone: 33/559 92 44 00	X		
Helitask Bourne Airfield Cambridge CB3 7TQ England Phone: 44/954-210-765		X	
KU-SINTEF Group S.P. Andersens vei 15b N-7034 Trondheim, Norway Phone: 47 73 59 11 00		X	
KOLDA Corporation 16770 Hedgecroft, Suite 708 Houston, Texas 77060 Phone: 281-448-8995	X		X

C.9, continued Manufacturers of dispersant spray systems for boats, helicopters and fixed-wing aircraft

	Boats	Helicopters	Fixed-wing aircraft
KAAF Agro Aviation Les Jasses D'Albaron 13123 Albaror Arles, France Phone: 33/9071188		X	
Kepner Plastic Fabricators, Inc. 3131 Lomita Blvd. Torrance, California 90505 Phone: 310-325-3162	X		
Ro-Clean Desmi 21B Hestehaven DK5260, Odense S. Denmark Phone 45-65-910-201	X		
Simplex Manufacturing Company 13340 NE Whitaker Way Portland, Oregon 97230 Phone: 503-257-3511		X	
Slickbar Products Corporation 18 Beach Street Seymour, Connecticut 06483 Phone: 203-888-7700	X		
Transland, Inc. 24511 Frampton Avenue Harbor City, California 90710 Phone: 310-534-2511	X		
Vikoma International Ltd. Prospect Road Cowes, Isle of Wight PO31 7AD, England		X	

From ExxonMobil, 2000

C.10 Dispersant "Window of Opportunity"

(this section is currently under revision)

The "window of opportunity" for dispersant use is general defined as the timeframe that is generally available for application of chemical dispersants in which that application can be expected to be reasonably effective. It is often difficult to accurately predict the "window of opportunity" for any given dispersant application. As a result, the use of "rules of thumb" combined with "best professional judgment" often provides for the best results.

A number of factors will affect the efficacy of dispersant use and these factors with either expand or narrow a given "window of opportunity." In general, most dispersant formulations are designed to work in ocean water with an average salinity around 35 ppt. The efficacy of most salt water dispersant formulations drop off significantly as the ocean salinity decreases, such as in bays and estuaries during times of fresh water incursion. In general, heavier crudes are more difficult to disperse than lighter crude oils. Additionally, dispersant efficacy will vary based on the weathering of oils, most significant are emulsion formation and evaporation. A number of studies have been funded by the United States Minerals Management Service, evaluating the perimeters that contribute to the "window of opportunity" for dispersant use and have found that in many cases the "window of opportunity" may be extended. The information found in this section will be revised to address the latest scientific information. Currently, the information below provides good, albeit perhaps conservative, parameters regarding the "window of opportunity" for dispersant use. Additionally, at the time of an oil spill incident, the NOAA Scientific Support Coordinator can run several models estimating the "window of opportunity" for dispersant use. The mathematics in these models, however, may not take into account the latest scientific data and as a result, something the best means of determining if dispersants will be effective during an oil spill incident is to conduct field tests and visually monitor dispersant efficacy.

Type	Description & General Dispersability
I	**Light distillates** No need to disperse; oil will dissipate rapidly**.**
II	**Light crudes** Relatively non-persistent. Easily dispersed if pour point under 41º F; probably difficult to disperse if water temperature is below pour point (behaves like a Group IV oil).
III	**Medium – heavy crudes, fuel oils** Fairly persistent, easily dispersed if treated promptly.
IV	**Heavy crudes and residues** Fairly persistent, probably difficult to disperse if water temperature is below pour point of material.
V	**Non-spreading oils (sinking oils)** Persistent, generally not dispersible

GENERAL DISPERSABILITY RELATIVE TO API GRAVITY AND POUR POINT

Probably difficult or impossible to disperse	Medium weight material. Fairly persistent. Probably difficult to disperse if water temperature is below pour point of material.	Lightweight material. Relatively non-persistent. Probably difficult to disperse if water temperature is below pour point of material.	No need to disperse. Very light weight material. Oil will dissipate rapidly
	Medium weight material. Fairly persistent. Easily dispersed if treated promptly.	Lightweight material. Relatively non-persistent. Easily dispersed.	

API	17	34.5	45
Gravity	.953	.852	.802

Derived from information published by the International Tanker Owners Pollution Federation, Ltd., London (API 1986)

This table provides general guidance only. Note that specific dispersant formulations are designed to treat heavier, more viscous oils. Consult manufacturer recommendations prior to application and recommendations from monitoring team for continued use.

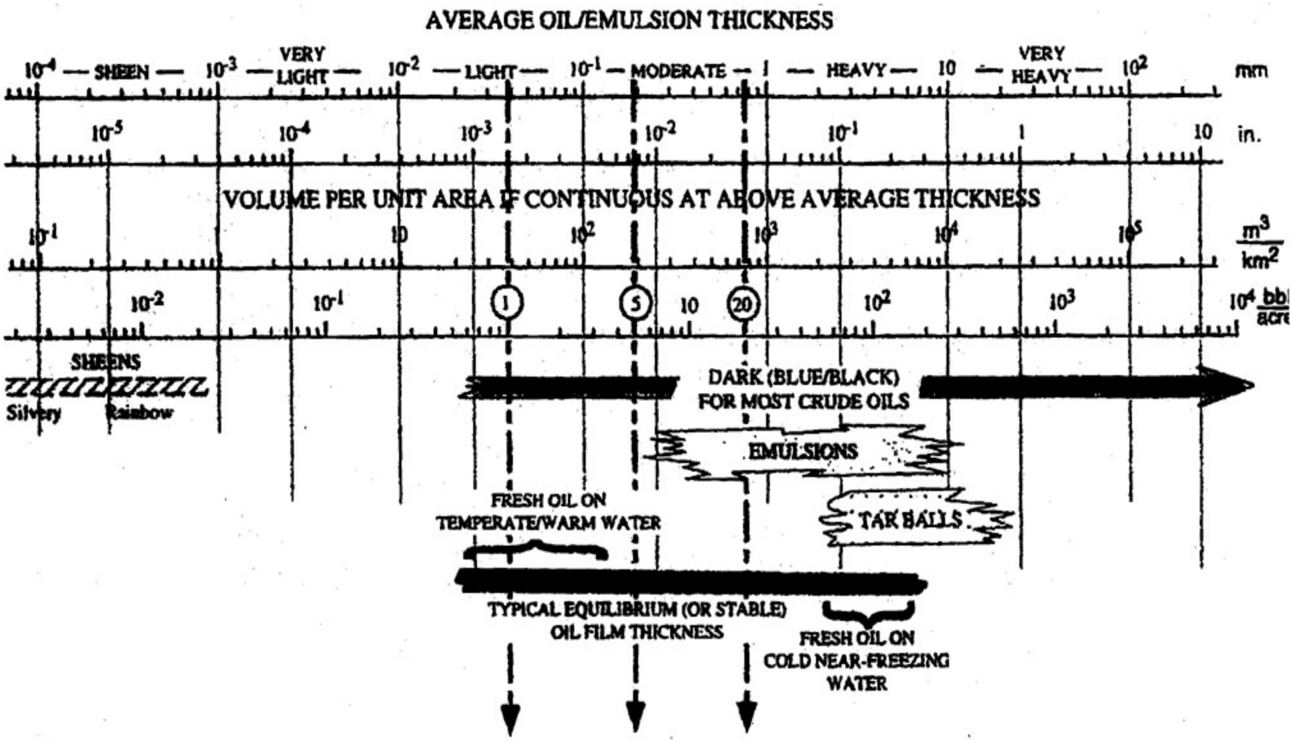
APPENDIX D

INSTRUCTIONS AND FORMS

D.1 Estimated dispersant dosages based on average oil thickness and dispersant-to-oil ratios

Average oil thickness (inches) (mm)	Relative thickness	Dispersant-to-oil ratio (DOR)						
		Oil concentration (volume of oil/unit area)	**1:1**	**1:5**	**1:10**	**1:20**	**1:50**	**1:100**
.0004 in (0.01 mm)	Very light to light	Gallons/acre	10.7	2.14	1.1	0.5	0.2	0.1
.001 in (0.02 mm)	Light	Gallons/acre	21.4	4.3	2.1	1.1	0.4	0.2
.002 in (0.05 mm)	Light	Gallons/acre	53.5	10.7	5.4	2.7	1.1	0.5
.004 in (0.1 mm)	Light to moderate	Gallons/acre	107	21.4	10.7	**5.4 ****	2.1	1.1
.019 in (0.5 mm)	Moderate	Gallons/acre	535	107	53.5	26.8	10.7	5.4
.04 in (1.0 mm)	Moderate to heavy	Gallons/acre	1070	214	107	53.5	21.4	10.7
.08 in (2.0 mm)	Heavy	Gallons/acre	2140	428	214	107	42.8	21.4
0.12 in (3.0 mm)	Heavy	Gallons/acre	3210	642	321	160.5	64.2	32.1

The 5 gallons/acre number was generated, assuming a light to moderate oil thickness and a DOR of 1:20. However, the table also makes it apparent that many other ratios may be appropriate depending on the volume or thickness of the spilled oil. How the oil behaves in the environment once it is spilled, and the dispersant application platform chosen, will also add a number of variables the FOSC will need to consider. Please see Discussion Note 9.1 for more information on slick thickness, oil volume, and dosage rate, as well as the figures in Appendices D.2 and D.3.



	DAY 3	DAY 2	DAY 1
Estimated Volume/Unit Area (bbl/acre)	1	5	20
Average Oil Thickness (inches)	0.0016	0.0077	0.031
Average Oil Thickness (millimeters)	0.039	0.197	0.79

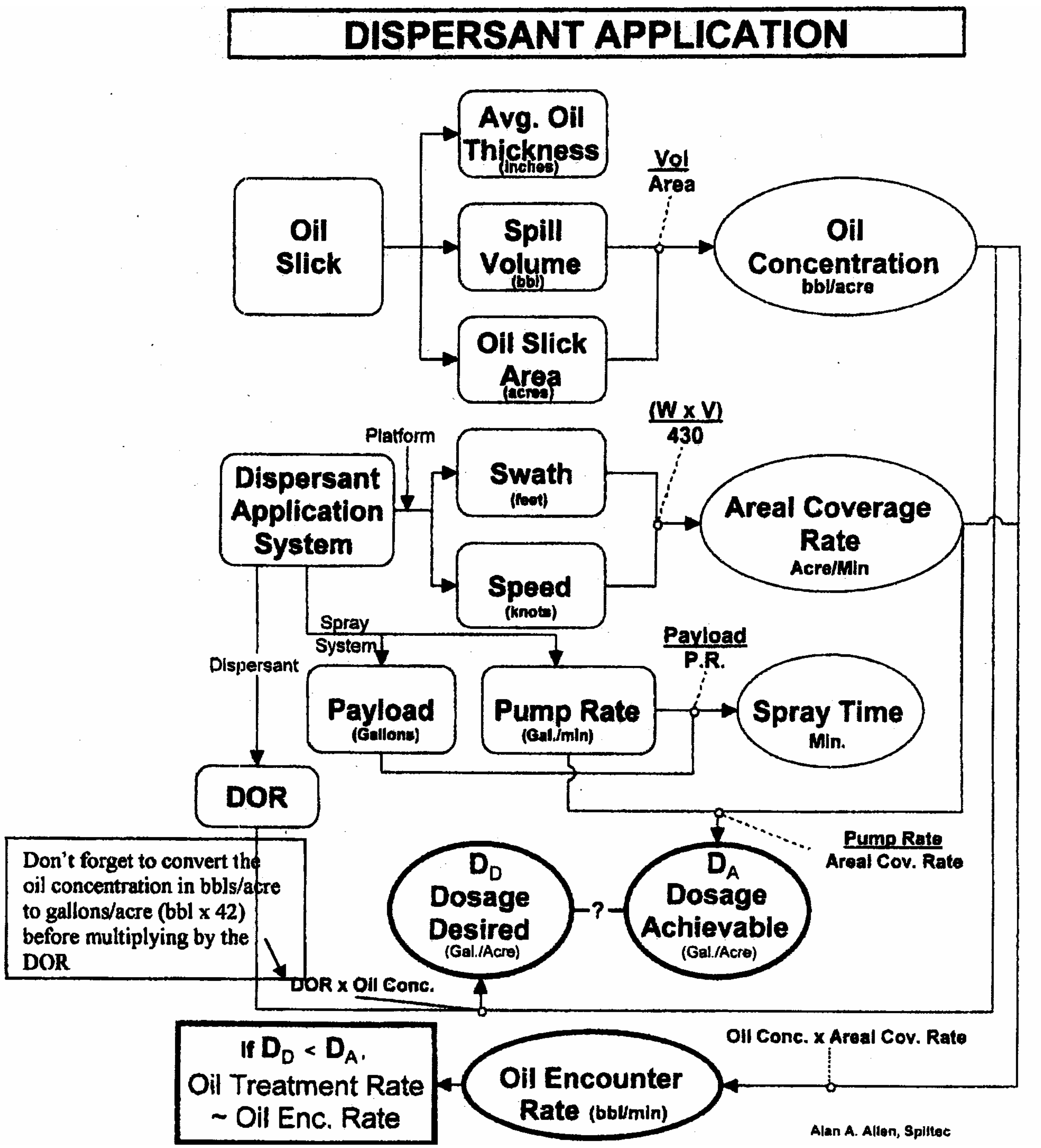
REPRESENTATIVE OIL CONCENTRATIONS & CORRESPONDING AVERAGE THICKNESS
(For Planning Purposes)

From Alan A. Allen (Spiltec), 2003 personal communication

D.2 Representative oil concentrations and corresponding average thicknesses

The circled numbers on the vertical lines in the figure above refer to 1, 5 and 20 barrels/acre as representative values for days 1, 2 and 3 following a significant crude oil spill.

D.3 **Oil slick characteristics and DOR as they apply to the dispersant application system**



D.4 Dispersant Application Summary Form

Incident name: ______________________________ Report number: __________

This report made by: ___________________________ Organization/agency: ____________________ Date: __________ Time: _______

Application parameters:

General location of application: __________________________________

Size of target area: __________________________________ (m^2/km^2/acres)
Circle one

Volume of oil targeted: __________________________________ (gal/bbl)
(from Dispersant Pre-Approval Assessment Form) Circle one

Dispersant: oil ratio used: __________________________________

Volume of dispersant required: __________________________________ (gal/bbl)
(calculate or use Appendix D.1) Circle one

Diagram of application. Include scale, north arrow, location of oil, flight path and application location. Partition this box if multiple passes are expected so that each pass may be sketched.

Application platform:

Aircraft/Boat/Other: ___________________________

Type: ___________________________

Capacity: ___________________________

Pump rate: ___________________________

Swath width: ___________________________

Application speed: ___________________________

Application capacity:

Distance to slick: ___________________________

Base to spill return time: ________________________

Applications per hour: ________________________

Coverage per hour: ________________________

Application details:

Start time	Finish time	Total dispersant applied

In part from Cawthron, 2000

D.5 Monitoring dispersant effectiveness

Information in this section is based on the SMART (Special Monitoring of Advanced Response Technologies) Guidelines – a joint project of the U.S. Coast Guard, National Oceanic and Atmospheric Administration (NOAA), US Environmental Protection Agency (EPA), the Centers for Disease Control and Prevention and the Minerals Management Service. Additional information is from the NOAA HAZMAT Report 96-7.

- It is essential to monitor the effectiveness of dispersant applications on oil dispersion.
- It is desirable to monitor the fate of oil, and to assess the impact of dispersed oil on the environment.
- Monitoring intensity should reflect spill size and prevailing conditions, as well as the potential effects of the spill, and logistical and physical constraints. Monitoring intensity should increase with spill size as follows:

Spill size	Visual monitoring	Water column monitoring and sample collection	
		1 m depth	multiple depths
Small	✔		
Medium	✔	✔	
Large	✔	✔	✔

- Visual observation of dispersant effectiveness is the minimum acceptable level of monitoring.
- Termination of dispersant operations should, wherever possible, be based on real-time on-site water column monitoring results from at least one depth.
- Monitoring at multiple depths (either with real-time data or samples collected for later analysis) will provide the best information on dispersant effectiveness and the fate of dispersed oil.

Mobilizing monitoring resources

- It is imperative that monitoring teams and technical advisors are notified of possible dispersant use, and are mobilized as soon as possible (see **Box 1a).**
- Dedicated monitoring staff should be appointed and should not be expected to perform other operational functions.

Visual observation

- Visual observation from aircraft is the most reliable technique for detecting and mapping oil distribution.
- General aerial observation objectives include mapping the distribution and appearance of the oil, verifying the modeled forecast of oil movement, providing responders with an overview of the incident, and directing cleanup operations.
- Observations should be made using the General Observation Guidelines (Appendix D.4), Dispersant Observation Checklist (Appendix D.5) and Dispersant Observation Report Form (Appendix D.6).
- Observations should be photographed and/or videotaped for comparison and documentation.
- Oil close to the coastline is best viewed from a helicopter, ideally with a door or window removed allowing the observer to look straight down on the oil.
- For oil further offshore, multi-engine aircraft provide a longer range, higher speeds and wider margin of safety.
- As a minimum, the aircraft should have space for two observers (excluding the pilot), visibility from both sides, pilot-observer communications, and sufficient navigational aids to follow the proposed flight path.
- Prior to take-off, the observer should be aware of aircraft safety procedures, be familiar with the general spill area, have appropriate maps or nautical charts to record spill details, and know the environmental conditions likely to be encountered.
- Visibility, surface wind speed and direction, and sea state are all important for predicting oil movement and interpreting visual observations. Poor viewing conditions (*e.g.*, fog, rain, or overwashing in rough seas) can prevent observers from seeing the entire spill. Strong winds could indicate emulsification rates may be more rapid than anticipated.
- Advanced sensing instruments (*e.g.*, infrared thermal imaging, side-looking airborne radar, laser fluorescence, microwave radiometer, infrared-ultraviolet line scanner, LANDSAT satellite systems) can provide a high

Appendix D.5 continued

degree of sensitivity in determining dispersant effectiveness. Problems associated with each of these systems preclude their exclusive use during oil spills. Visual observations cannot always confirm that the oil is dispersed, and physical sampling of water beneath the slick may also be required.

Water column fluorometry and water samples

- Dispersant effectiveness can be confirmed in real-time by monitoring hydrocarbons in the water column using fluorometry.
- For medium and large spills, on-site monitoring is the preferred method for determining whether there is a significant difference between natural and chemical dispersion, and for deciding when dispersant operations should cease. It also provides the best means for determining the volume of chemically dispersed oil.
- Samples should ideally be collected at multiple depths from:
  - Water free of oil contamination (reference or control sites)
  - Water beneath the oil spill before dispersant application (pre-treatment)
  - Water beneath the oil spill after dispersant application (post-treatment)
- The time of sampling, instrument readings, relevant observations at selected time intervals and the exact position of each reading (preferably using Global Position System) must be recorded. Documentation of fluorometer calibration and verified instrument response should also be available.
- The sampling regime will depend on the availability of monitoring resources, the spill size and the logistical constraints of the response. At a minimum, sufficient samples are needed to characterize pre- and post-treatment differences relative to reference sites.
- As fluorometry measures natural fluorescence and not just oil, water samples should also be collected to allow fluorometry results to be related to measured oil concentrations. Fluorometry measures should be made using a continuous flow fluorometer. Water samples should be collected at the outlet port of the flow-trhough water duct, past the fluorometer cell. Water samples should be kept in a cool dark place prior to laboratory analysis.

Fate of dispersed oil

- Monitoring the track of the dispersed oil plume at several depths allows the dilution rate for the dispersed oil to be assessed, and the determination of the rate that hydrocarbon levels in the water column return to background levels.
- Trajectory models should be used where available to assist in tracking the plume. Dye markers can also be used.
- Oil fate monitoring requires:
  - Simultaneous monitoring from a single vessel using independent set-ups from at least two depths.
  - Collection of water samples to validate the fluorometer readings.
  - Wherever possible, measurement of water quality parameters (*e.g.*, temperature, conductivity, dissolved oxygen, pH, turbidity) to help explain the behavior of the dispersed oil.

Using and interpreting monitoring results

- Fluorometry readings will vary widely, reflecting the patchiness and inconsistency of the dispersed oil plume.
- Real-time data are essential if monitoring results are being used to guide dispersant operations and to determine when a response is no longer effective.
- An increase in the fluorometer signal trend beneath chemically dispersed oil of five times or greater than that of readings beneath untreated oil and reference sites is a good indication of dispersion occurring.
- It is important that actual oil concentrations are also measured so that the rate of natural dispersion can be compared to the rate of chemically enhanced dispersion, to determine the actual effect of dispersant use.

From Cawthron, 2000

D.6 General observation guidelines

- Wherever possible, use observers trained and experienced in identifying and quantifying oil floating on the sea;
- Use standard reporting terms (see below) and common guidelines to maintain consistency among observers.

STANDARD TERMS TO DESCRIBE OIL FLOATING ON THE WATER		
1	**Light sheen**	A light, almost transparent layer of oil. Sometimes confused with windrows and natural sheen resulting from biological processes.
2	**Silver sheen**	A slightly thicker layer of oil that appears gray, silvery or shimmers.
3	**Rainbow sheen**	Sheen that reflects colors
4	**Brown oil** (heavy or dull sheen)	Water-in-oil emulsion. Thickness typically 0.1 to 1.0 mm. Can vary depending on wind and current conditions.
5	**Mousse**	Water-in-oil emulsion. Colors can range from orange or tan to dark brown.
6	**Black oil**	Sometimes with a latex texture. Can look like kelp and other natural phenomena.
7	**Windrows** (fingers, stringers, streamers)	Oil or sheen oriented in lines or streaks. Brown oil and mousse can be easily confused with algal scum collecting in convergence lines, algae patches, or kelp.
8	**Tar balls**	Oil weathered into a pliable ball up to 30 cm. Sheen may or may not be present.
9	**Tar mats**	Non-floating mats of oily debris (usually sediment and/or plant matter) found on beaches or just offshore in shallow water.
10	**Pancakes**	Isolated patches of mostly circular oil (size range a few centimeters to 100s of meters in diameter). Sheen may or may not be present.

Oil on the water

- Oil is best viewed with the sun behind the observer, flying at a 30-degree angle to the slick.
- Mid-morning or mid-afternoon viewing is generally best, avoiding midday glare off the water and the limited contrast encountered in early morning or early evening.
- Overall spill dimensions are generally best viewed from an altitude of 1000-2000 feet.
- Estimating oil coverage and color are best from an altitude of 200-300 feet or less.
- Oil surface slicks and plumes can appear different for many reasons including oil or product characteristics, sun angles, viewing angles, type of observation platform, weather, light conditions, sea state, and dispersion rate.
- Waves, kelp beds, natural organics, pollen, plankton blooms, cloud shadows, jellyfish and algae can all look like oil under certain conditions.
- Low-contrast conditions (*e.g*., overcast, twilight, haze) make observations difficult.

Dispersant applications

- May have variable effectiveness where different oil concentrations (spill thicknesses) result in variable oil/dispersant ratios being applied.
- May cause herding, temporarily "pushing" the oil together and making the slick appear to shrink, or to disappear from the sea surface for a short time.
- May change the color of an emulsified slick by reducing water content and viscosity.
- May change the shape of the slick, due to the de-emulsification action of the dispersant.
- May modify the spreading rates of oils (treated slicks can cover larger areas).

Dispersed oil plumes

- May not form immediately after dispersant application, especially if the oil is emulsified or there is low mixing energy.
- May not form or be visible at all.
- May be masked by surface oil and sheen or hidden by poor water clarity.
- May be mistaken for other things such as suspended solids.
- Are often highly irregular in shape and concentration.
- Can range in appearance from brown to white or cloudy.

Dispersant effectiveness

- A visible cloud in the water column indicates the dispersant is working
- Differences in the appearance of treated and untreated slicks indicate dispersion is likely.
- Boat wakes may physically part oil, falsely indicating successful dispersion.

D.7 **Dispersant Observation Checklist**

To be completed by dispersant observers on aircraft and vessels before departure

Incident name: ____ Report number:_____

This report by: ______________________ Organization: ___________________ Date: ______ Time: ______

Observer name(s) and organizations: ____
____

Observation platform: Helicopter / aircraft / boat / other (specify): ____
Application platform: Helicopter / aircraft / boat / other (specify): ____

COMMUNICATIONS

	VHF	UHF	Other
Air to air:	____________________	____________________	____________________
Air to vessel:	____________________	____________________	____________________
Air to ground:	____________________	____________________	____________________
Ground to vessel:	____________________	____________________	____________________
Vessel to vessel:	____________________	____________________	____________________

	Aircraft/personnel names	Call sign	ETD to spill	ETA at spill
Sprayer 1:	____________________	____________________	__________	__________
Sprayer 2:	____________________	____________________	__________	__________
Spotter:	____________________	____________________	__________	__________
Observer:	____________________	____________________	__________	__________
Command Center:	____________________	____________________	__________	__________

DISPERSANT

Name: ____________________ Dispersant : oil ratio: ________________________________
Application altitude (ft): ____________________ Dilution prior to application (if any): ____________________
Observation altitude (ft): ____________________ Application rate: ________________________________
Circle one: gallons/acre, gallons/km^2, liters/hectare

WEATHER (Circle units used) ❑ Sunny ❑ Overcast ❑ Cloudy ❑ Rain ❑ Fog

Sea state: __________ Wind speed: _________ knots Air temp: ______ ºF
Wave height: __________ ft Wind direction: _________ ºtrue/ºmagnetic Sea temp: ______ ºF
Water depth: __________ft Current speed: _________ knots Salinity: ______ ppt
Visibility: __________nm Current direction: _______ ºtrue/ºmagnetic Tide: ______(flood/ebb/slack)

DISPERSANT OBSERVATION EQUIPMENT AND SAFETY CHECKLIST

Observation
- Basemaps, charts
- Clipboard, notebook, reporting forms, checklists
- Pens, pencils
- GPS, spare batteries
- Job aids for visual observation
- Camera, spare film
- Video camera, spare batteries
- Binoculars

Personal safety
- Lifejacket (and exposure suit if required)
- Survival equipments (*e.g.*, flares, locator beacon)

Safety brief
- Safety brief with pilot/skipper
- Purpose of mission
- Operational constraints
  - Area orientation, observation plan
- Trip duration
- Landing or mooring sites
- Radio frequencies and reporting schedule
- Safety features (*e.g.*, emergency locator beacon, fire extinguishers, first aid kit, radios)
- Emergency exit procedures
- Gear deployment (*e.g.*, current drogue, dye)

From Cawthron, 2000

D.8 Dispersant Observations Report Form

For recording dispersant observations from aircraft and vessels

Incident name: ____ Report number:_____

This report by: _______________________ Organization: ____________________ Date: ______ Time: ______

Application start time: _________________ (military time) Viewing difficulties (if any): _________________________
Application finish time: _________________ (military time) ____

VISUAL APPEARANCE OF SLICK (use standard definitions and visual guides of oil on water)

Before application	Immediately after application	20 minutes after application
______________________	______________________	______________________
______________________	______________________	______________________
______________________	______________________	______________________
______________________	______________________	______________________
______________________	______________________	______________________
______________________	______________________	______________________
Film roll #: ________________	Film roll #: ________________	Film roll #: ________________
Photo #: ________________	Photo #: ________________	Photo #: ________________

Dispersion cloud observed? ❑ Yes ❑ No
Time taken for cloud to form: __________ minutes

Did oil re-appear (re-coalesce)? ❑ Yes ❑ No
Time taken to reappear: __________ minutes

% of slick treated: _________
% overspray: _________
Estimated % efficiency: _________

Describe any variation in effectiveness across slick:

Describe differences between treated and untreated areas:

Describe any biota present and any effects observed:

General comments/problems encountered:

Recommendations for future applications:

Start position
Latitude: ___________________________ north
Longitude: _________________________ west
Distance from shore: _________________ miles

Finish position
Latitude: ___________________________north
Longitude: _________________________ west
Distance from shore: _________________ miles

From Cawthron, 2000

D.9 Wildlife Aerial Survey Form

Incident name: ____ Survey #: ____ Flight # ____

Date: ___________ Survey page ____ of ____

Survey Crew: ____

____

____

____

Survey Equipment: ________________________________

____

____

____

Flight information:

Aircraft type: __________________________________

Start flight local time: ___________

End survey local time: ___________

End survey local time: ___________

End flight local time: ___________

Survey altitude range (ft): ___________

Physical conditions:

Wind (kts): _________ from direction: _____________

Cloud cover (%): _________ Seastate (wave height): _____ ft

Overall sighting conditions:

☐ Excellent ☐ Very good ☐ Good

☐ Fair ☐ Poor

Sighting #	Sighting specifics			General location
	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
	Current altitude (ft):			
Comments:				

Wildlife Aerial Survey Form, continued

Incident name: ____ Survey #: ____ Flight # ____
Date: ___________ Survey page ____ of ____

Sighting #	Sighting specifics			General location
	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Comments:				

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APPENDIX E

WILDLIFE SPOTTING AND MONITOR PROTOCOLS
TRUSTEE MONITORING DURING DISPERSANT OPERATIONS

The primary purpose of the trustee wildlife spotter (TWS) is to monitor dispersant operations and provide confirmation that dispersant application operations are being conducted in accordance with the policies and procedures for wildlife protection outlined in the dispersant use plan. Specifically, the trustee wildlife spotter is to ensure that:

1) dispersants will not be applied directly to marine mammals within or outside of an oil slick:

2) dispersants will be applied in such as way as to avoid, to the maximum extent practicable, the spray of seabirds outside of the oil slick are being treated

3) if sea birds and/or marine mammals are present in the dispersant application area, the application of dispersants will be dictated by the first two stipulations.

Although it is the commitment of the RRT that wildlife trustee spotters be used when at all possible, dispersant operations will not be unduly delayed should a trained spotter not be available prior to dispersant application.

The trustee agencies with responsibility for oil spill prevention and response will select one trustee wildlife designee that will observe dispersant application operations and will be located in the dispersant spotter aircraft. It is the role of the trustee wildlife spotter to observe wildlife and assist the dispersant spotter and pilot avoid spraying of wildlife, making notes as necessary and appropriate to document the operation. If inadvertent spraying of wildlife occurs, the trustee wildlife spotter should make a note of this (including number of animals, species and location if possible) and include this information in his/her report to the Unified Command at the end of each dispersant operation. If at any time dispersant operations are not being conducted in accordance with the California Dispersant Plan, the trustee wildlife spotter should report back immediately to the Unified Command.

The trustee wildlife spotter should be properly trained to fulfill the functions required. Such training shall include:

1) Identification of marine birds and mammals from an aircraft, with special emphasis on species of concern during a dispersant operation;
2) General knowledge of dispersant application policies and procedures and annual training and coordination with operational personnel tasked with dispersant spotting in California;

3) General knowledge and understanding of the Incident Command System; and,

4) General aviation and safety knowledge.

E.1 Wildlife Aerial Survey Form

Incident name:____________________________________ Survey #: _____ Flight # _____
Date: ____________________ Survey page ____ of _____

Survey Crew: ____________________________ Survey Equipment: ___________________________
____________________________ ___________________________
____________________________ ___________________________
____________________________ ___________________________

Flight information:
Aircraft type: _________________________
Start flight local time:_________________
End survey local time: _________________
End survey local time: _________________
End flight local time: _________________
Survey altitude range (ft): _________________

Physical conditions:
Wind (kts): _________ from direction___________
Cloud cover (%): _______ Seastate (wht): _____ ft

Overall sighting conditions:
☐ Excellent ☐ Very good ☐ Good
☐ Fair ☐ Poor

Dispersant Spraying Operations:

It is the policy of the RRT that the following stipulations apply for any dispersant use application:

1) dispersants will not be applied directly to marine mammals within or outside of an oil slick:

2) dispersants will be applied in such as way as to avoid, to the maximum extent practicable, the spray of seabirds outside of the oil slick are being treated

3) if sea birds and/or marine mammals are present in the dispersant application area, the application of dispersants will be dictated by the first two stipulations.

Where dispersant use operations in accordance with these stipulations: ☐ yes ☐ no
If no, please elaborate ____
____
____
____
____
____

Wildlife Sighting:

Please note any observed wildlife in the grid below. Provide this information to the Resources at Risk Unit.

Sighting #	**Sighting specifics**			**General location**
	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			

Sighting	Number of animals:	Lat:	Taxa	
	Local time:	Long:	Species/ancillary ID info	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Comments:				

E.2 Sample Wildlife Aerial Survey Form

Incident name: *Santa Barbara Mystery Spill 34*
Date: *11Dec03*

Survey #: *1* Flight # *1*
Survey page *1* of *1*

Survey Crew: *Amelia Aviator -- pilot*
Joe Computer – data recorder
Bill Byrd – wildlife spotter
Olivia Oyle – dispersant spotter

Survey Equipment: *7 x 50 binoculars*
Garmin GPS
Digital camera
Tape recorder

Flight information:
Aircraft type: *Partenavia fixed-wing*
Start flight local time: *1400 PST*
End survey local time: *1415 PST*
End survey local time: *1510 PST*
End flight local time: *1530 PST*
Survey altitude range (ft): *400-1000 ft*

Physical conditions:
Wind (kts): *10-15* from direction: *NW*
Cloud cover (%): *ave. 60%* Seastate (wave height): *1-2* ft

Overall sighting conditions:
☐ Excellent ☐ Very good ☐ Good
☐ Fair ☐ Poor

Dispersant Spraying Operations:

It is the policy of the RRT that the following stipulations apply for any dispersant use application:

1) dispersants will not be applied directly to marine mammals within or outside of an oil slick:

2) dispersants will be applied in such as way as to avoid, to the maximum extent practicable, the spray of seabirds outside of the oil slick are being treated

3) if sea birds and/or marine mammals are present in the dispersant application area, the application of dispersants will be dictated by the first two stipulations.

Where dispersant use operations in accordance with these stipulations: ☐ yes ☐ no
If no, please elaborate:____

____

____

____

Wildlife Sighting:

Please not any observed wildlife in the grid below. Provide this information to the Resources at Risk Unit.

Sighting #	Sighting specifics			General location
1	Number of animals:*12*	Lat: *34 23.22 N*	Taxa: *Avian*	*NE corner of spill, 100m from leading edge*
	Local time: *1430*	Long: *119 43.23 W*	Species/ancillary ID info: *Brown pelicans*	
	Current altitude (ft): *450*			
Sighting *2*	Number of animals: *300*	Lat: *34 24.11 N*	Taxa: *Unknown*	Center of spill, in oil
	Local time: *1000*	Long: *119 33.87 W*	Species/ancillary ID info: *UNID small cetaceans*	
	Current altitude (ft): *1000*			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	

E.3 List of experienced aerial wildlife observers

This list is drawn in part from the List of Wildlife Experts and Contractors from Appendix 1b of the Wildlife Response Plan, a stand-alone response resource to use with each of California's Area Contingency Plans. Individuals excerpted from that list are those with aerial wildlife observation experience. Others listed are known to the response community as also having the requisite aerial observation skills and potentially available to help implement the Wildlife Observation Protocols during a dispersant response.

We offer here some of the same insights and caveats found in the Wildlife Response Plan:

> "*In general, the listing is divided into marine birds and marine mammals [experts}, with a few having expertise in near shore terrestrial animals. The list includes individuals who have a history of cooperation with [the California Department of Fish and Game] CDFG (other than individuals already known ... through the Oiled Wildlife Care Network – OWCN). It includes both agency personnel and private consultants statewide. This list is not comprehensive; some qualified individuals or companies may not be included. This list is not an endorsement of the ability of the personnel shown.*
>
> *This list was generated as a resource to [the Office of Spill Prevention and Response] OSPR field responders to aid in addressing wildlife issues and environmental sensitivities during spill response. Individuals on this list may be valuable to a spill response in many ways. For example, 1) local experts will often have site-specific knowledge (e.g., status of local populations, breeding status, abundance, seasonal occurrence) which will be necessary for effective spill response planning, 2) agency personnel shown can assist by recommending individuals from this list or others that may not be listed who may also be willing to participate in the response, 3) staffing Wildlife Reconnaissance functions, and 4) endangered species consultation and monitoring.*
>
> *Generally, all personnel listed, other than agency personnel, have indicated an ability to travel and work statewide. Spills involving endangered species and/or marine mammals will require special expertise. Non-agency affiliated personnel who are shown having expertise with listed species and marine mammals generally have permits and/or MOUs with CDFG, USFWS and/or NMFS.*"

While these observers have the training and approvals necessary to assist in wildlife surveys during an oil spill response, they have not yet been separately briefed, pre-trained or vetted relative to the more particular needs of implementing the Wildlife Aerial Observation Protocols during a dispersant application.

This is a preliminary list that will be updated once experienced observers have been identified, trained in the specific dispersant-related Wildlife Observation Protocols, and vetted by the responsible federal and state trustee agencies. This list below is offered for the interim.

E.3 List of wildlife experts potentially able to assist in dispersant-related implementation of the WILDLIFE OBSERVATION PROTOCOLS (THIS DOCUMENT IS CURRENTLY BEING UPDATED)

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Adams, Josh	Seabird capture, handling, ID, at-sea survey, radio telemetry, Monterey Bay to San Mateo county coast.	USGS	Work: 831-771-4422 Cell: Home: 831-684-9317 Emergency: home Email: Josh_Adams@usgs.gov
Ainley, David*	Seabirds, boat surveys	Harvey and Associates	Work: 408-263-1814 or 415-332-5718 Cell: Home: Emergency: Email:
Ames, Jack	Sea otters, oil spills, boat/shore/aerial sea otter surveys	CDFG-OSPR	Work: 831-469-1740 Cell: 831-212-7010 Pager: 408-939-5489 Home: 831-633-5294 Emergency: pager or cell Email: james@ospr.dfg.ca.gov
Anderson, Dan*	California brown pelican, waterbirds, pollution ecology	University of California	Work: 530-752-2108 Dept. office: 530-752-6586 Email:
Applegete, Tom	Shorebirds, California least tern, western snowy plover, waterfowl, SLO and Santa Barbara counties	Wildwing	Work: 805-764-2780 Cell: 805-235-1728 Home: Emergency: work or cell Email: wildwing@onemain.com
Boyce, Jennifer*	Seabirds, oil spills	NOAA, Restoration Center	Work: 562-980-4086 Cell: Home: Emergency: Email: Jennifer.boyce@noaa.gov
Burkett, Esther*	Marbled murrelet	CDFG-HCPB	Work: 916-654-4273 Cell: Home: Emergency: Email: eburkett@dfg.ca.gov
Colwell, Mark	Shorebirds, waterbirds	Humboldt State University	Work: 707-826-3723 Cell: Home: 707-822-7309 Emergency: home Email:
Copper, Elizabeth	California least tern	Avian Research Associates	Work: 619-435-1340 Cell: Home: Emergency: Email: ecopper@san.rr.com
Ford, Glenn	Seabirds	R.G. Ford Consulting	Work: 503-287-5173 Cell: 503-282-0799 Home: Emergency: Email: eci@teleport.com

E.2, continued **List of wildlife experts potentially able to assist in dispersant-related implementation of the WILDLIFE OBSERVATION PROTOCOLS**

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Garrett, Kimball	Birds	Los Angeles County Museum of Natural History	Work: 213-763-3368 Cell: Home: Emergency: Email: kgarrett@nhm.org
Golightly, Rick	Seabirds, seabird colonies, oil spills	USGS-BRD	Work: 707-826-3952 Cell:530-304-4118 Home: Email: rtg1@humboldt.edu
Gorbics, Carol	Seabirds and sea otters. Alternate to Katy Zeeman.	USFWS	Work: 760-431-9940 x 214 Cell: 760-271-6934 Home: 760-804-3984 Emergency: Email:
Gress, Frank*	Seabirds, California brown pelican	CA Institute of Environmental study	Work: 530-756-6944 or 530-756-1175 Cell: Home: Emergency: Email; fgress@pacbell.net
Harvey, Jim*	Seabird and shorebird surveys, seabird and pinniped handling, marine mammals, Santa Cruz and Monterey counties	Moss Landing Marine Labs	Work: 831-632-4400 Cell: Home: Emergency: Email: harvey@mlml.calstate.edu
Haulena, Martin	Marine mammals and sea turtles, Mendocino to SLO counties	The marine Mammal Center	Work: 415-289-7370 Cell: 415-819-2254 Home: Email: haulenam@tmmc.org
Henkel, Laird	Aerial wildlife observation Seabird and shorebird surveys	CDFG-OSPR	Work: 831- 649-2880. Cell: 831-212-7665 Home: Emergency: home or cell Email: lhenkel@ospr.dfg.ca.gov
Hewitt, Ro	Western snowy plover, bird ID, local avifauna, California and southern Oregon	LBJ Enterprises	Work: 707-442-0339 Cell: phone 707 496 0854 Home: 707-269-0271 Emergency: home or cell Email: lbjent@humboldt1.com
Imai, Randy	Aerial wildlife observations, oil spill mapping and technology	CDFG-OSPR	Work: 916-324-0000 Cell: 916-826-5271 Pager: 916-360-2232 Home: Emergency: pager or cell Email: rimai@ospr.dfg.ca.gov
Jurek, Ron*	Snowy plover, least tern, shorebirds, birds, raptors	CDFG-HCPB	Work: 916-654-4267 Cell: Home: Emergency: Email: rjurek@dfg.ca.gov
Keane, Kathy	California least tern	Keane Biological Consultants	Work: 562-708-7657 Cell: 562-708-7657 Home: Emergency: Email: keanebio@yahoo.com

E.2, continued **List of wildlife experts potentially able to assist in dispersant-related implementation of the WILDLIFE OBSERVATION PROTOCOLS**

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Kovacs, Karen*	Wildlife, waterbirds	CDFG-Eureka	Work: 707-445-6493 Cell: Home: Emergency: Email: kkovacs@dfg.ca.gov
LeValley, Ron	Waterbirds, marbled murrelet, snowy plover	Mad River Biologists	Work: 707-839-0900 Cell: 707-496-3326 Home: Emergency: Email:
Karl Mayer	Specialty/ Geographic Area: Sea Otters, marine mammals, land/ boat basedsea otter surveys, sea otter capture/ handling; Santa Cruz, Monterey, SLO counties	Monterey Bay Aquarium	Work phone: (831)644-7595 Cell phone: (831)915-2635 Email: kmayer@mbayaq.org
McAllister, Sean	Waterbirds, marbled murrelet, snowy plover, oil spills	Mad River Biologists	Work: (707) 442-4302 Cell: (707) 496-8790 Home: Emergency: Email: sean@madriverbio.com
McChesney, Gerry	Seabirds, seabird colonies, oil spills	USFWS, San Francisco Bay NWR	Work: 510-792-0717 Cell: Home: Emergency: Email:
Nevins, Hannah	Seabird and shorebird surveys, seabird and pinniped handling	Moss Landing Marine Labs	Work: 831-771-4422 Cell: Home: Emergency: home Email: hrnevins@hotmail.com
Ralph, C.J.	Marbled murrelet, seabirds, oil spills	US Forest Service	Work: 707-825-2992 Cell: Home: 707-822-2015 Emergency: Email: jcr2@homboldt.edu or cjralph@humboldt1.com
Roletto, Jan	Wildlife, marine mammals, oil spills	Gulf of the Farallones NMS	Work: 415-561-6622 Cell: home: Emergency: Email: j.roletto@noaa.gov

E.2, continued List of wildlife experts potentially able to assist in dispersant-related implementation of WILDLIFE OBSERVATION PROTOCOLS

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Sharp, Brian	Waterbirds, oil spills	Sharp	Work: 541-763-2050 Cell: Home: Emergency: Email: ecoperspectives@yahoo.com
Singer, Steve	Marbled murrelet, birds	Singer	Work: 831-427-3297 Cell: Home: Emergency: Email:
Strong, Craig	Seabirds, shorebirds, special expertise with brown pelicans, waterfowl, marine mammals and marbled murrelet; west coast, San Diego-WA, Del Norte and Humboldt counties	Crescent Coastal Research	Work: 503-338-6023 Cell: 503-791-0509 Home: 503-338-5510 Emergency: home Email cstrong@pacifier.com
Swanson, Jim	Region 3 biologist	CDFG	Work: 707-944-5528 Cell: Home: Emergency: Email: jswanson@dfg.ca.gov
Sydeman, Bill*	Birds, oil spills	Point Reyes Bird Observatory	Work: 415-868-1221 Cell: Home: Emergency: Email: waterislife@hotmail.com
Tershey, Bernie	Seabirds	Island Conservation, Center for Ocean Health	Work: 831-459-1461 Cell: Home: Emergency: Email: tershey@islandconservation.org
Zeeman, Katy	Endangered species, wildlife, sea otters; Ventura through San Diego counties	USFWS	Work: 760-431-9440 x 291 Cell: Home: Emergency: Email: Katie_zeeman@fws.gov
Other Experienced Observers			
Boggs-Blalack, Melissa	Regional marine biologist, oil spills	CDFG-OSPR	Work: 805-772-1756 Cell: 805-558-1005 Pager: 805-614-2106 Home: Emergency: cell or pater Email: mboggs@ospr.dfg.ca.gov
Croll, Don	Seabird identification, surveys	University of California Santa Cruz, Center for Ocean Health	Work: 831-459-3610 Cell: Home: Emergency: Email: croll@biology.ucsc.edu
DeVogeleare, Andrew	MBNMS marine research director	Monterey Bay National Marine Sanctuary	Work: 831-647-4213 Cell: Home: Emergency: Email: andrew.p.devoglaere@noaa.gov

E.2, continued List of wildlife experts potentially able to assist in dispersant-related implementation of WILDLIFE OBSERVATION PROTOCOLS

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Faurot-Daniels, Ellen	Land/boat/aerial sea otter surveys, oil spills, marine biologist, supervisor	California Coastal Commission	Work: 415-904-5285 or 831-427-4852 Cell: 831-334-2134 Pager: 415-201-5792 Home: 831-726-1750 Emergency: pager Email: efaurotdaniels@coastal.ca.gov
Harris, Mike	Land/boat/aerial sea otter surveys	CDFG-OSPR	Work: 805-772-135 Cell: 831-212-7090 Pager: 805-348-9316 Home: Emergency: cell or pager Email: mikeharris@ospr.dfg.ca.gov
Hatfield, Brian	Land/boat/aerial sea otter surveys	USGS-BRD	Work: 805-927-3893 Cell: 805-305-2121 Home: Emergency: Email: brian_hatfield@usgs.gov
Kenner, Mike	Land/boat/aerial sea otter surveys	USGS-BRD	Work: 831-459-3244 Cell: Home: Emergency: Email:
Kieckhefer, Tom	Cetaceans and sea otters	Pacific Cetacean Group and Friends of the Sea Otter	Work: 831-582-1030 or 831-373-2747 Cell: Home: Emergency: Email: kieckhefer@aol.com or education@seaotters.org
Kong, Corey	Los Angeles/Long Beach Area Environmental Scientist – Oil Spills	Dept. Fish and Game, Office of Spill Prevention and Response	Work: 562-598-6203 Cell: 562-477-7081 Pager: 562-400-4181 Home: Emergency: Email: ckong@ospr.dfg.ca.gov
Lewis, Robin	Regional marine biologist and supervisor, oil spills	CDFG-OSPR	Work: 858-467-4215 Cell: 619-972-0507 Pager: 619-893-2969 Home: Emergency: cell or pager Email: rlewis@ospr.dfg.ca.gov
Staedler, Michelle	Land/boat/aerial sea otter surveys	Monterey Bay Aquarium	Work: 831-648-4976 Cell: 831-594-7Pager: Home: Emergency: Email: mstaedler@mbayaq.org
Stewart, Julie	Land/boat/aerial sea otter surveys	Monterey Bay Aquarium	Work: Cell: 831-254-0949 Pager: Home: Emergency: Email: jstewart@mbayaq.org
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APPENDIX F

PUBLIC COMMUNICATIONS PLAN

F.1 Sample Press Release for use in the California Pre-Approval Zone

Attention: Proposed Use of Chemical Dispersants

In response to oil spill cleanup issues associated with the ________________________ oil spill incident, the Unified Command has given approval for the use of the chemical dispersant ________________ to promote rapid oil dispersion into the surrounding water column during this incident and under the following conditions:

The dispersant use meets the "pre-approval zone" criteria as set forth in the California Dispersant Use Plan – Pre-approval zone checklist and as approved by the Region IX Regional Response Team, ensuring;

- the application of dispersants will be in the off-shore waters off the state 3 – 200 miles and not within a National Marine Sanctuary;
- the application of dispersants provides a net environmental benefit for species at risk from this oil spill and/or of species of special concern; and,
- the application of dispersants can be done safely and in accordance with standard marine and aviation practices.

As a part of the Unified Command's decision for dispersant use, federal and State Trustee Agencies **(list agencies, as necessary)** identified the (**list species of special concern in which dispersant use will potentially benefit**) as species of special concern and of significant risk of injury from this oil spill, especially if the spill were allowed to spread and hit sensitive habitats and shorelines. Wildlife and resource agencies believe that these species will be benefited by the use of dispersants and will monitoring the operations as appropriate for these species. (**provide any information, as necessary on fisheries and plans for any seafood tainting panels)**

In addition, dispersant use operations will be monitored by **(list the agencies; contacts of necessary**) using the methodology developed by the US Coast Guard (1999) Special Monitoring of Applied Response Technologies (SMART) protocols and as specified in the California Dispersant Use Plan. These protocols are designed to determine the effectiveness of dispersant use, thus providing a feed-back loop to the Unified Command for when operations should be terminated.

Close the press release with information on any press conferences or public meetings that will be held, where to get additional information, etc. . . and/or any telephone numbers of contact information that people can use.

FI.b. Oil Spill Dispersants: Frequently Asked Questions (FAQs)

1. Why are chemical dispersants used on an oil spill ?

Dispersants are used to minimize the environmental impact of an oil spill.

Dispersants *do not eliminate the problem of an oil spill* but are intended as a means of reducing the overall environmental impact of an oil slick at sea. Oil Spill Dispersant use accelerates the weathering and biological breakdown of oil at sea and *reduces the impact of oil on sensitive nearshore environments*.

Oil Spill Dispersants are also highly effective in *reducing exposure of sea birds and marine mammals to oil* as most sea birds are oiled by slicks on the surface of the sea or in near shore coastal habitats.

Undispersed slicks and residual oils are a persistent threat to nearshore, birds, mammals and intertidal communities due to the toxicity of, and contact with oil. Dispersed oil is less "sticky" than undispersed oil, therefore the adhesion and absorption onto surfaces and sediments of dispersed oil is greatly reduced compared with the original oil slick.

In a spill incident environmental trade-offs of protection and sacrifice will occur. These decisions are not taken lightly by response authorities and will be based on the best available advice and scientific data to achieve a net environmental benefit.

2. What are oil spill dispersants ?

Dispersants are chemical formulations with an active ingredient called surfactants. Surfactants are specifically designed chemicals that have both hydrophilic (water liking) and oleophilic (oil liking) groups in the chemical compound. These chemicals reduce the interfacial tension between the oil and water and helps the creation of small oil droplets, which move into the water column facilitating quicker natural biological breakdown (biodegradation) and dispersion. By decreasing the size of the oil droplets, and dispersing the droplets in the water column, the oil surface area exposed to the water increases and natural breakdown of the oil is enhanced. Thus removing the threat of the oil from the water surface to within the water column.

Dispersion is a natural process that occurs in surface slicks as wind and wave action break up the surface slick. However, naturally dispersed oil droplets tend to recoalesce and return to the water surface and reform as surface slicks. The additional of chemical disprsants allows the wind and wave action to then carry the small oil drolets away and dilut the concentration of the droplets in the water colum; these dispersed oil droplets are then targeted by indigenous oil-consuming microbes wehre they are broken down into the ultimate components, carbon dioxide and water.

3. On what basis is the decision made to use dispersants in a spill incident?

The main basis for decision making in determining whether oil spill dispersant will be used is:

" Will the application of the chemical dispersant to the spilled oil minimize the overall environmental impact of the oil spill?"

Except for the impact on marine birds and mammals, the most damaging effect of oil spills is when the oil strands on shorelines or enters restricted shallow waters like estuaries. Oil Spill Dispersants are a prime and vital response tool to stop oil coming ashore or from entering sensitive nearshore environments especially when weather and sea conditions do not allow the use of oil containment and recovery equipment.

Oil Spill Dispersants are usually not applied to oil spills in "near shore areas" for example: where sea grass beds, oyster beds, mariculture or coral reefs are present. However, dispersant use may be authorized by the Region IX Regional Response Team in these circumstances when there is a possibility of an impact of oil on a more sensitive nearhore habitat, or wildlife impacts are possible. For example, when an approaching oil slick may impact sensitive mammal breeding areas, or endangered species such as migratory birds.

4. What are the negative effects of dispersants on the environment ?

The acute toxicity of dispersed oil generally *does not reside in the dispersant* but in the more *toxic fractions of the oil*. Dispersing oil into the water in situations where there is little water movement or exchange, such as shallow embayments, increases exposure of subsurface, benthic organisms and fish to the toxic components of the oil.

Fish and other marine life in the larvae stage or juvenile stages are more prone to the toxicity effects of oil and dispersants. Therefore it is unlikely dispersants will be used near commercial fisheries, important breeding grounds, fish nurseries, shellfish aquaculture etc. unless it is to protect a more important environmental resource.

Seagrasses and coral reef communities are particularly sensitive to dispersed oil because instead of the oil "floating over" the reefs and submerged seagrass beds the oil/dispersant mixture in the water colour will *come into direct contact with these sensitive ecosystems.*

Generally there is a reluctance by spill responders to use dispersants in shallow waters less than 30 feet deep, although there may be situations where using dispersants could save nearshore impacts or wildlife.

5. Who authorizes the use of dispersants during an oil spill response?

Under the Oil Pollution Act of 1990, the Region IX Regional Response Team is vested with the authority over dispersant use for marine oil spills. Subpart J of the National Contingency Plan (NCP) provides that the Federal On-Scene Coordinator (FOSC), with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule and licensed for use by the State of California.

The California Dispersant Use Plan outlines the process by which the Federal On-Scene Coordinator can undertake a dispersant use decision and provides the criteria to determine if a spill meets the requirements outlined by the RRT for pre-approval of dispersant use. If all the pre-approval criteria is met, the FOSC can authorize the use of dispersants. If it is determined that a spill does not meet the pre-approval, then the final decision for a dispersant-use determination rests with the RRT

6. How effective are oil spill dispersants ?

Chemical dispersants aid the natural dispersion of oil by reducing the oil/water interfacial tension and, along with the natural motion of the sea, allow the break up of oil on the water into very fine droplets.

Effectiveness of oil dispersion by chemical dispersants at sea is governed by a range of conditions and include the:

- type and chemistry of the oil,
- degree of weathering of the oil,
- the thickness of the oil slick,
- type of dispersant,
- droplet size and application ratio,
- prevailing sea conditions (wave mixing energy), and
- sea temperature and salinity.

7. Will dispersants work on all types of oils ?

No, dispersants will not work on all oil spills.

The first rule in combating oil spills with dispersants is that the oil must be amenable to dispersant use. It is also well understood by oil spill response agencies that *dispersants are only effective on certain types of oils* and the first priority is always to determine the spilled oil's physical and chemical properties in order to assess combat options.

It has been generally accepted that non-dispersable oils are;

non-spreading oils (pour point is higher than sea temperature), highly viscous oils (> 2000 Centistokes (cSt) - a measurement of the mobility of oil), a water-in-oil emulsion has formed (mousse).

A "rule of thumb" amongst spill responders as to whether or not a dispersant will work has historically been - "a dispersant may have a reasonable success rate if the oil is continuing to "flow" or spread as a fluid (not just sheening)".

Unfortunately this "rule of thumb" is only partly correct. The properties of these oils are determined by their chemical composition which vary widely. For the purposes of determining the use of dispersants at various sea temperatures the important properties are:

- the specific gravity (or API gravity),

- pour point, and
- viscosity.

Pour point and viscosity of a spilt oil are the dominant factors for the determination dispersant use. The California Dispersant Use Plan provides an outline of this information that can assist responders at the time of an oil spill incident

8. How quickly do we need to apply dispersants to an oil spill ?

As quickly as possible!

There is only a limited "window of opportunity" to use chemical dispersant in an oil spill incident. This is primarily due to the changing properties of the spilt oil due to weathering of the oil, but is also governed by the location and speed of movement of the slick onto the foreshores or into estuarine environments.

This window of opportunity may be as little as only a few hours. Sometimes if the conditions are favourable, a day or two.

Therefore it is essential that the capability exists to quickly activate and deploy resources anywhere across California to deliver and apply oil spill dispersants at sea.

9. What are the Health and Safety Issues Associated with the Use of Chemical Dispersants During An Incident?

Response workers must be careful to ensure that personnel do not get sprayed by the dispersants, or come in contract with any of the overspray. Vessels must only be deployed under safe sea conditions.

10. Are There any Waster Generation of Disposal Issues Associated with the Use of Chemical Dispersants?

Effective use of dispersant agents should signficatly reduce the amount of oil wastes generated.

F.2 General risk communication guidelines

- **Know the stakeholders**

  Identifying both external and internal stakeholders and finding out their diverse and sometimes competing interests and concerns is the first step to any successful risk communication effort. The best way to determine stakeholder interests and concerns is to ask them! Conduct interviews with key leaders both outside and inside your organization. Use the information gathered in this step to develop your risk communication program for establishing collaborative problem-solving and communication efforts.

- **Simplify language and presentation, not content**

  When trying to communicate the complex issues behind a health risk, it is easy to leave out information that seems to be overly technical. Risk communication research and studies have proven that all audience members can understand any technical subject if it is presented properly. This can be done, for example, through the use of visuals and diagrams and by defining all technical, medical and scientific jargon and acronyms.

- **Be objective, not subjective**

  It is often very easy to differentiate between opinions and facts. It can be difficult, however, to respond credibly to opinions without substantiating them or offending the individual asking the question. In order to maintain credibility, respond to both opinions and facts in the same manner.

- **Communicate clearly and honestly**

  To communicate clearly, present information at the audience's level of understanding. People can reject information that is too difficult for them or they can reject a communicator who is perceived to be dishonest or untrustworthy. As a result, they may refuse to acknowledge the information or become hostile. On the other hand, they may become hostile if they feel patronized. The bottom line is – know the audience! In addition, whenever possible, provide familiar examples and concrete information that can help put the risk in perspective.

- **Deal with uncertainty**

  When communicating health risks, results are not definitive. Discuss sources of uncertainty, such as how the data were gathered, how they were analyzed, and how the results were interpreted. This demonstrates that the uncertainties are recognized, which can lead to an increase in trust and credibility. However, when discussing uncertainty, the communicator should stress his or her expertise and knowledge of the subject. This will reinforce the leadership's ability to handle the situation and could allay concerns and fears regarding the risk and the risk-management decision.

- **Be cautious when using risk comparisons**

  In order to put risks in perspective, comparing an unfamiliar risk to a familiar one can be helpful. However, some types of comparisons can alienate audience members. Avoid comparing unrelated risks, such as the risks associated with smoking versus those associated with air contamination. People rarely accept the comparison of unrelated risk.

- **Develop key messages**

  Key messages are those items of importance, the health risk information that needs to be communicated. They must be clear, concise, and to-the-point. No more than three messages should be communicated at one time. Repeat key messages as often as possible to ensure they are not misunderstood or misinterpreted.

- **Be prepared**

  Most questions and concerns can be anticipated if the audience is known. In fact, the communicator should know 70 percent of the possible questions that could be asked. Consider how to answer general questions and how to respond to specific inquiries.

F.3 Risk communication guide for state or local agencies

Much of the following is excerpted from "Risk Communication Guide for State and Local Agencies", produced be the California state Office of Emergency Services (October 2001). The full copy of the report can be requested from Yvonne Addassi (OSPR; see Appendix A) or by accessing the following internet web site:

http://www.oes.ca.gov/oeshomep.nsf/all/RiskGuide/$file/RiskGuide.pdf

Key risk issues often of interest to the community

- Consequences of worst-case and alternative scenarios and the likelihood of disaster.
- Local government and community emergency response actions, and how those have been factored into state and federal response actions.
- Community notification systems.
- Perceived risks as reported by the media.
- Use of standards and accepted practices.
- Safety thresholds and limits.
- Acceptance of the decision process and decisions by the technical, scientific and environmental communities
- Other potential considerations (*e.g.*, business (including commercial fishing and tourism) and recreation (including fishing and beach access) impacts.

- Pay as much attention to community outrage factors, and to the community's concerns, as you do to scientific data. At the same time, do not underestimate the public's ability to understand technical information.

General risk perception and communication issues

- Risks under individual control are accepted more readily than those subject to industry or government control.

  At the time of an actual spill response and/or a decision to use dispersants, response actions will be directed by the Unified Command. It is important that during an oil spill emergency response, actions taken are quick, well-considered, yet nevertheless directive. To offset public unease at how heavy-handed this may seem, it will be helpful to briefly review how various stakeholder groups and the public were included in preceding dispersant response <u>planning</u> process, and how the current dispersant decision is being guided by real-time data gathering. Also include information on other agency consultations, and how particular concerns about living resources, fishery impacts, and socioeconomic impacts will be addressed.

- Risks that seem fair are more acceptable than those that seem unfair.

  It may be helpful to explain the Net Environmental Benefit Analysis process that was used in the response planning phase. At that time, it was determined that 1) harm would occur as a result of a spill, and 2) the goal is to minimize the overall harm and spare the most sensitive resources, and provide a <u>net</u> environmental benefit. However, the communicator will also need to address questions of impacts to business and coastal and ocean access, as these were not considered at the time that net environmental benefits were being weighed during the planning process.

- Risk information that comes from trustworthy sources is more readily believed than information from untrustworthy sources.

  Use the guidance offered above in Appendix F.2.

- Exotic risks seem more dangerous than familiar risks.

  Use of dispersants in California is not yet a common oil spill response practice. The public will expect to see that all other means to recover oil using the more traditional mechanical means have been considered. They also need to understand the circumstances under which dispersants may cause less harm to the environment than would those more traditional mechanical recovery tools, and how all means to recover and/or re-locate the oil to less sensitive environmental "compartments" will be used.

- Risks that are "undetectable" are perceived as more dangerous.

  It is extremely likely that the public will interpret a decision to use dispersants as a decision to "hide" the oil. These concerns need to be addressed openly and honestly, drawing on the communication tools in Appendix F.2 as well as the resource impact information generated during the dispersant Net Environmental Benefit Analysis response planning process.

F.3, continued

Possible objectives of a risk communication program

- Research the issues with stakeholders to gather sufficient information to identify the most important risk communication objectives to address.
- Identifying the stakeholders to anticipate or assess their varying interests, in order to design an effective risk communication program is a critical initial task.
- Stakeholders can include the residential, business, commercial or industrial communities, your agency and other agencies (local and state governments, special districts), environmental groups, and general interested members of the public. Media members may also be present.
- The level of stakeholder interest is a driving force in the assignment of risk communication priorities -- properly identifying and understanding all stakeholder objectives will enhance risk communication effectiveness.
- Communication objectives may include:
  - informing the community, seeking input or feedback, clarifying the probability and consequences of potential risks, addressing existing controversies or concerns, providing a forum for discussion, improving stakeholder understanding and support of government decisions, clarifying agency roles in controlling risk, coordinating federal and state emergency response plans with local government and business emergency response plans, and satisfying regulatory requirements to communicate risk.
- Potentially important objectives during and after the incident include:
  - retaining credibility and trust, clarifying how the current incident compares to the previously assessed risk, identifying how lessons-learned will be used to decrease risks and consequences in the future, and providing enhancements to future community emergency response.

Defining effective risk communication activities during and after incidents

- If an incident was noticed by or impacted the public, time is of the essence in providing information to the community.
- Several communication media (*e.g*., newspapers, television, radio, technical journals) will be readily available, but not necessarily controllable.
- The community will gauge the success of the incident investigation efforts and control of causal factors by how much information is communicated to the community.
- If there is a high degree of uncertainty, focus the risk communication effort on what is being done to control the emergency. Keep the communication channels open.
- Contact news media to provide information. See "**Guidelines for meeting with the media**" below. If there is uncertainty with respect to event chronology or causes, release the information prudently and properly identify that the information is preliminary, but additional information will be provided as it becomes available.
- After an incident:
  - Ensure that any preliminary information has been verified, clarified or modified so that future references to the incident will be factual.
  - Follow-up with local and regional media to verify key information and provide a close-out mechanism for the spill response.
  - Be honest and candid with the public and media, using the guidelines in Appendix F.2.a

Choosing the right representatives

- Use field/community relations staff to relay community concerns within the agency.
- Choose carefully those who represent the agency, and provide appropriate support (e.g.
- Technically-qualified people should have a major role in risk communication.
- For effective communication, representatives need to address <u>technical</u>, <u>communication</u> and <u>authority</u> issues.
- If possible, use the same agency representative throughout the life of the event.
- In some situations, a non-agency representative may be more useful than someone from inside an agency.

Responding personally

- When you speak at a public meeting, tell people who you are, what your background is, and why you are there.
- When speaking personally, put your views into the context of your own values, and urge your audience to do the same.
- If your personal position does not agree with agency policy, do not misrepresent yourself or mislead the community.
- Prepare responses to potential questions before the meeting.

F.3, continued

Creating and maintaining trust and credibility during and after an incident

- Maintain open channels of communication.
- Provide critical information promptly.
- Ensure that the public receives a clear message that the emergency responders are taking appropriate actions to mitigate the event.
- Provide a resource for the public to call to secure additional information.
- Take appropriate steps to promptly investigate the cause of the event.
- Ensure that the public receives a clear message that an investigation of the incident was performed and appropriate actions to prevent a future incident were identified for implementation.
- Provide appropriate follow-up information and follow through with any commitments to the community.
- Recognize that people's values and feelings are a legitimate aspect of public health and safety issues and that such concerns may convey valuable information.
- When people are speaking emotionally, respond to their emotions. Do not merely respond with data.
- Be aware of your own values and feelings about an issue and the effect they have on you.
- Empathetic words will be effective only if your tone of voice, body language and demeanor reinforce what you are saying.

Guidelines for meeting with the media

- Be prepared. Plan what you want to say and anticipate reporter's questions.
- Take and keep control. You decide where to be interviewed. Bridge to your points or to turn negative questions into positive responses. Don't repeat negatives. Know when to exit the interview.
- Make your point. Bring your own agenda to the interview. Stress positive aspects of your operation.
- Keep your composure and watch your body language. Look and sound like you want to be there. Be cooperative, not combative. Avoid a defensive appearance.
- Don't speculate. If you do not have an answer, say so. Do not answer hypothetical questions. Do not feel all questions must be answered immediately.
- Never say "No Comment". Give sound reasons why you cannot answer a question (proprietary information, lack of authority, etc.).
- Never go "Off the Record". Anything you say may be reported. Do not be tricked into answering a question when a reporter says he has turned off a microphone or camera.

F.4 Planning a public meeting: Checklist

As discussed in Appendix F.3, public meetings are one way to involve the community stakeholders in your agency's spill response communications plan. They can be organized in many different ways, depending on the goal, topic, audience and other factors. This checklist will help with general elements that would apply to most public meetings.

PUBLIC MEETING CHECKLIST

MEETING PURPOSE

Organizations and individuals identified?	❑Yes	❑ No
Interests identified and categorized?	❑Yes	❑ No
Meeting time:	________________	
Date:	________________	
Hours:	________________	
Meeting place(s):	________________	
Address:	________________	
	________________	
Central location?	❑Yes	❑ No
Public transportation access?	❑Yes	❑ No
Suitable parking?	❑Yes	❑ No
Safe area?	❑Yes	❑ No
Adequate space?	❑ Yes	❑ No
Adequate facilities?	❑Yes	❑ No
Total expected:		
General session planned?	❑Yes	❑No
Number of small groups/number in each:		
Agenda questions developed?	❑Yes	❑No
Schedule developed?	❑Yes	❑No
Stakeholder interest topics included?	❑ Yes	❑ No
Speakers and speaker order identified?	❑Yes	❑ No

PUBLICITY

Methods selected: ________________

____

____

Material prepared?	❑Yes	❑ No
Number of copies:	________________	
Material distributed?	❑Yes	❑ No
Personal follow-up?	❑Yes	❑ No
PIO/JIC contacted?	❑Yes	❑ No
Message developed?	❑Yes	❑ No
Message approved?	❑Yes	❑ No
Answers prepared?	❑Yes	❑ No
Press release issued?	❑Yes	❑ No

MEETING ARRANGEMENTS

Tables, chairs, lecterns obtained?	❑Yes	❑No
Audio/visual equipment obtained?	❑ Yes	❑No
Registration table?	❑Yes	❑ No
Name tags?	❑Yes	❑No
Refreshments?	❑Yes	❑ No
Heating & cooling OK?	❑Yes	❑ No
Sound & lights OK?	❑Yes	❑ No
Pens, pencils, flipcharts?	❑Yes	❑ No

INFORMATION DEVELOPMENT AND PRESENTATION

Information to be provided:

Written information completed?	❑Yes	❑ No
Role for moderator identified?	❑Yes	❑No
Moderator rehearsed?	❑ Yes	❑ No

RECORDING THE PROCEEDINGS

Methods:

Moderators:

Meeting evaluation tools:

Recommendations made?	❑Yes	❑No
Recommendations taken?	❑ Yes	❑No
Post-meeting report to public made?	❑Yes	❑ No

F.5 Dispersant fact sheet

Include in press packet, distribute at public meetings, or use for other general background briefing and information purposes.

Oil Spill Dispersants

One tool used occasionally in oil spill response is chemical dispersants. Under strict approvals and a narrow set of conditions, dispersants can be sprayed from planes, helicopters or boats onto oil spills in California marine waters. Chemical dispersants break a slick into smaller droplets, promoting mixture of oil into the water column, and accelerating dilution and biological degradation.

Conditions of use

- Federal and state approval for dispersant applications in California is considered when an effective conventional response is not feasible or not totally adequate in containing or controlling the spill.

- Before dispersants are used the response agencies will use all real-time information at their disposal to determine the resources at probable risk from both the oil and the dispersants used against it. Any dispersant application must follow strict guidelines laid down by several agencies and the groups, biologists and community members that assist with advice to those agencies. The federal and state response agencies will make every effort to communicate their oil spill response decisions to the public, through the media and/or in public meetings.

- The primary oil spill response method used in California is mechanical containment and recovery, which involves the use of containment booms, skimmers and other related equipment. The many hindrances to spill recovery, however, place a real advantage to having many “tools in the toolbox”, as historically, no more than 10 percent of the oil has been recovered from large marine spills. Current mechanical technology is not effective in waves greater than about 6 feet, winds greater than 20 knows, or currents greater than 1 knot.

- Dispersants are best used to protect shorelines, when the damage to the shore and nearby marine life would be worse than dispersing the oil into deeper offshore water.

- Dispersants are best used on the leading edge of oil slicks, which might otherwise get out of control and head toward shore.

- Dispersants must be applied soon after the oil is spilled and before the oil weathers or the slick is broken up. This usually means dispersant application with a matter of several hours to a few days, depending on spilled oil circumstances.

- The best conditions are whet the water is deep and when there is sufficient mixing action from waves, wind or current.

How dispersants work

- Dispersants help prevent formation of water-oil emulsions, or mousse, and they speed up biological breakdown of oil by natural marine organisms. They also ability of oil to stick to sediments and other organisms in the water.

Limitations on dispersant application

- Only dispersants approved by federal and California state governments can be used, and only on oils that have a fairly high likelihood of being “dispersible”.
- Ocean and weather conditions must be conducive to dispersant use.
- The spilled oil must be at least 3 miles from shore and not within a National Marine Sanctuary, or other agency approvals will be required before they can be used.
- Dispersant use must be considered to provide a “net environmental benefit” – in other words, once the oil is spilled, resources somewhere are going to be negatively impacted, so the goal is to minimize impacts to the most sensitive resources in the area at the time of the spill.
- Dispersants have to be applied safely, and dispersants cannot continue to be used if they are not effective.

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APPENDIX G

SEAFOOD TAINTING PLAN

G.1 Overview for Managing Seafood Concerns During an Oil Spill

The following material is drawn largely from three documents:

Mearns, A.J. & R.Yender, 1997. A summary of a NOAA workshop on management of seafood issues during an oil spill response. Proc. Arctic and Marine Oil Spill Program Technical Seminar. Environment Canada, Vancouver, pp. 203-214.

Reilly, T.I. and R.K York. 2001. Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill. NOAA Technical Memorandum NOS OR&R 9.107pp.

Yender,R., J. Michel, and C. Lord. 2002. Managing Seafood Safety After an Oil Spill Seattle: Hazardous Materials Response Division., Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

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Seafood safety is a concern raised at nearly every oil spill incident of any significance. Both actual and potential contamination of seafood can substantially affect commercial and recreational fishing, subsistence seafood use and generate public health concerns. Loss of confidence in seafood safety and quality can impact seafood markets long after any actual risk to seafood from a spill has subsided, resulting in serious economic consequences. Protecting consumers from unpalatable and unsafe seafood is a primary objective of federal and state public health agencies after a spill occurs.

The purpose of this guidance is to identify the various problems that can arise and to describe the remedies available. The information is aimed primarily at those in the fisheries sector suffering economic loss as well as spill responders and managers with responsibilities for protecting public health, and consumers concerned about the safety and quality of seafood. Interested parties are encouraged to share experience gained in managing fishery resources during oil spills. Guidance will be changing as a result of recent California legislation (2008 AB 2935 Huffman) mandating fishing closure in response to il spills, but implementing procedures are under development. Seafood managers may be faced with making many urgent decisions after an oil spill, often based on limited data:

Should seafood harvest in the spill area be closed or restricted?

If closed, what criteria should be applied to re-open a fishery?

How should seafood safety and palatability be evaluated?

How can health risks best be communicated to the public?

Public health officials and other seafood managers do not routinely deal with oil spills as part of their day-to-day responsibilities. Consequently, they typically have little experience with risks to seafood from oil spills when they suddenly are faced with determining appropriate seafood management actions in response to a spill.

Subsequent to an oil spill, there are three separate areas of concern that are often grouped together under the broad definition of "seafood tainting." The Unified Command will need to adequately address each issue in turn as well as the pertinent stakeholders. These three areas can be loosely outlined as follows:

- **Seafood Tainting Concerns**: Contamination of seafood can usually be detected as a petroleum taste, or taint. Public confidence in seafood products can quickly erode as a result of suspect, or actually contaminated products reach the market. The presence of taint simply indicates that flavor or odor is altered; it does not characterize the nature of the off-flavor or off-odor, quantify the degree of taint, or imply any human health hazard. Although health concerns are usually generated from seafood taint, "tainting" is primarily a marketing concern regarding the salability of seafood. It is reasonable to conclude, with respect to oil spill contamination, that if seafood is not "tainted," it is acceptable for consumption.

  ***Seafood tainting panels can be established on a spill-specific basis by contacting the U.S. Food and Drug Administration. Additionally, the U.S. Coast Guard can close a particular "area of operation" to fishing and/or seafood harvest as a part of the emergency powers of an oil spill**.*

- **Public Health Concerns:** The occurrence of contamination in seafood organisms or products following an oil spill can lead to public health directives being involved because of the presence of known carcinogenic compounds in petroleum products. The aromatic fractions of oil contain the most toxic compounds, with polycyclic aromatic hydrocarbons (PAH) being of greatest concern. The California Department of Public Health (CDPH; see **Appendix A**) should be contacted to determine chemicals of concern as well as testing levels. Additionally, the CDPH can coordinate the closure and reopening of areas and fisheries for public health reasons.

- **Trustee Agency Concerns:** Many finfish, shellfish, mollusks, and crustaceans can become contaminated during an oil spill. Petroleum contamination of finfish and shellfish depends upon a variety of biological and ecological factors, including feeding strategies, habitat utilization, and physiology. The ecological and population impacts of a spill will be species and habitat specific. The California Department of Fish and Game (CDFG) has the primary state trustee authority for these resources and can be contacted to determine if biological and ecological factors are a concern for a given resource. Additionally, the CDFG can close any fisheries under its jurisdiction for population health concerns.

Fishing is important in all maritime nations and many oil spills cause damage to subsistence, recreational and commercial fishing activity. Aquaculture enterprises have become widely established, thereby increasing the sensitivity of many coastal areas to oil pollution impact. Increased public awareness and heightened food quality and safety standards have meant that even small oil spills can cause a large impact and generate strong political interest.

Oil pollution effects take a variety of forms. Animals and plants may be killed as a result of oil smothering and toxicity. Catches and cultivated stock may become physically contaminated or acquire a taint. Fishing and cultivation gear may be oiled, leading to the risk of catches or stock becoming contaminated or fishing being halted until gear is cleaned or replaced. The handling of seafood products in bulk means that it is seldom practical to locate and remove the oiled specimens.

Fishermen and aquaculture operators are often on the front line of oil spill impact, but equipment suppliers, transporters, wholesalers and others are also involved in the process of bringing seafood produce to the market. Government authorities have a duty to protect public health and ensure that seafood products reaching the consumer are safe and palatable. A number of management strategies are available to prevent or minimize oil pollution impact on fishing and aquaculture activity. Fishing and harvesting restrictions can be imposed to prevent contamination of fishing gear and to protect consumers and markets. Such measures also provide time for evaluating risks and for organisms and their habitat to recover from oil contamination.

Oil spill impact on seafood resources

The impact of an oil spill on marine life depends largely on the physical and chemical characteristics of the oil and the way these change with time, a process known collectively as “weathering”. The main physical processes which act on the oil during the course of a spill are evaporation, natural dispersion and, to a lesser extent, sedimentation. Specific gravity, viscosity, chemical composition and toxicity of the pollutant and the way they change with time tend to determine the degree of oil exposure for seafood organisms. The prevailing weather and sea conditions will determine the movement of spilled oil. Clean-up activities such as the use of chemicals or aggressive washing techniques can also affect the fate of oil. Thus, a variety of factors combine to define the character of a particular oil spill and the fate of sensitive resources in its path.

Adult free-swimming fish, squid, shrimp and wild stocks of other commercially important marine animals and plants seldom suffer direct harm from oil spill exposure. This is because only rarely will oil concentrations in the water reach sufficient levels to cause tainting or mortality. The greatest impact is found on shorelines and shallow waters where animals and plants may be physically coated and smothered by oil or exposed directly to toxic components in the oil. Edible seaweeds and sea urchins are examples of shoreline species that are especially sensitive to smothering and oil toxicity, respectively. Apart from direct effects, oil may cause more subtle long-term damage to behavior, feeding growth, or reproductive functions. It is a complex task to isolate these sublethal pollution effects from the influence of numerous other factors.

As a general guide, dispersants should not be used close to aquaculture facilities or spawning grounds and nursery areas. Stripping oiled seaweed from rocks and indiscriminate hot water washing are examples of aggressive response techniques that can affect commercially exploited species and delay natural recovery.

Fishing and aquaculture activities

Oil can foul the boats and gear used for catching and cultivating commercial species. Flotation equipment, lift nets, cast nets, and fixed traps extending above the sea surface are more likely to become contaminated by floating oil, whereas lines, dredges, bottom trawls and the submerged parts of cultivation facilities are usually well protected, provided they are not lifted through an oily sea surface or affected by sunken oil.

Seaweeds, shellfish and cultivated animals kept in cages or tanks are usually unable to avoid contact with oil contaminants in the water and the presence of oil pollutants may significantly add to the stresses already imposed by keeping animals in artificial conditions. Floating oil may physically coat fish-farming facilities, and unless they are rapidly cleaned they may act as a longer-term source of stock re-contamination.

There are many complex influences on the health of cultivated organisms and observed effects may be the result of a combination of factors. If, for example, the stocking density or the water temperature in a fish farm is unusually high, there is a greater risk of mortality, disease or growth retardation occurring as a result of oil contamination.

The cultivation of seaweed, fish, crustaceans, mollusks, echinoderms and sea squirts frequently involves the use of onshore tanks to rear the young to marketable size, or to a size and age suitable for transfer to the sea. Such facilities are usually supplied with clean seawater drawn through intakes located below the low water mark. The intakes may occasionally be under threat from sunken oil or dispersed oil droplets, which may lead to contamination of pipework and tanks and the loss of cultivated stock.

Fishing and seafood cultivation are not always pursued throughout the year and seasonal differences in sensitivity to oil spills can therefore occur. The collection of wild seed, or the rearing of larvae in onshore tanks supplied with water piped from the sea is one example of seasonal activity.

Tainting

The contamination of seafood can usually be detected as a petroleum taste, or taint. Public confidence in seafood products can quickly erode as a result of suspect, or actually contaminated, products reaching the market. Filter-feeding animals such as bivalve mollusks are particularly vulnerable to tainting since they may easily ingest dispersed oil droplets and oiled particles suspended in the water column. Animals with a high fat content have a greater tendency to accumulate and retain petroleum hydrocarbons in their tissues.

A taint is commonly defined as an odor or flavor that is foreign to a food product. Background concentrations of oil in water, sediment and tissues are highly variable and both the degree of taint that may result and consumer tolerance levels for taint are different for different seafood products, communities and markets. The presence and persistence of taint will depend mainly on the type and fate of oil, the species affected, the extent of exposure, hydrographic conditions and temperature. Tainting of living tissue is reversible but, whereas the uptake of oil taint is frequently rapid, the depuration process whereby contaminants are metabolized and eliminated from the organism is slower.

The concentrations of hydrocarbons at which tainting occurs are very low. Some of the chemical components in crude oils and oil derivatives with the potential to cause tainting have been identified but many are unknown and no reliable threshold concentrations for petroleum-derived tainting agents have been established. Hence it is not possible to determine by chemical analysis alone whether a product is tainted or not. However, the presence or absence of taint can be determined quickly and reliably by sensory testing, when a trained panel and sound testing protocols are employed. Sensory testing is further described below.

Public health concerns

The occurrence of contamination in seafood organisms or products following a major spill has potentially damaging implications for marketing and can lead to public health directives being invoked because of the presence of known carcinogenic compounds in petroleum products. The aromatic fractions of oil contain the most toxic compounds, and among these it is the 3- to 7-ring polycyclic aromatic hydrocarbons (PAH) that command greatest attention.

The input of potentially carcinogenic PAH stems largely from combustion sources and petroleum and, for the human population, exposure to PAH is primarily from food. However, in common with other potentially carcinogenic pollutants, it is not possible to define a concentration threshold of potential carcinogens in seafood products that represents a risk-free intake for humans. Furthermore, a wide variety of smoked food, leafy vegetables and other dietary components also contain the same PAH compounds. The detailed composition of the diet determines which food items are major contributors for individual consumers. It is important to recognize that different regions and ethnic groups have varying levels of seafood in their diets.

Generally, PAH levels in foods are not subject to legislative limits, although limits exist for some compounds in drinking water. The risk to an individual or community from oil spill-derived carcinogens should be assessed in the context of the overall exposure from all potential sources, which is subject to many variables. From a general risk evaluation of the amount, frequency and duration of PAH exposure following oil spills, most studies have led to the conclusion that oil spill-derived PAH contamination of seafood is not a significant threat to public health. However, it is important to note that while toxicologists have assessed the threat to public health as negligible, it may be difficult to convince local users, fish buyers and consumers in general, especially when there is an option of buying seafood from other locations.

A further complication for food safety and quality controllers is that a seafood diet is inherently nutritious and rich in protein and vitamins. Restrictions on seafood intake can cause consumption patterns to shift toward less healthy diets. Other forms of contamination, such as heavy metals, algal toxins, pathogenic bacteria and viruses, also affect seafood safety and quality. The potential impact of an oil spill on public health must be viewed in a wider context in order to identify and implement appropriate strategies.

Oil spill protection and clean-up response options

Booms and other physical barriers can sometimes be used to protect fixed fishing gear and aquaculture facilities, although in most cases it is impossible to prevent damage altogether. Fishing and cultivating equipment is often purposely sited to benefit from migration routes or efficient water exchange. Such locations are characterized by fast water flow, which is where booms will not perform well.

Sorbent materials are often useful for removing oil sheens from water and tank surfaces. Sorbent booms are easy to deploy and move, and serve to control sheens in floating cultivation pens. However, oil-saturated sorbents should be replaced regularly to avoid them becoming a source of secondary pollution. Another potential concern when dealing with aquaculture facilities is the risk of spreading disease with booms and other equipment moved from one location to another.

Dispersant should be used with care so as not to cause tainting of shellfish and captured or cultivated stock. As a general guide, it is not prudent to use dispersant in shallow waters where fishing or aquaculture is important. However, if used at a safe distance, dispersants can reduce or prevent contamination of equipment by floating oil. It is difficult to define in general terms what represents a safe distance since this will depend on dilution rates and the strength and direction of prevailing currents.

The remedial methods employed should be chosen with care, so as not to make matters worse. Almost all clean-up techniques cause damage, which should be taken into account when considering the merits of removing oil pollution from an affected area. For example, attempts at cleaning intertidal mudflats can cause long-term disruption and damage to the habitat of cockles and clams. There are occasions when it is better to rely on natural recovery processes for oiled habitats than to inflict more damage from clean-up measures known to be futile.

Sensory testing

Oil-tainted food is unpalatable even at very low levels of contamination, which provides a safety margin in terms of public health. As a generalization, if seafood is taint-free, it is safe to eat. Properly conducted sensory testing is the most efficient and appropriate method for establishing the presence and disappearance of tainting, and for indicating whether seafood is fit for human consumption. The International Standards Organization (ISO) provides information on the training of sensory evaluation panels. A trained sensory panel using properly prepared samples and a written testing protocols are essential elements in sensory testing in order to obtain reproducible results. In some cases of potentially unsafe seafood it may be appropriate to avoid taste tests and instead focus on olfactory testing.

A sampling program with defined objectives will often be necessary to determine the degree, spatial extent and duration of the oil contamination problem. The aim is to take and analyze the number of samples necessary to obtain statistically reliable results. Target species are those of commercial, recreational or subsistence fishing value and which are commonly consumed. Samples of animal and plant tissue are perishable and must be secured and stored so as to preserve their integrity. Control samples from a nearby area unaffected by oil pollution are important for reference purposes and to eliminate the interference of background contamination, but are difficult to find in practice. In the case of commercial species it is sometimes possible to obtain reference samples from the marketplace. If appropriate reference samples cannot be obtained, a trained panel of expert testers should nevertheless be able to determine when seafood is taint-free.

In principle, a relatively small number of samples are sufficient to confirm the initial presence of taint and define the affected area in order to introduce a restriction. Monitoring the progressive loss of taint, by sampling at appropriate intervals thereafter, allows the point at which taint disappears to be determined with some confidence. The oil type would determine the frequency of sampling, the habitat and organisms affected, and the rate at which depuration was observed to occur. A time series of samples gives clues to depuration rates and allows future trends to be predicted. While it is not an absolute requirement to have reference samples in order to conduct a sensory evaluation, the taint-free threshold can best be defined as the point where a representative number of samples from the polluted area are no more tainted than an equal number of samples from a nearby area or commercial outlet outside the spill zone. Account should also be taken of levels considered acceptable in comparable seafood species being harvested in other areas of the country.

This approach is inherently fair and recognizes that tainted samples, not necessarily due to oil spills, can occur in any population. Once two successive sample sets over a short period of time remain clear, restrictions can be removed or the scope of the ban adjusted as a distinct area or species is shown to be free of taint. The confidence in accepting that the fish or shellfish are clean and safe following a particular spill comes from an adequate time-series of monitoring data showing the progressive reduction in taint.

Chemical analysis

In some cases, the chemical composition and the fate of the spilled oil, widespread subsistence fishing and aquaculture, or the presence of commercial shellfish resources in the path of the oil may argue for chemical analysis to be undertaken. Chemical screening for exposure can complement sensory evaluations and help validate sensory testing. Sensory evaluation does not preclude the need for chemical analysis and may serve as a screening tool for selecting samples for further chemical analysis.

It is widely recognized that to impose a single fixed standard for PAH levels in seafood by reference to baseline data is unworkable for several reasons. Baseline data are rarely available and unlikely ever to be applicable to the conditions prevailing during a particular oil spill. Background levels of hydrocarbons, where they are known, vary greatly and are subject to both pyrogenic and chronic anthropogenic input. PAH intakes in seafood meals also vary greatly between different communities, as do the perceived sensitivities of individual consumers. One viable approach is to ensure that samples should be taint-free. PAH levels in the samples may also be compared to reference samples collected just outside the affected zone or which are freely marketed elsewhere in the country. However, this may be difficult to implement in areas that are known for their "pristine" seafood.

Analysis of water and sediment is usually not necessary since the condition of seafood organisms inhabiting water and sediment environments is of primary interest. In any case, the organisms effectively “monitor” the condition of their surrounding environment by the process of accumulating and depurating contaminants, and if they remain viable then there is little need to monitor other components. In cases where animals or plants are continuously re-contaminated from an invisible or unknown source it may be appropriate to attempt to monitor the pathway of oil contamination. However, reliable interpretation of analytical data from sediment samples can be difficult if there is a wide range of other contaminants present.

Costs and compensation

When it proves impossible to protect fishing gear and cultivation facilities from oil contamination, the choice becomes one of cleaning, repairing, restoring or replacing the affected item, facility or habitat.
In some situations compensation arrangements may exist, allowing fishermen and aquaculture operators to be reimbursed for costs incurred and losses suffered. Claimants will be expected to provide evidence of the losses, such as receipts of payments made and records of income in previous years.

The complexities of biological systems and business interactions often make it difficult to separate the actual impact of an oil spill from other influences. Reliable catch statistics are rarely available in sufficient detail to enable oil spill effects to be isolated from other influences such as variable fishing effort and natural fluctuations in the stock. Only with expert knowledge of local circumstances, careful investigation and comparisons with nearby unpolluted areas can the true causes of observed damage be determined. In the case of subsistence fishing no financial transactions may be involved, so catch records are unlikely to be available. However, it should be possible to quantify subsistence loss in bartering terms or with other market-based substitutes.

Economic loss resulting from mortality of cultivated organisms may need to be quantified at several levels. The first level is the immediate mortality and loss suffered by the grower. This may simply be a question of counting and weighing the casualties, documenting any reduction in growth rate, and calculating any financial losses from projected harvests and from closed or under-utilized aquaculture facilities. Depending on the magnitude of the event and the availability of suitable substitutes, losses may also be suffered by processors, transporters, wholesalers and retailers. In a large or notorious incident actual or perceived tainting may result in short and long-term loss of markets and reduced prices across broad geographic regions. Quantification of these impacts can be complicated and may involve not only the direct losses, but also the advertising costs incurred to limit the harm to a region's reputation.

Management strategies for protecting seafood resources

The simplest management strategies involve no intervention beyond monitoring the evolution of an oil spill and any threat to seafood safety. Low-key intervention can take the form of advisory information or the issuing of guidelines to the seafood industry. Stricter measures include retail controls, impoundment of catches and seafood products, activity bans and fishery closures.

All management options have drawbacks or indirect effects and a careful review of the various facets of an oil spill is to be recommended before any actions are taken. Commercial fishing creates complex changes in the abundance and distribution of the exploited species. Any sudden change in the fishing effort is therefore likely to affect population densities. Thus, while most oil spill management strategies undoubtedly cause business interruption and financial loss, some fishery closures have also resulted in beneficial stock conservation, particularly where the exploited species have been non-migratory.

Preferred management strategies reflect cultural and administrative traits in different countries. In Asia there are few reported instances of tainting or seafood contamination following oil spills. Formal closures or activity bans are seldom, if ever, introduced. Instead voluntary suspension of fishing in oil-polluted areas is the norm. The voluntary suspension typically lasts a few weeks until the gross oil contamination of shorelines has disappeared or has been removed. In most cases, fishing and harvesting are resumed without any ill effects in terms of tainting, public health or market confidence.

During an oil spill it is vital to communicate information to the media and the public in an effective manner on the likelihood of adverse consequences for fishery resources. Inaccurate public information about tainting and contamination may limit the range of management strategies available, causing unnecessary fishing and harvesting restrictions and/or loss of consumer confidence in the market. Risk communication is an ongoing process that must be addressed in both spill response planning as well as during the spill event. Information about risk can be communicated through a variety of channels, from media reports to public meetings. Several resources provided in Appendix F can provide further information on successfully communicating risk to the media and public.

The media can play a valuable role in promoting a rational reaction to temporary disruptions. For example, where a properly conducted sampling and testing regime provides clear evidence that seafood is safe, the media provides the vehicle for getting this message to the consumer. The needs of the media are best served by providing factual information and by clearly justified decisions. Contingency planning provides the best opportunity for managers to select an appropriate strategy and implement the most effective response for dealing with a threat to seafood safety and quality.

Fishing and aquaculture procedures

In addition to standard spill response measures, there are management options that may help minimize contamination and financial losses. Options include moving floating facilities out of the path of slicks, sinking of specially designed cages to allow oil to pass, and transfer of stock to areas unlikely to be affected. The opportunities to use these approaches are likely to be rare for a range of technical, logistical and cost considerations, but in the right circumstances and with planning they may be practicable.

Temporarily suspending the replenishment of seawater drawn in from the sea and re-circulating water already within the system may be an effective method of isolating stock cultivated in shore tanks or ponds from the threat of oil contamination. Closing sluice gates to prawn ponds, for example, can also afford short-term protection, but care must be taken to ensure that the build-up of noxious waste products in stagnant or re-circulating water over time does not cause mortalities. Suspension of feeding is another way of reducing the risk to farmed fish and other cultivated stock from coming into contact with floating oil or contaminated feed. In land-based facilities the reduction or suspension of feeding has the advantage that the loading of waste products in the re-circulated water is reduced.

For such measures to be effective it is vital that sensitive fishing and aquaculture facilities are identified in local area contingency plans and that key personnel are notified in the event of an oil spill in their area. The plans can also identify optimal response options and the sources of necessary materials and equipment. The preparation and maintenance of such plans are normally the responsibility of local government authorities or operators of local oil-handling facilities.

In some cases aquaculture operators may face the risk of ultimately losing all the stock due to oil spill damage. Harvesting before the stock becomes oiled might be possible, albeit selling the products at a lower price, and thereby salvaging some of its value. Conversely, normal harvesting could be delayed to allow contaminated stock to depurate and become taint-free.

Where fish are caught by anglers for sport, sufficient protection can sometimes be provided simply by issuing advice against consuming the catch and for recreational fishermen to adopt a catch-and-release policy.

Fishing and harvesting restrictions

Government restrictions on fishing activity are often unrelated to oil spills and are imposed as a means of stock conservation or to ensure fair competition among fishermen. Fishing may be restricted to certain periods and locations, with closures often coinciding with breeding seasons and sites to encourage natural stock replenishment. Catches may be restricted to certain quantities or quotas in a given period. Temporary closures of fisheries are imposed to protect consumers from health hazards when water and sediment quality or a seafood resource has become degraded by pollutants, natural toxicants or microorganisms.

Fishery closures can be imposed after an oil spill in order to prevent or minimize fishing gear contamination and to protect or reassure seafood consumers. Fishermen can agree to a voluntary suspension of fishing activity as a precautionary measure during a period when oil is drifting in their normal fishing area, and thereby avoid repeatedly contaminating fishing gear. Alternatively, a fishery may be protected by extending existing closures or imposing additional bans, but there are likely to be secondary consequences from all these measures.

Fishery closures imposed to protect equipment and catches can generally be lifted once the sea surface is visually free of oil and sheen, and there is no problem with sunken oil. Aerial surveillance is the most reliable way of checking sea surface conditions. Restrictions imposed on the basis of proven tainting are likely to be more prolonged and require careful monitoring. In most oil spill scenarios a fisheries and aquaculture management protocol consisting of a visible-sheen test and sensory tests will satisfy the demand for scientific credibility and provide adequate safeguards against unpalatable and unsafe seafood reaching consumers.

Credible decision-making with respect to fishing and harvesting restrictions should be based on sound scientific principles and common sense. Knowledge of fishery resource management is essential, as is an understanding of oil pollutants, their physical and chemical characteristics, likely biological impact, and background levels of contamination, both locally and nationally. Seafood consumption patterns and seasonal variations in trading and marketing will further help define a public health risk profile and allow regulators to form a considered opinion on risk management. It is vital to determine the criteria that will be applied for reopening a fishery before a ban is put in place. These criteria form an important part of contingency plans. It is also critical to assess the benefits accruing as a result of a closure against the losses that will ensue from closing or restricting normal fishing and cultivation activity.

Conclusions and recommendations

Oil spills can pose a significant threat to fishing and aquaculture resources. The main oil pollution effects are physical contamination of equipment, tainting and contamination of seafood, and economic loss from business interruption, including loss of consumer confidence. With effective contingency plans and spill response procedures, much can be done to prevent or reduce the impact of oil spills on fishing and aquaculture.

The repercussions of contaminated seafood on public perception can be serious unless the issues of market confidence and public health are properly managed. In most cases a management protocol consisting of a visible-sheen test coupled with sensory testing will provide adequate safeguards against unpalatable and unsafe seafood reaching consumers.

To maintain confidence in the fisheries sector there should be a sound strategy for implementing a fishery closure, based on scientific data, and a consistent application of management restrictions. An important component of oil spill contingency considerations is the need to determine re-opening criteria before deciding on whether to impose fishing and harvesting bans. Part of the rationale for introducing fishery closures is to minimize or prevent economic damage that might otherwise occur, as well as protecting the consumer. In such cases some form of economic appraisal is necessary in order to monitor the effectiveness of control measures from a cost-benefit viewpoint.

G.2 Decision Process for Managing Seafood Safety

The default position regarding management of seafood safety during an oil spill is to have no closure or other restrictions on seafood harvest. In some cases there may be an initial, temporary *de facto* closure if the U.S. Coast Guard establishes a safety zone restricting access in areas of active oil recovery. Fishermen also may voluntarily avoid working in oiled areas to prevent oiling their gear and catch. This initial period after a spill can provide an opportunity to evaluate spill conditions and conduct limited testing to determine whether a precautionary closure or other immediate restrictions on seafood harvest are warranted.

The first step for seafood managers after an oil spill has occurred is to collect and evaluate information on the nature of the spill. The spill response organization should be able to provide the following information almost immediately after the spill occurs:

- Overflight maps and trajectory analyses showing the present and predicted spread of surface slicks;
- Forecasts of weather and sea conditions that may affect the potential for oil to mix into the water column;
- Results of oil weathering models;
- Details about the oil type and expected behavior;
- Predictions of oil fate and persistence; and, some cases,
- Chemical results for water and sediment samples collected in the spill area.

Fishery management agencies and associations should be able to provide information on:

- Species being harvested now or in the near future;
- Geographical extent of the harvest areas;
- Harvest gear types in use; and,
- Data on background levels of PAH contamination in the spill area (from NOAA, California State Mussel Watch, and other monitoring programs).

Based on this information, seafood managers can assess whether the oil spill is likely to expose and contaminate seafood. If seafood is not at significant risk, then no harvest closures or other seafood restrictions are needed, and this determination is communicated to the public. Because spills are dynamic, conditions are monitored and risks to seafood reevaluated until the threat abates.

If managers determine that seafood may be affected, the next step is to assess whether seafood is tainted or contaminated to levels that pose a consumption risk to human health. Information that can help determine the impacts includes:

- Overflights and ground surveys identifying visible oil in seafood harvesting areas;
- Chemical analysis of water and/or sediment samples from the harvest area;
- Sensory testing of seafood samples from representative species and areas (both spill and reference areas);
- Chemical analysis of tissue samples from representative species and areas (both spill and reference areas); and,
- Data on background levels of oil-related contaminants.

Determining whether seafood has been contaminated can take time. Developing and implementing sampling plans, conducting sensory and/or chemical testing, and evaluating results may require weeks or longer. Monitoring continues and the risk assessment process is repeated as necessary.

If seafood is tainted or is contaminated to a level posing a potential health risk, the next step is to select the most appropriate seafood management action(s). Examples of management actions include seafood advisories, increased inspections of harvested seafood or fishing gear, harvest closures, and fishing gear restrictions. If a fishery is closed or otherwise restricted, seafood managers must establish criteria for determining when the seafood is palatable and safe for human consumption and that restrictions can, therefore, be lifted. No accepted international or federal criteria have been established for oil-related contaminants in seafood. State seafood managers generally have developed their own criteria for each spill, resulting in some inconsistencies among spills. Varying levels of background contamination also have contributed to inconsistencies in criteria applied.

Seafood Safety Management Authority

Typically, authority to manage seafood to protect human health resides with state health agencies. Many states routinely chemically analyze finfish and shellfish tissues for contamination as part of their water-quality monitoring programs. If a state concludes that eating contaminated finfish or shellfish collected from state waters poses an unacceptable human health risk, it may issue local fish consumption advisories or harvest closures for specific water bodies or parts of water bodies and specific species.

The Food, Drug, and Cosmetic Act authorizes the U.S. Food and Drug Administration (USFDA) to protect and promote public health. The USFDA's responsibilities include keeping "adulterated" food off the market. The USFDA has jurisdiction over seafood that crosses state lines in interstate commerce.

The Magnuson Act, 16 U.S.C. 1801 *et seq.*, authorizes NOAA's National Marine Fisheries Service (NMFS) to regulate fishing in federal waters (generally from 3-200 miles from shore). The act is targeted toward fishery conservation rather than protection of public health or economic concerns. Fishery management plans, developed under the authority of the Magnuson Act, specify any limitations imposed on fishing for federally regulated species. Limits on fishing are enforced by means of regulations published in the Federal Register, in compliance with the Administrative Procedures Act. In the event of an oil or chemical spill, publication of an emergency rule in the Federal Register is required to put an enforceable, official fishery closure in place and to make any modifications to the closure once it is put into effect. The Magnuson Act was recently amended to allow emergency action fisheries closures to remain in effect indefinitely. Previously, such closures were limited to two 90-day periods.

Specific Seafood Contamination Terminology

Adulteration

According to the U.S. Food and Drug Administration (FDA), a food is considered adulterated if it bears or contains any poisonous or deleterious substance that may render it injurious to health, if it contains any filthy, putrid, or decomposed substances, or if it is otherwise unfit for food (Federal Food, Drug, and Cosmetic Act, Section 402).

Taint

Taint is commonly defined as an odor or flavor that is foreign to a food product, including seafood (ISO 1992). According to this definition, the presence of a taint simply indicates that flavor or odor is altered; it does not characterize the nature of the off-flavor or off-odor, quantify the degree of taint, or imply health hazard.

Body Burden

The concentration of a contaminant in an organism, reported for the whole animal, or for individual tissues such as gonads, muscle, and liver, is referred to as the body burden. It can be reported on the basis of either wet or dry weight of the organism or tissue.

Uptake

Uptake is the process of contaminant accumulation in an organism. Uptake of oil can occur via the following mechanisms:

- Adsorption (adhesion) of oil on the skin.
- Absorption of dissolved components from the water through the skin (including interstitial water exposures for infauna).
- Absorption of dissolved components through the gills.
- Adsorption of dispersed oil droplets to the lipid surfaces in the gills.
- Ingestion of whole oil droplets directly or of food contaminated with oil, followed by sorption in the gut.

Many factors influence uptake, including the exposure concentration and duration, pathway of exposure, lipid content, and feeding and metabolic rates. Uptake from water generally occurs more quickly than dietary uptake or uptake from sediments.

Bioaccumulation

The net accumulation of a substance by an organism as a result of uptake from all environmental sources and possible routes of exposure (contact, respiration, ingestion, etc.) is termed bioaccumulation.

Bioconcentration

The net accumulation of a substance as a result of uptake directly from aqueous solution.

Biomagnification

The increase in body burden of a contaminant with trophic level is called biomagnification. PAHs generally do not biomagnify in finfish and shellfish because of their low dietary uptake efficiencies, on the order of 1 to 30%, reflecting slow kinetics and short residence time in the gut.

Elimination

All of the processes that can decrease tissue concentrations of a contaminant, including metabolism, excretion, and diffusive loss are collectively termed elimination. *Metabolism* is an active physiological process whereby a contaminant is biotransformed into metabolites. For PAHs, the metabolites are more water-soluble, which facilitates *excretion*, another active physiological process that eliminates contaminants (both parent compounds and metabolites) through bile, urine, or feces. *Diffusive loss* refers to a decrease in tissue burden caused by simple diffusion out of the organism, which is controlled by partitioning between tissue and water. The term *depuration* may be used for the mechanism of diffusive loss, and *elimination* may be used for the combined process of metabolism, excretion, and diffusive loss. These definitions are slightly different than those used by ASTM (1994), which defines depuration as "the loss of a substance from an organism as a result of any active or passive process" and provides no definition for elimination. However, the definitions given are more precise and will be followed in this document. Elimination can also include release of PAHs in lipid-rich eggs or gametes during spawning.

Elimination processes begin as soon as uptake occurs. In constant exposure experiments, body burdens tend to reach a "steady state" in which fluxes of the contaminant moving bi-directionally across a membrane or boundary between compartments or phases have reached a balance, not necessarily equilibrium. When the exposure decreases, elimination rates depend, in part, on the hydrophobic properties of the compound. The half-lives of individual compounds vary (see discussion below).

Growth Dilution

Growth dilution occurs when the rate of tissue growth exceeds the rate of accumulation, such that it appears as though elimination is occurring because the tissue concentration is decreasing. This process may be important when monitoring bivalves during the growing season.

Oils have been grouped into types with similar properties to help predict their behavior at spills. This same approach can be used to characterize the relative risk of contamination of seafood by oil type. Table II-2 summarizes the properties and risk of seafood contamination for the five oil groups commonly encountered by spill responders. These generalizations can be used when initially screening an incident to evaluate the potential for seafood contamination.

ASSESSING THE LIKELIHOOD OF SEAFOOD EXPOSURE AND CONTAMINATION

Each oil spill is a unique combination of conditions and events. Seafood is only at risk of contamination from a spill if it is exposed to the oil. Once exposed to oil, an organism becomes contaminated only to the extent it takes up and retains petroleum compounds. Factors that influence the potential for spilled oil to expose and contaminate seafood are discussed in this section.

Oil Types and Properties

Oil type and properties strongly influence whether seafood is exposed and contaminated. Crude oils and the refined products derived from them are complex and variable mixtures of hydrocarbons of different molecular weights and structures. They can contain hundreds of different compounds. All crude oils contain lighter fractions similar to gasoline, as well as heavier tar or wax fractions. Because of these differences in composition, different oils vary considerably in their physical and chemical properties. For example, consistencies of different crude oils vary, ranging from a light volatile fluid to a viscous semi-solid. Such differences in properties influence behavior of spilled oil and subsequent cleanup operations.

The petroleum hydrocarbons that comprise oil are composed primarily of hydrogen and carbon, but also can contain varying amounts of sulfur, nitrogen, oxygen, and trace metals. The three main fractions of hydrocarbon compounds in oils are saturates, aromatics, and polar compounds. The table below shows the properties and relative abundance of each fraction in different types of oil products.

Seafood contamination can result from exposure to the dissolved fraction of oil, dispersed oil droplets, or an oil coating. With regard to the dissolved fraction, the aromatic fraction of the oil poses the greatest exposure risk because aromatics are relatively more soluble than the other components in oil. Saturates are a major component of oil, but they have lower solubility and higher volatility compared to aromatics of the same molecular weight. Furthermore, saturates are virtually odorless and tasteless, and do not contribute to tainting.

Table G.2-1 Characteristics of oil types affecting the potential for seafood contamination

Gasoline products	Diesel-like products and light crude oils	Medium-grade crude oils and intermediate products	Heavy crude oils and residual products	Non-floating oils
Examples – Gasoline	Examples – No. 2 fuel oil, jet fuels, kerosene, West Texas crude, Alberta crude	Examples – North Slope crude, South Louisiana crude, IFO 180, lube oils	Examples – San Joaquin Valley crude, Venezuelan crude, No. 6 fuel oil	Examples – Very heavy No. 6 fuel oil, residual oils, vacuum bottoms, heavy slurry oils
Specific gravity of < 0.80 Floats on surface	Specific gravity of < 0.85; API gravity of 35-45* Usually floats on surfaces, although can contaminate suspended sediments that are then deposited on the bottom.	Specific gravity of 0.85-0.95; API gravity of 17.5 – 35 * Usually floats on surface, although can mix with sand by stranding on beaches or in the surf zone, and be deposited in the nearshore area.	Specific gravity of 0.95 – 1.00; API gravity of 10-17.5 * Usually floats on surface but can sink in fresh water or in seawater if they emulsify or mix with sand (in the surf zone or after stranding on beaches) and deposit in the nearshore.	Specific gravity greater than 1.00; API gravity < 10 * Will sink in fresh water; may sink in seawater if they emulsify or mix with sand (in the surf zone or after standing on beaches) and deposit in the nearshore.
High evaporation rates; narrow cut fraction with no residues.	Refined products can evaporate to no residue; crude oils do leave residues.	Up to one-third will evaporate in the first 24 hours; will form persistent residues.	Very little product loss by evaporation; will form persistent residues.	Very little evaporation when submerged; also very slow weathering overall when submerged.
Low viscosity; spreads rapidly to a thin sheen; readi8ly dispersed; will not emulsify.	Low to moderate viscosity; spread rapidly into thin slicks; readily dispersed by natural processes; may form unstable emulsions.	Moderate to high viscosity; dispersed by natural processes only very early in the spill; readily emulsifies.	Very viscous to semisolid; will not readily disperse or mix into the water column; can form stable emulsions.	Very viscous to semi-solid; will not readily disperse or mix into the water column; can form stable emulsions.
Low risk of seafood contamination because of rapid and complete loss via evaporation; potential contamination for spills in confined areas with high mixing, such as small rivers; no reported cases of tainting for marine spills.	Moderate to high risk of seafood contamination because relatively high content of low molecular weight, water-soluble aromatic hydrocarbons, which are semi-volatile and so evaporate slowly; dispersed droplets are also bio-available.	Moderate to high risk of seafood contamination because of high percentage of low-molecular weight aromatic hydrocarbons; coating of gear and intertidal species can be significant.	Low risk of finfish contamination because of low water-soluble fraction and little natural mixing in the water; moderate to high risk of shellfish contamination where shoreline oiling is heavy; can coat gear and intertidal species.	Low risk of finfish contamination because of high viscosity; where thick oil accumulates on the bottom, could become a chronic source; moderate to high risk of contamination of benthic species because of coating and persistence of submerged oil.

* API gravity is used by the petroleum industry rather than density. It is determined by the following equation: API at 60º F = 141.5/oil density – 131.5

Of the aromatic hydrocarbons, the mono-aromatic hydrocarbons, such as benzene, toluene, ethyl benzene, xylene (known collectively as BTEX), other substituted benzenes, and the 2- to 3-ringed PAHs (naphthalene, fluorene, dibenzothiophene, anthracene and their substituted homologues, referred to as low-molecular weight

PAHs) comprise over 99 percent of the water-soluble fraction. The distribution of these compounds in the spilled oil is one measure of the potential for contamination of seafood from water exposure.

Compounds in petroleum-derived oils have a general pattern of increasing abundance with higher level of substitution of a benzene ring (*e.g*., unsubstituted parent naphthalene is less abundant than C1-naphthalene, which is less abundant than C2-naphthalene). This pattern indicates that the PAHs are "petrogenic," that is, they are from petroleum oils. The PAH pattern is very different for hydrocarbons produced from the combustion of fossil fuels ("pyrogenic" hydrocarbons), in that the parent PAHs are by far the dominant compounds in hydrocarbons of pyrogenic origin. Also, it is important to note that crude oils contain very low concentrations of the high-molecular weight PAHs (*e.g*., 4- and 5-ringed compounds such as pyrene, chrysene, and benzo[a]pyrene) that are associated with combustion by-products. These differences in relative PAH abundance are key components of fingerprinting analysis.

Refined products have characteristic ranges of PAHs representative of the distillation fraction in the product. PAHs in No. 2 fuel oil are dominated by the 2- and 3-ringed compounds. Heavy fuel oils are sometimes cut or blended with lighter fractions to meet customer specifications, as is the case with the intermediate fuel oil (IFO-180), and so can contain some low-molecular weight PAHs.

For exposure via ingestion of whole oil droplets or contaminated sediments, the high-molecular weight PAHs pose greater risk of contamination. These compounds have low water solubility and are more lipophilic. In organisms with relatively limited capability to metabolize PAHs, such as bivalve mollusks, the high-molecular weight compounds are more likely to accumulate in tissues and persist for longer periods, compared to the low-molecular weight PAHs, which are more rapidly eliminated. Finfish and some crustaceans, however, readily metabolize and eliminate all of these compounds rapidly.

Biological and Ecological Factors Affecting PAH Contamination of Seafood

Petroleum contamination of finfish and shellfish depends upon a variety of biological and ecological factors. Understanding how different feeding strategies, habitat utilization, and physiology influence the likelihood of petroleum contamination of particular species is critical when managing seafood after spills. G.2-2 summarizes several of these factors for different types of seafood organisms.

Metabolic Capacity

Both vertebrates and invertebrates have mixed-function oxygenase (MFO) enzyme systems that enable them to metabolize petroleum substances. Enzymatic activity is low in invertebrates compared to vertebrates, and therefore induction of metabolism occurs at a higher contamination level in invertebrates. Finfish are able to rapidly and efficiently biotransform or metabolize PAHs and excrete the resulting metabolites into bile. These metabolites do not pose a health risk to human consumers of the finfish. Marine invertebrates, including most shellfish, metabolize petroleum compounds slowly and inefficiently; consequently, they tend to accumulate high concentrations and wide ranges of PAHs.

Metabolic capacity of organisms is important from a seafood safety standpoint because some PAHs have carcinogenic potential for human consumers, due to the highly chemically reactive oxidation products that form during the first stage of metabolism in vertebrates. Human consumers often eat invertebrates in their entirety, and, therefore, may ingest all of the hydrocarbons that have accumulated in the organism and may be present in the organism's gut. Because finfish, like other vertebrates, rapidly and efficiently metabolize petroleum hydrocarbons, they generally pose little or no health risk to human consumers. Exceptions to this may occur for consumers for whom the edible portion of finfish includes tissues such as liver and gall bladder, which tend to accumulate higher levels of PAHs than muscle tissue.

Temperature

It is generally accepted that uptake and elimination rates both tend to increase with increasing temperature, though there is some contradiction among reported study results for PAHs.

The rate of reaction in chemical and biological processes generally increases 2- to 4-fold for a 10°C increase in temperature. Uptake, metabolic, and elimination rates typically increase with temperature, but at different rates, making it difficult to predict body burdens under the constantly changing oil concentrations that occur at spills. However, at high temperatures and increased respiration and filtration rates, it is expected that uptake will occur quickly, to relatively high concentration, followed by rapid declines. At low temperatures, body burdens are likely to be lower, but elimination rates will also be slower. At very low temperatures, some species stop feeding and thus are at lower risk of exposure.

Table G.2-2 Habitat utilization, feeding strategies, and risk of exposure to oil of different seafood groups.

Seafood groups	Examples	Metabolic capacity	Habitat utilization	Feeding strategies	Risk of exposure
Finfish					
Anadromous fish	Sturgeon, herring, salmon	High capacity	Nearshore and shallow water during spawning	Predatory	Moderate to high in nearshore and shallow water during spawning
Marine pelagic and bottom fish	Mackerel, jacks, cod, flounder	High capacity	Highly mobile, most species prefer depths of > 10m	Predatory	Low
Reef fish	Sea basses, snappers, porgies	High capacity	Relatively deep waters (10 – 200 m)	Predatory	Low to moderate; higher risk in shallow water
Estuarine fish	Bluefish, mullet, anchovies	High capacity	Spawning in intertidal or subtidal habitats; offshore winter migrations	Predatory	Moderate to high in nearshore and shallow water during spawning
Crustaceans					
Lobster, crabs, shrimp	American lobster, pink shrimp, blue crab	Reduced capacity	May migrate seasonally; range of depths between estuarine and deep waters.	Predatory; omnivorous, scavengers	Benthic burrowing, estuarine and shallow water species at higher risk than deep water species
Mollusks					
Oysters, mussels	American oyster, Pacific oyster, blue mussel	Very limited capacity	Shallow subtidal and intertidal regions, estuaries; attached to substrates	Filter-feeders	High
Clams, scallops	Hard clam, soft-shell clam, bay scallop, sea scallop	Very limited capacity	Intertidal and shallow subtidal areas; benthic or buried in the sediment; some mobility	Filter/deposit feeders	High
Gastropods	Abalone, conch, snails, whelk, limpet, top shell	Very limited capacity	Intertidal and shallow to deep subtidal areas; epibenthic; some mobility	Grazers and predatory	Moderate to high

Physiology

Lipid, carbohydrate, and protein levels are known to vary seasonally in certain aquatic invertebrate species, often associated with reproductive changes. Some of these changes in biochemical composition may affect uptake and elimination rates seasonally. Seasonal variation may also result from differences in feeding rates, microbial activity, and various environmental factors.

Organisms with higher overall lipid content generally exhibit higher levels of uptake or retention of petroleum compounds. For example, salmon (muscle lipid content of 4.0% wet weight) accumulated higher hydrocarbon concentrations than cod (muscle lipid content of 0.75% wet weight). Uptake rates of PAHs in clams peaked when gametogenesis was near completion and decreased during spawning, while elimination rates peaked during spawning. Oysters and clams sampled at the high point of lipid and glycogen reserves during their spawning cycles (the fall) had PAH tissue levels that were 2 to 3 times higher than they were when sampled during the spring. High elimination rates during the loss of lipid-rich eggs are consistent with findings that finfish and shellfish tend to accumulate PAHs in tissues with high lipid content because PAHs are strongly hydrophobic.

Potential variations in PAH uptake and elimination rates in seafood species due to seasonal and physiological variation should be taken into account during spill response. These differences should be considered when designing seafood sampling plans and when comparing analytical results from samples from different species, collected at different times of year, or collected during different stages in the life cycle of the organisms.

Chronic Exposure Stress

Bioaccumulation levels and elimination rates of hydrocarbons for finfish and shellfish may depend on the type and duration of exposure to petroleum products, and the extent to which the organisms have been chronically exposed to other contaminants. Chronic exposure appears to reduce elimination capacity. In fact, there may be two phases of elimination: an initial rapid phase followed by a second slower phase for PAHs that are sequestered in stable compartments of the organism, such as storage lipids. Some chronic hydrocarbon pollution studies have indicated no significant reductions in PAH levels in tissues over 2-4 months for clams and mussels, even when the animals were moved to cleaner habitats. The ratio of liver/muscle concentrations in finfish sometimes can be used as an indicator of the level of chronic PAH contamination at a site. Liver levels represent shorter-term exposure to oil, while muscle levels represent longer-term bioaccumulation. Therefore, lower liver/muscle ratios may indicate decreased efficiency in an organism’s ability to biotransform absorbed or ingested oil into compounds that are easily excreted.

Other subsistence and recreational seafood organisms

Some organisms that are collected and consumed for subsistence and recreation were not discussed in this section. Examples are octopus, squid, seals, whales, seaweed, and algae. There isn’t enough information on these organisms to thoroughly discuss the level of risk they may pose to consumers following an oil spill. It should be noted, however, that if these organisms occur in a spill area and are exposed, restrictions on harvest or consumption advisories might be warranted, depending on contamination and consumption levels.

Summary

- Wild finfish are unlikely to become contaminated or tainted because they typically are either not exposed or are exposed only briefly to the spilled oil and because they rapidly eliminate petroleum compounds taken up. Exceptions may occur if a large amount of fresh, light oil is mixed into the water column or if bottom sediments become contaminated. If nearshore sediments are contaminated, species that spawn in nearshore and shallow waters are more likely to be exposed to spilled oil than pelagic and benthic species.
- Penned finfish are more susceptible to tainting and contamination because they are not able to escape exposure.
- Shellfish are more likely than finfish to become contaminated from spilled oil because they are more vulnerable to exposure and less efficient at metabolizing petroleum compounds once exposed.

- Among crustaceans, species that burrow are at the highest risk of exposure at spills where bottom sediments are contaminated, followed by species that utilize nearshore and estuarine benthic habitats.
- Bivalves are at high risk of contamination because they are sessile, filter- and deposit- feed, and occur in substrates in shallow subtidal and intertidal areas that are more likely to become contaminated.
- It is generally accepted that uptake and elimination rates both increase with temperature, though study results are somewhat contradictory.
- PAHs tend to accumulate to higher concentrations in lipid-rich tissues and organisms. Sea-sonal differences in tissue lipid content associated with spawning may influence uptake and elimination rates of PAHs in some marine species.
- Chronic exposure to hydrocarbons in water and sediments may reduce elimination capacity.

MONITORING SEAFOOD FOR CONTAMINATION

The preceding section described information that can help determine the likelihood that spilled oil will expose and contaminate seafood. If it is decided that seafood is at significant risk, the next step is monitoring to determine whether seafood actually is contaminated, and to characterize the extent and degree of contamination. This section provides general guidelines for developing seafood sampling plans and conducting sensory and chemical testing of seafood samples for petroleum contamination.

Developing Seafood Sampling Plans

The first step in developing a sampling plan is defining the questions to be answered. Sampling should not begin before study objectives have been clearly established. Because every oil spill is a unique combination of conditions and the objectives of seafood sampling may vary from spill to spill, there is no standard sampling plan that can be applied to all seafood contamination monitoring studies. Generally, though, any sampling plan to monitor for potential seafood contamination from an oil spill should specify the study area, sampling locations, target species, number of samples to be collected, timing of initial and repeat sampling, sample collection methods and handling procedures, and analyses to be conducted. The statistical design must ensure sufficient statistical power to provide the information needed at the desired level of confidence to support seafood management decisions.

Some general guidelines for designing a seafood-sampling plan are presented below. For more detailed guidelines, see *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories Volume 1: Fish Sampling and Analysis* by the U.S. Environmental Protection Agency (2000). For more detailed sampling guidelines for sensory testing, see *Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill* (Reilly and York 2001).

Selecting sampling locations

In selecting sampling locations, all likely pathways of oil exposure should be identified (*e.g.*, surface slicks, dispersed or dissolved oil in the water column, submerged oil associated with bottom sediments), so that risks to specific fisheries can be evaluated. Inclusion of commercial, recreational, and subsistence harvest areas should be considered.

Collection of pre-exposure samples from the spill area or samples from appropriate unexposed reference areas is extremely important because they can provide information on background levels of contamination in the spill area. Petroleum hydrocarbons are ubiquitous in environmental samples, so we cannot assume that all petroleum hydrocarbons measured in a sample or all increases over time are a result of an oil spill. Furthermore, monitoring often continues until the level of contamination returns to “background.” Reference samples are key to determining the range of background concentrations and the baseline against which changes over time will be evaluated.

The best reference samples are pre-spill samples taken in areas not yet oiled but in the potential path of the oil ("before" can be compared with "after" exposure). If pre-spill sampling is not possible, unexposed reference sites comparable to exposed sites can be selected for sampling. However, site histories and differences in the characteristics of the sites should be carefully evaluated to determine whether there are significant differences between the exposed and reference areas. Often, areas that escape oiling do so because they differ fundamentally from exposed areas (for example, bays that face different directions), and so would not be expected to exhibit the same "background" conditions. Any differences between reference and exposed sites must be considered when analyzing and interpreting results.

National monitoring programs such as NOAA's National Mussel Watch Program can provide valuable pre-spill data for determining historical ranges of background concentrations of PAHs in shellfish at several locations around the country. When available for an area, PAH data from the NOAA Status and Trends Program (including the National Mussel Watch Program) or other monitoring programs may help determine normal background levels and seasonal patterns in contaminant levels.

Selecting target species to be sampled

Evaluating risk to human health from seafood consumption usually is a primary purpose of seafood sampling, so including species harvested commercially, recreationally, and for subsistence use may be important. Species that are present throughout the area of concern may be most appropriate for sampling if results are to be compared spatially or if the results are to be used to make statistical inferences to the entire area.

Hydrocarbon uptake and elimination rates vary widely. Finfish, for example, quickly metabolize and eliminate PAHs. Bivalves generally tend to bioaccumulate most contaminants and often serve as good indicators of the potential extent, degree, and persistence of contamination. On the other hand, some shellfish species stop feeding or passing water over their gills at extreme temperatures and, consequently, may exhibit low uptake rates under certain conditions. Consider such differences when selecting species for monitoring and comparing results among species.

Sampling frequency and duration

Monitoring generally should continue until contaminant levels reach background levels or predetermined acceptable levels. Periodic sampling before those levels are reached can reveal trends in contaminant levels. Appropriate monitoring frequency and duration will depend on spill conditions, such as oil type and volume spilled, flushing rates of affected water bodies, and the degree of exposure to wave action of contaminated shorelines. Appropriate monitoring frequency and duration will also depend on the species exposed and exposure duration. Finfish generally eliminate hydrocarbons within days or weeks, whereas bivalves may require several weeks or months. Elevated levels of petroleum compounds in bivalves have been detected for years at some sites where high levels of oil persist in adjacent sediments. Time of year should also be considered in some climates because elimination rates may be slower in cold temperatures. Other factors to consider with regard to monitoring frequency are the turnaround time for sample analysis and time required for the evaluation team to meet, interpret the results, and decide on the need for further sampling. Sampling plans may need to be adjusted over time as conditions change and as monitoring results provide new information on the fate of the oil and on which pathways of exposure are significant.

Sample collection and handling

The seafood-sampling plan should specify all details about sample collection. This includes the areas to be sampled, number of samples to be collected from an area (to meet statistical objectives), number of organisms or quantity of tissue to be composited (to meet analytical requirements), size of organisms to be collected, tidal elevations for collection (in the case of intertidal invertebrates), method of marking or recording exact sampling locations, and field notes to be recorded.

The sampling plan should also specify how seafood samples should be handled. This includes any field preparation, packaging and temperature requirements (for example, wrapping in foil, keeping in a cooler at 4°C or below, and freezing within a specified period of time), labeling, and any chain-of-custody requirements during transport to the analytical laboratory. The edible portion, which may vary culturally, is usually the portion of interest. Seafood samples collected for sensory testing generally should be handled as they would be during commercial, recreational, or subsistence harvest and transport.

Procedures should be followed to prevent cross-contamination in the field (such as preventing exposure of samples or sampling equipment to exhaust fumes and engine cooling systems on vessels) and to maintain the integrity of the samples. Likewise, good laboratory practices should be employed to prevent contamination of samples during preparation and analysis.

Testing Seafood for Contamination and Tainting

Generally, two different types of evaluations can be conducted after oil spills to determine whether seafood is contaminated. Sensory testing determines whether seafood is tainted, *i.e.*, if it has an off-odor or off-flavor. Chemical analysis determines whether tissues are contaminated with targeted compounds. Detailed methods of chemical analysis can indicate the presence as well as the quantity of specific contaminants in tissues. These results can be used to evaluate risk to human health through consumption of contaminated seafood. Summaries of these types of seafood testing are described below.

Sensory evaluation of seafood for presence of petroleum taint

When an oil spill occurs, local seafood resources may be exposed to petroleum compounds that affect their sensory qualities; that is, smell, taste, and appearance. Even when seafood from a spill area is considered acceptable with regard to food safety, flavor and odor may still be affected, negatively impacting the seafood's palatability, marketability, and economic value. Furthermore, tainted seafood is considered by the U.S. Food and Drug Administration to be adulterated and, therefore, is restricted from trade in interstate commerce.

Tainted seafood is defined as containing abnormal odor or flavor not typical of the seafood itself (ISO 1992). Under this definition, the odor or flavor is introduced into the seafood from external sources and excludes any natural by-products from deterioration due to aging during storage, decomposition of fats, proteins, or other components, or due to microbial contamination normally found in seafood. Taint is detected through sensory evaluation, which has been defined as "the scientific discipline used to evoke, measure, analyze and interpret those reactions to characteristics of foods and materials as perceived through the senses of sight, smell, taste, touch and hearing" (Food Technology Sensory Evaluation Division 1981). Humans have relied for centuries on the complex sensations that result from the interaction of our senses to evaluate quality of food, water, and other materials. In more recent times, sensory testing has developed into a formalized, structured, and codified methodology for characterizing and evaluating food, beverages, cosmetics, perfumes, and other commercial products. Sensory evaluation techniques are routinely used commercially in quality control, product development, and research. Sensory testing can be either subjective or objective. Subjective testing measures feelings and biases toward a product rather than the product's attributes. For objective testing, highly trained assessors use the senses to measure product attributes. Testing of seafood for petroleum taint should be completely objective and should be conducted by highly trained analysts.

Objective sensory testing serves as a practical, reliable, and sensitive method for assessing seafood quality. Only human testers can measure most sensory characteristics of food practically, completely, and meaningfully. Though advances continue to be made in developing instrument-based analysis, human senses remain unmatched in their sensitivity for detecting and evaluating organoleptic characteristics of food. The U.S. Food and Drug Administration and NOAA's National Marine Fisheries Service routinely employ sensory evaluation in inspecting seafood quality. Seafood inspectors are essentially sensory analysts, or assessors, who work as expert evaluators in the application of product standards. A major objective of seafood sensory inspection is to evaluate quality with regard to decomposition of fisheries products. Sensory analysis can also provide information on presence of taint from external sources, such as spilled oil and chemicals.

Sensory panels

Objective sensory evaluation of seafood is usually conducted using a panel of trained and experienced analysts. Sensory analysts must be screened for sensitivity and then trained in applying established sensory science methodology. Participation in calibration or "harmonization" workshops ensures uniform application of sensory evaluation criteria for particular types of contaminants, including standard terminology and consensus on levels of intensity of sensory characteristics. Descriptive analyses and references are used to yield results that are consistently accurate and precise.

There are different types of sensory analysts, which function differently and have specific selection, training, and validation requirements. *Trained assessors* are sensory analysts selected and trained to perform a specific task. *Expert assessors* are the most highly trained and experienced category of sensory analyst. Expert assessors generally evaluate product full-time, function independently, and often are used in quality control and product development. Examples of products evaluated by expert sensory assessors include wine, tea, coffee, and seafood. Through extensive standardized training and experience with sensory methodology, these expert assessors have become extremely objective and evaluate quality with a high degree of accuracy and precision. Seafood inspectors fall into the category of expert assessors, and can make consistent and repeatable sensory assessments of quality characteristics of seafood as they relate to grade level or decisions to accept or reject product.

The number of panelists needed depends on the level of expertise and experience of the analysts used. For panels of expert assessors, such as NMFS and FDA seafood inspectors, usually only three to five analysts are needed. If less experienced analysts are used, a larger number of panelists is recommended. Whenever possible, use of expert seafood assessors, such as seafood inspectors, is recommended for evaluation of seafood for presence of petroleum taint. Extensive product knowledge and experience enable seafood inspectors to very accurately distinguish variations related to product processing, storage, deterioration, etc. from taint due to external sources. Some seafood inspectors for NMFS and FDA have had specialized training for detecting petroleum taint in seafood and experience evaluating seafood samples at oil spills. If called upon, these specialized inspectors are available to conduct sensory evaluation of seafood during spill events.

Sensory evaluation procedures

Applied as a science, sensory evaluation should be conducted under specific, highly controlled conditions in order to prevent extraneous influences in the testing environment from affecting panelists' sensory responses. Accordingly, sensory testing is best conducted in facilities specifically designed for sensory testing. The NMFS Seafood Inspection Branch maintains several such laboratories around the country. Seafood samples collected during a spill event can be shipped to these laboratories for sensory evaluation. In most cases, NMFS and FDA recommend that samples be shipped and evaluated in the same manner as they normally are shipped and sold (*i.e.*, fresh, live, frozen). When this is not possible, as may be the case for oil spills in very remote areas, sensory analysts can conduct evaluations at the scene of an incident.

All sensory testing should be conducted under the supervision of a sensory professional, who designs and implements the sensory testing procedure. A trained "facilitator" should coordinate sensory analysis. The facilitator conducts the testing, including receiving, preparing, and presenting samples to the expert sensory panel, and collecting the resulting data in a scientific and unbiased manner. All of these steps should be conducted according to standardized procedures under highly controlled conditions. Suspect samples are presented to assessors in blind tests, along with control or reference samples. Samples are first smelled raw, then smelled cooked, and finally tasted by each panelist independently to determine whether petroleum taint is present. A sensory professional statistically analyzes panelist's responses to determine whether samples pass or fail with regard to presence of petroleum taint. These results, in turn, help seafood managers determine whether restrictions are needed on seafood harvest or marketing from the spill area due to tainting.

We are not certain which compounds in petroleum are responsible for taint perceived by humans, so chemical analysis cannot yet substitute for sensory testing in determining whether a taint is present. It has been suggested that the principal components of crude and refined oils responsible for tainting include the phenols, dibenzothiophenes, naphthenic acids, mercaptans, tetradecanes, and methylated naphthalenes. The human olfactory system generally is very sensitive to phenolic and sulfur compounds, even though they are minor components of oil.

In 2001, NOAA published a technical guidance document on appropriate sensory methodology to objectively assess seafood for the presence of petroleum taint. Written by sensory scientists with NOAA's National Marine Fisheries Service Seafood Inspection Program and Canada's Food Inspection Agency, in cooperation with the U.S. Food and Drug Administration, *Guidance on Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill* comprehensively describes recommended standard procedures, including collection, preservation, and transport of seafood samples, for sensory evaluation. The guidance is intended to assist in conducting scientifically sound and legally defensible sensory tests on seafood during oil spill response, with adequate and appropriate quality control.

Chemical testing techniques for petroleum contaminants in seafood

Chemical testing of seafood often is conducted after an oil spill to determine whether seafood tissues are contaminated with petroleum compounds. Both detailed and screening methods of analysis can be employed. Below, we summarize methods typically used after past oil spills, including some of their advantages and disadvantages.

DETAILED METHODS OF CHEMICAL ANALYSIS: GAS CHROMATOGRAPHY/MASS SPECTROMETRY

Detailed chemical analysis of seafood after oil spills typically is conducted using gas chromatography and mass spectrometry (GC/MS), which measures individual PAHs at very low detection levels and provides a PAH pattern (or fingerprint) to compare to that of the source oil. Prior to analysis, hydrocarbons are extracted from seafood tissue samples and the extract is split into three fractions: 1) the saturated hydrocarbons fraction (containing the n-alkanes, isoprenoids, steranes and triterpanes; 2) the aromatic hydrocarbon fraction (containing the PAHs and sulfur heterocyclics; and 3) the polar hydrocarbon fraction (containing the nitrogen heterocyclic compounds. Recovery standards appropriate to each fraction are added.

The PAHs in the fraction generally are of greatest concern with regard to risk to human health. The gas chromatograph separates targeted PAH compounds yielding a retention time that, in combination with the mass spectra from the mass spectrometer, enable detailed identification of individual compounds by their ion masses. The method often used is usually referred to as "Modified" EPA Method 8270, which is EPA Method 8270 for semi-volatile compounds modified to include quantification of the alkyl-substituted PAH homologues, in addition to the standard PAH "priority pollutants." In oil, alkylated homologues of PAHs are more predominant than parent PAH compounds, often by an order of magnitude. This is in contrast to pyrogenic (combustion) and other potential PAH sources. The detailed chemical fingerprint provided by GC/MS analysis enables differentiation among sources of PAHs found in the sample. Contamination from a specific spill can be distinguished from background sources of contamination, such as PAHs derived from combustion sources. GC/MS can also measure analytes other than PAHs to help with fingerprint analysis of oil or to track oil weathering. The GC/MS can be run in the selected ion monitoring (SIM) mode, rather than the full-scan mode, to increase the minimum detection levels (MDL) of the individual parent and selected homologue PAHs by a factor of 10 to 40. Minimum detection levels for individual PAHs are very low, in the range of parts per billion (ng/g) in tissue. The quantitative results for specific, targeted PAHs can be used to assess whether levels detected pose a risk to human health through seafood consumption.

Normal turnaround time for analysis of tissue samples for PAHs is approximately two weeks. Fast turnaround time is approximately three days for a batch of samples. Costs for GC/MS-SIM analysis of tissues are relatively high, starting from about $750 per sample, plus premiums of 50-100% for fast turnaround. The sample-processing rate depends on the throughput capabilities of the laboratory and the degree of quality control (QC) of the data before the results are released, ranging from approximately 20 to a maximum of 100 samples per week.

Data Reporting and Interpretation

The importance of data reporting and interpretation should not be underestimated in plan-ning seafood safety monitoring programs after oil spills. Some simple steps can be taken to help avoid confusion and prevent incorrect conclusions. For example, the analytical laboratory should include at least the following information for all analytical data reported:

Header Information

- *Sample Name or Field ID: the sample name or number assigned by the sampler*
- *Sample Type: e.g., sample, field blank, trip blank, procedural blank, QC*
- *Batch No.: analytical batch number (so samples run as a batch can be identified, particularly if problems are found with a batch run)*
- *Matrix: e.g., water, sediment, tissue, oil*
- *Percent Moisture: for tissue and sediment samples*
- *Sample Size: weight or volume of sample used for analysis*
- *Collection Date: date the sample was collected*
- *Extraction Date: date the sample was extracted*
- *Analysis Date: date the sample was analyzed*
- *Analysis Method: EPA Method or other description*
- *Surrogate Corrected?: Are the reported concentrations corrected for surrogate recovery?*
- *Method Detection Limit: the minimum detection level*
- *Units: units in which the concentration is reported, including whether concentrations are wet weight or dry weight (for tissue)*

Analyte Data

- *Individual and Total PAH concentrations*
- *Surrogate Recovery (%): for every sample*
- *Key to Data Qualifiers: The lab should include a key to any qualifiers used to flag reported values that have some kind of data accuracy issue. For example, two standard qualifiers used under the USEPA Contract Laboratory Program guidelines (USEPA 1994) are:*
- *U = the analyte was analyzed for, but was not detected above the reported sample quantification limit*
- *J = the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample*

Analysis of the source oil, if available, is needed to enable fingerprint comparisons. Only expert petroleum hydrocarbon chemists should interpret fingerprints because the complex processes of oil weathering and uptake result in variable PAH patterns in organisms. Also, patterns can be difficult to interpret in samples collected from areas with high background levels of contamination.

Caution is advised when comparing analytical results for samples of different types, or samples collected from different areas or at different times. Before drawing conclusions, consider any differences in the analyses conducted or the way the data are reported. Examples of differences to watch for include:

- The units in which results are reported, and whether reported concentrations are dry or wet weight;
- Whether the lists of analytes and minimum detection limits for individual PAHs are the same;
- Whether reported concentrations have been corrected for surrogate recovery; and

- Whether reported concentrations have been lipid-normalized. PAH uptake and retention tend to increase with the increasing lipid content of tissues. Consequently, differences in lipid content may need to be considered when comparing and interpreting analytical results over time or among different organisms.

Rapid screening methods of analysis

Rapid, low-cost analytical methods, generally known as screening methods, can be employed to identify contaminated samples and prioritize them for detailed analysis. Detailed methods of analysis for PAHs in tissue are time-consuming and expensive. The large number of samples often collected after an oil spill can quickly overwhelm laboratory capacity and strain resources. Screening methods of analysis can rapidly process large numbers of samples to yield semi-quantitative estimates of contaminant concentrations and allow ranking of samples by degree of contamination. Used in a tiered approach, screening methods can identify the most contaminated samples, prioritizing or reducing the number of samples that need to be processed by detailed analytical techniques, such as GC/MS.

For example, in response to the need to analyze large numbers of subsistence seafood samples collected after the *Exxon Valdez* oil spill in Prince William Sound, Alaska, NOAA's Northwest Fisheries Science Center used reverse-phase, high performance liquid chromatography (HPLC) with fluorescence detection to screen for metabolites of aromatic compounds in finfish bile. Finfish rapidly metabolize aromatic compounds and concentrate the resulting metabolites in bile for excretion, often at concentrations that are orders of magnitude greater than those in edible tissue. Using this rapid, low-cost method, hundreds of finfish tissue samples were screened for indication of exposure to petroleum contaminants, enabling GC/MS analyses to be focused on selected samples to confirm presence and quantities of individual contaminants. HPLC/UV fluorescence screening methods have also been used for rapidly measuring aromatic compounds in invertebrate tissues. This screening method was used successfully on lobster samples collected after the *North Cape* oil spill off the coast of Rhode Island in 1996.

Screening analyses, such as the HPLC/fluorescence method described above, generally can be completed in rapid turnaround time (within 24 hours) and can be conducted on a research vessel or onshore lab. Rapid availability of results enables sampling modifications based on indications of exposure. This can be very helpful during the critical early phases of an oil spill response, when decisions regarding closing or otherwise restricting seafood harvest may be made.

The utility of HPLC/fluorescence and other screening methods, however, is more limited than detailed methods of analysis. For example, though it may be possible to recognize chromatographic patterns associated with characteristic classes of petroleum products, HPLC/fluorescence screening does not produce a detailed "fingerprint" similar to the results acquired from GC/MS. Consequently, HPLC/fluorescence usually will not enable differentiation between background contamination sources and the spilled oil, especially in very polluted areas. Since HPLC/fluorescence screening does not quantify individual aromatic compounds, the results cannot be used to assess risk to human health from consumption of contaminated seafood. Furthermore, measurement of fluorescent aromatic compounds in bile is not a standard analysis, limiting temporal and spatial comparisons using historical data sets. Lastly, HPLC/fluorescence screening for fluorescent aromatic compounds in bile is a specialized technique, and laboratory availability and expertise needed to conduct the analyses reliably may be limited.

Water Monitoring

Water samples often are collected and analyzed as part of the initial spill response and assessment. Seafood safety managers can use these results to help estimate the extent and duration of seafood exposure to oil in the water column. Monitoring water concentrations may also be important if water-quality criteria are applied as a condition for reopening a closed fishery or removing other harvest restrictions.

Oil concentrations in the water column generally peak early after an oil spill and, in most cases, rapidly decline to background levels within days to a week, as was the case for example at the *New Carissa* oil spill. Accordingly, if water sampling is to be conducted, initial sampling should commence very soon after a spill occurs. Oil may persist longer than usual in the water column if there are multiple or ongoing oil releases, if the released volume is extraordinarily large, or if large volumes of oil are physically dispersed. After the *Braer* oil spill, for example, elevated oil concentrations were detected in the water column as long as 50 days after release. Dissolved and dispersed oil plumes in the water column are driven by currents and so may have a very different spatial distribution than surface slicks, which are driven primarily by wind.

Under the authority of the Clean Water Act (63 FR 68354-68364), EPA has issued national recommended water-quality criteria for priority toxic pollutants to be used by states and tribes in adopting water quality standards. EPA has issued water-quality criteria for protection against human health effects for three mono-aromatic hydrocarbons and eight PAHs (listed in Table G.2-3). These particular compounds, however, are present in crude oils and refined products at very low levels and constitute a tiny percentage of the PAHs normally detected in water samples after an oil spill. None of the water quality criteria to protect aquatic communities (both freshwater and saltwater) issued by EPA are for PAHs. EPA has issued recommended water quality criteria for organoleptic effects for 23 chemicals, though not for any of the compounds present in petroleum products. Some states have established state water quality standards for PAHs in their coastal waters.

Sediment Monitoring

Sediment monitoring can be included as part of a post-spill monitoring program to determine whether sediments may be a potential chronic source of oil exposure to adjacent seafood collection sites, particularly at intertidal sites where bivalves are harvested. Sediment sampling also may facilitate fingerprint analysis of PAHs in tissues by providing the PAH pattern in contaminated sediments, which may be different than the PAH pattern in the fresh source oil. It is important to recognize, however, that sediments often contain high levels of background PAH contamination, particularly in urban areas and harbors. PAHs and other contaminants detected may not be related to a particular oil spill. Also, characterization of sediment contamination can be difficult because of the inherent heterogeneity of intertidal sediments over space, depth, and time.

There are no national sediment quality criteria for PAHs in marine or freshwater sediments. Some states have established sediment quality standards and cleanup screening levels to prevent adverse biological effects. How these standards would relate to seafood adulteration or safety issues is unclear.

Table G.2-3 National recommended water quality criteria for priority toxic pollutants for protection agains human health effects.

PAH priority pollutant	Human health criteria for consumption of water + organism (µg/L)	Human health criteria for consumption of organism only (µg/L)
Benzo[a]anthracene	0.0044	0.049
Benzo[a]pyrene	0.0044	0.049
Benzo[a]fluoranthene	0.0044	0.049
Benzo[k]fluoranthene	0.0044	0.049
Dibenzo[a]anthracene	0.0044	0.049
Fluoranthene	300	370
Fluorene	1300	14000

SEAFOOD RISK ASSESSMENT

(Risk assessment and determination of caner risk should be conducted by the California Department of Public Health).

Several different endpoints can be considered when assessing risks posed to human health from consuming contaminated seafood. These include both carcinogenic and non-carcinogenic effects to the general population, as well as to particularly susceptible segments of the population such as children, pregnant women, and subsistence seafood consumers. Human epidemiological studies, when available, and laboratory studies involving animals are used to assess the likely effects of contaminants at various exposure levels.

Evidence from occupational studies of workers exposed to mixtures of PAHs indicates that many of these compounds may be carcinogenic to humans. Individual PAHs that are considered to be probable human carcinogens include benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene (IRIS 1994). Most of the data gathered from laboratory studies provides information on carcinogenic effects of lifetime exposure to PAHs. Information on non-carcinogenic effects is limited. Consequently, cancer generally is the primary endpoint considered when assessing potential risks to human health from consumption of seafood from an oil spill area.

Seafood Advisory and Action Levels from Previous U.S. Oil Spills

The action or advisory levels resulting from cancer risk calculations differ among spills, depending on the assumptions made and input values selected. At the *New Carissa* oil spill, the Oregon Health Division calculated action levels for average and upper end shellfish consumers of 45 ppb BaP equivalents (BaPE) and 10 ppb BaPE, respectively. Action levels derived by the California Department of Health Services for average and upper-end shellfish consumers following the *Kure* spill were 34 ppb BaPE and 5 ppb BaPE, respectively. At the *North Cape* oil spill, the Rhode Island Department of Health essentially applied a BaPE criterion of 20 ppb for the maximally exposed lobster consumer over the five-year exposure duration. Action levels calculated by the Maine Bureau of Health for lobster consumption after the *Julie N* oil spill for ten and 30- year exposure durations were 50 ppb and 16 ppb BaPE, respectively. Advisory levels for subsistence consumers after the *Exxon Valdez* oil spill, assuming a ten-year exposure period, were three ppb BaPE for salmon, five ppb BaPE for finfish, 11 ppb BaPE for crustaceans, and 120 ppb BaPE for bivalve mollusks. Advisory levels based on a lifetime exposure assumption were approximately an order of magnitude lower. None of the finfish or shellfish samples collected from harvesting areas near Prince William Sound exceeded these advisory levels. Interestingly, the upper-bound lifetime cancer risk for Alaskan subsistence seafood consumers eating the most contaminated bivalve mollusks from the spill area was calculated to be two orders of magnitude lower than the lifetime risk calculated for consumers of locally smoked salmon

.

At several of these spills, the calculated action levels were used as recommended levels for reopening harvest of closed seafood fisheries. For example, at the *New Carissa* oil spill, shellfish were considered safe if all samples contained less than 10 ppb BaP equivalents. If any shellfish tissue levels were above 45 ppb BaP equivalents, shellfish in those areas would be considered unsafe, and further monitoring considered necessary. If samples contained more than 10 ppb but less than 45 ppb BaP equivalents, the need for further monitoring would be assessed on a case-by-case basis. A similar tiered approach was used at the *Kure* oil spill. If all samples contained less than 5 ppb BaP equivalents, shellfish beds could be reopened. If any samples contained between 5 and 34 ppb BaP equivalents, the need for further action before reopening would be assessed. If any samples contained more than 34 ppb BaP equivalents, additional sampling and environmental monitoring prior to reopening would be considered.

The Equivalency Approach for Risk Assessment

The equivalency approach used in relative cancer risk assessment is a method used for assessing the risk of exposure to a mixture of several different compounds that are related in terms of chemical and biological activity. Rather than calculating individual risks for each compound, one component of known potency is used as a standard. Concentrations of each of the other compounds are adjusted based on their estimated potency relative to the standard, to calculate an equivalent concentration for the standard. Summing the equivalent concentrations yields a single number from which the cancer risk can be estimated.

This toxicity equivalency approach has been widely used for mixtures of dioxins and furans, for example. The relative potencies of individual dioxin and furan compounds are expressed in terms of 2,3,7,8-tetra-chlorodibenzo-*p*-dioxin (2,3,7,8-TCDD) equivalents. 2,3,7,8-TCDD was chosen as the standard by which the potency of individual dioxin and furan compounds are estimated because most laboratory studies on the effects of dioxins have been conducted using 2,3,7,8-TCDD. Data are more limited on the effects of other congeners. The same approach can be used with petroleum compounds, which also occur in complex mixtures.

SEAFOOD TAINT RISK COMMUNICATION

Both technical and social factors should be considered when communicating information on the health and safety of seafood following an oil spill, particularly when dealing with different groups. The risks and consequences have different meanings for the subsistence user, sport fisher, average consumer, commercial fisher, elected official, regulator, and responsible party representative. Regulators and scientists measure risk quantitatively and accept the uncertainty inherent in the risk-assessment process. The public perceives risk more qualitatively and subjectively, and is influenced by prior experience with similar risks and information made available to them. The public wants to know whether the seafood is safe to eat; yet the answers given are typically posed in terms of “acceptable risk” or “not a significant risk.” Risk communicators should be aware of and try to overcome: 1) gaps in knowledge, 2) obstacles inherent in the uncertainties of scientific risk assessment, and 3) barriers to effective risk communication.

Please see Appendix F for further general information on risk communication approaches and techniques. In addition:

- Meet directly with groups such as commercial fishing associations, recreational users, subsistence users, seafood vendors, etc. Meetings can fail if the risk communicators are not prepared or knowledgeable, or appear to be withholding information. Specialized bulletins or communication methods may be necessary for special groups, such as Native American subsistence users and non-English-speaking users.
- Use unambiguous terms whenever possible. Health risks are commonly described in terms of probabilities of cancer based on assumed consumption rates and periods. It is assumed that carcinogens do not have safe thresholds for exposures; that is, any exposure to a carcinogen may pose some cancer risk (USEPA 2000b). However, it is both useful and appropriate to define “safe” and “unsafe” levels of PAHs in seafood based on risk rates that are commonly considered to be acceptable. For example, water-quality criteria for carcinogenic contaminants in water usually use risk rates in the range of 10^{-5} to 10^{-6}. The general public understands the concepts of acceptable risks, although there may be components of society where these risks conflict with local cultures, such as the Alaska Native subsistence users during the *Exxon Valdez* oil spill. As long as the risk communicators clearly define what is meant by “safe” and “unsafe,” these terms are appropriate.

Communicating Relative Risks

Risk communicators commonly compare the relative risk of a specific activity to known risks of other activities. For example, the public is accustomed to hearing the risks of death by automobile accident or airplane crash. These are considered voluntary risks taken by people who decide to drive or fly after considering the risks and benefits associated with these activities, whether or not their perceptions are realistic. The public generally will accept risks from voluntary activities that are roughly 1,000 times greater than involuntary risks that provide the same level of benefits.

Because the potential human-health risks from eating seafood contaminated by an oil spill are associated with PAHs, it is tempting to compare the PAH levels in seafood samples with those found in other food sources. PAHs are ubiquitous contaminants, measurable in many foods. Based on information from previous spills, PAH levels in seafood from oil-spill-contaminated waters generally are considerably lower than PAH levels found in smoked foods. During the *Exxon Valdez* oil spill, however, village community residents became upset when it was pointed out that samples of smoked fish from the villages contained carcinogenic hydrocarbon levels hundreds of times higher than any shellfish samples collected from oiled beaches, and nearly 10,000 times higher than wild salmon. The residents considered eating smoked salmon to be an acceptable, voluntary risk, and eating oil-contaminated seafood to be an involuntary, unacceptable risk. Guidelines for risk communication include being sensitive to the distinction between voluntary and involuntary risk, and avoiding risk comparisons that equate the two. Risk comparisons should be made carefully.

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APPENDIX H

NATIONAL CONTINGENCY PLAN (NCP) PRODUCT LIST

and

STATE LICENSED OIL SPILL CLEANUP AGENTS (OSCA)

Within the U.S. only dispersants that have met the approval criteria set by the U.S. Environmental Protection Agency (EPA) and that are listed on the EPA National Contingency Plan (NCP) Product Schedule can be legally sprayed. The NCP Product Schedule includes the products shown in the table below.

In addition to meeting the approval criteria set by the EPA, dispersants used in California must be a California state-licensed Oil Spill Cleanup Agent (OSCA). The two dispersants currently meeting the state-licensing requirements are also shown below.

Dispersants with federal approval	Dispersants licensed in California
BIODDISPERS	
DISPERSIT SPC 1000	
FINASOL OSR 52	
JD-109	
JD-2000	
NEOS AB 3000	
MARE CLEAN 200	
SAF-RON GOLD	
SEA BRAT #4	
ZI-400	
COREXIT 9527A	**COREXIT 9527A**
COREXIT 9500A	**COREXIT 9500A**
NOKOMIS 3-AA	**NOKOMIS 3-AA**
NOKOMIS 3-F4	**NOKOMIS 3-F4**

Updated NCP Product Lists can be accessed via the EPA representative on the RRT (Appendix A), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) or accessing the Internet at http://www.epa.gov/oilspill/ncp/dsprsnts.htm

Additional information on California state-licensed dispersants may be obtained by contacting the OSPR representative on the RRT (Appendix A) or accessing the Internet at http://www.dfg.ca.gov/ospr/reg_com/osca.html

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APPENDIX I

DETERMINATION PROCESS FOR CALIFORNIA OFFSHORE DISPERSANT ZONES

The use of dispersants in marine waters off California requires detailed foresight and planning. In an effort to expedite a decision to use dispersants and reduce first strike response time, the Regional Response Team Region IX in August of 2000 adopted formal changes to the planning and operations sections of the Regional Contingency Plan (RCP). These sections detail a dispersant use planning process to be undertaken by each of the six California marine Area Committees (AC). Specifically, each AC was tasked with designation of approval zones for dispersant use within its area of operation and the development of a dispersant use plan to include at least the following: 1) Incident Command System (ICS) protocols and forms, 2) Federal On-Scene Coordinator Checklist, 3) dispersant monitoring plan, and 4) wildlife spotting protocols. Finally, each committee was asked to review training and drill requirements for plan implementation as well as dispersant response equipment assuming a 4-hour response time.

Beginning in February 2001, each Area Committee (North Coast, San Francisco-Bay Delta, Central Coast, Los Angeles-North, Los Angeles-South, San Diego) designated a dispersant subcommittee to develop their regional dispersant use zone recommendations. Los Angeles subsequently combined LA-north and LA-south efforts under one subcommittee. San Diego developed an additional Sea Bird Task Force that compiled sea bird information primarily for the Southern California Bight area, and reported their results to the San Diego dispersant subcommittee for their particular consideration in developing recommended zones. All subcommittees initiated the planning process by gathering the pertinent resource data for the region and becoming familiar with the effects of dispersants and dispersed oil in the marine environment. Based on the information reviewed, each subcommittee developed a Net Environmental Benefit Analysis (NEBA) to aid them in constructing the area’s dispersant use zone recommendations. Based on the results of the NEBA, each subcommittee ultimately concluded that in the case of dispersible crude and fuel oils, dispersing the spilled oil into the water column may, on balance, be less harmful to the environment than letting the oil remain on the ocean’s surface for extended periods of time.

Each subcommittee and Area Committee drafted their dispersant zone recommendations, along with some general dispersant application guidelines, and forwarded those through the U.S. Coast Guard to the RRT. All zone recommendations were approved by the RRT between February 2002 and July 2003. Parallel to the RRT dispersant zone review and approval process, the Los Angeles subcommittee was continuing to meet in workgroups to develop drafts of the other elements (updated FOSC checklist, Wildlife Observation Protocols, Public Outreach Plan, dispersant shortfall analysis, and incorporation of dispersant effectiveness monitoring) necessary to make a complete Area Dispersant Plan (ADP). In doing so, there was a recognition that much of the Los Angeles effort would not only be useful as a starting point for similar efforts by other Area Committees in developing their individual ADPs, but would in fact mature into an overarching California Dispersant Plan that would serve all six marine Area Committee regions in the state and save them the need to develop five other, largely redundant, dispersant plans. This California Dispersant Plan (CDP) includes the zones for each area, as well as an updated Federal On-Scene Coordinator (FOSC) checklist and all appendices needed to implement the CDP.

The Net Environmental Benefit Analysis (NEBA) Process

Once oil is spilled to the ocean there will be inevitable impacts to the environment within the geographical area of the spill no matter how much effort is put into spill response. The primary goal of any oil spill response is to minimize the area of impact and remove the spilled oil from the water's surface as fast as possible, thus minimizing the impact to the organisms inhabiting the terrestrial, estuarine, intertidal, shallow subtidal and ocean surface environments. This response goal is not meant to overlook the potential for impacts to the organisms found immediately below the ocean surface, but instead provides a mechanism for discussion of the environmental trade-offs associated with any response option.

Each regional dispersant subcommittee assessed and compared the impacts of an oil spill and associated cleanup activities on the biological resources of their area. This examination was conducted using a Net Environmental Benefit Analysis (NEBA), modeled on an Ecological Risk Assessment previously conducted for the San Francisco Bay. In each case, the NEBA examined and compared the risk to the environment associated with available oil spill response options. Spill response options evaluated were 1) no on-water response, 2) mechanical cleanup, 3) *in situ* burning, and 4) dispersant use. The risks of these cleanup options were examined using a NEBA risk matrix, which qualitatively combined the risk to the biological resource resulting from both the magnitude (percentage) of the population impacted with the expected time for the population to recover from the impact.

The NEBA in each area was conducted using an assumed spill of Alaska North Slope crude oil, a dispersible crude oil commonly transported along the coast of California. The approach was a "what-if" analysis in that all sensitive species that could be found in a region, regardless of time of year, were incorporated. This approach was undertaken to eliminate the need to conduct the multiple NEBAs necessary to address spatial and temporal differences found each region. By using this approach, each dispersant subcommittee had all the pertinent resource information at their disposal at one time and could examine and incorporate temporal and spatial differences in their single analysis.

Each regional NEBA had the same general findings:

1) In average or worse-than-average offshore response settings, and/or where spill distance from shore significantly increases the response time, mechanical cleanup techniques and *in situ* burning may, by themselves, provide very little improvement over the no response option. When this is the case, these response techniques will not significantly reduce the risk of spilled oil contacting biological resources at the sea surface or in more inshore (*e.g.*, intertidal) regions.

2) When used in an appropriate and timely manner, dispersants can remove a significant amount of oil from the surface water. Appropriate and timely application includes a number of decision factors, included in this CDP.

3) While dispersants may measurably reduce the risk of oil to surface and coastal biological resources, there may be a temporally limited increase in risk to the plankton community in the upper several meters of the water column.

4) Shoreline cleanup methods may not be available or appropriate for use in some sensitive coastal habitats (*e.g.*, rocky intertidal, marshes, wetlands); their inappropriate use may pose a greater risk to these sensitive habitats and dependent species than the oil itself. The goal in this case shifts to keeping the oil from ever reaching sensitive coastal and inland areas.

In the NEBA process, the benefits and risks of each cleanup option were evaluated separately. However, an effective spill response may use a combination of several available response options. Oceanographic conditions permitting, it is expected that dispersants would be used in combination with mechanical cleanup equipment and response strategies.

NEBA results suggested that the appropriate and timely use of dispersants (on oil spills characterized as "dispersible") could greatly enhance the ability to remove significant quantities of oil from the offshore water surface. This may greatly reduce the risk of spilled oil reaching the more abundant and sensitive habitats and species found in the more inshore, coastal areas. While dispersing oil into the water column can pose a short-term risk to the plankton community inhabiting the upper few meters of the water column, the impacts will be to a much more geographically limited area, and the temporal duration will be relatively very short. The environmental "trade-off" decision-making at the time of a response – weighing the impacts associated with oil on the surface for weeks to months versus the short term toxicity (minutes to hours) resulting from dispersed oil in the water column – can and will be made by the response agencies on a case-by-case spill response basis.

The detailed NEBA matrices developed by each regional dispersant subcommittee are not part of this report, although information about particular resources of concern is summarized in Appendix B.

Environmental "Trade-off" Decisions

The proposed area dispersant zone recommendations acknowledge that weighing of environmental "trade-offs" is not as easy as it may seem, even when information on sensitive resources has been gathered ahead of time. Information on species occurrences and distributions is still very incomplete, as is our knowledge of how they may be affected by prevailing oceanographic conditions.

No resource can be categorized as always being of greater or lesser value than another. For instance, while spill impacts on seabirds, mammals and sensitive communities are more "apparent" to scientists, responders and the general public, other more "hidden" resources (such as the seasonal plankton community in the upper water column) are at potentially greater risk from oil dispersed into the water. This community may contain the larvae of important sport, commercial, and/or ecologically significant (*i.e.*, primary or important animal prey) species.

The following were understandings regarding the plankton communities at risk from a dispersed oil plume:

- In most imaginable response settings, it may be better to disperse the oil into the water column (where there may be short-term toxicity to larvae in the upper few meters of the water column) than to leave the undispersed and unrecoverable oil on the water surface (where it could reside long-term, spread, and potentially impact a wider range of sensitive coastal species and habitats).

- Due to the spatial and temporal distribution of larval species, the dispersed oil from any one oil spill response was expected to impact a very limited portion of the overall community. Many constituent plankton species would quickly replenish their numbers through reproduction or immigration from surrounding waters. It was therefore considered unlikely that there would be population-level affects to the plankton community.
- The concentration of dispersed oil in the open ocean can decrease rapidly through natural dispersion and biodegradation processes. The dispersed oil plume can spread and thin quickly in the three-dimensional space of the water column, and natural biodegradation processes work quickly to break the small droplets of oil in the plume into carbon dioxide and water. In areas where the dilution potential is the greatest (*i.e.*, open ocean), concentrations of dispersed oil high enough to cause adverse effects are unlikely to persist for more than several hours. Oil concentrations are typically less than 50 part per million (ppm) below dispersed slicks, although different authors report slightly

different upper levels. Field data indicate that concentrations of dispersed oil are usually less than 1 ppm at depths below 10 meters. Within a matter of weeks to months, dispersion and biodegradation processes can remove much of the plume of oil droplets from the upper water column, and/or reduce concentrations of oil in the water column and at depth to scientifically non-detectable levels.

- In contrast, undispersed and unrecovered oil left on the water's surface in the open ocean can drift for weeks to months, where it can continue to impact pelagic birds, mammals and perhaps sea turtles. If the oil moves toward shore, it can strand in sensitive coastal habitats (especially intertidal areas) and pose a persistent threat, on a time scale of months to years, to those sensitive coastal habitats and their dependent species and communities.

- Emulsification of the oil remaining at the water surface increases the oil-in-water volume, and hence the contamination risk to marine and coastal plant and animal communities.

Oil spill impacts to marine birds and mammals can threaten the existence and persistence of whole colonies and perhaps the entire population of some species. This is especially true for colonies and populations of common murres, the endangered marbled murrelet, shorebirds (including the endangered western snowy plover) and the southern sea otter.

Stakeholder involvement and outreach efforts

The regional Area Committees, which developed the pre-approval dispersant zone recommendations, and from those this document, are mandated by the Oil Pollution Act of 1990 to include any interested member of the public. Given the sensitivity that dispersant use issues can raise, each regional Area Committee made special and repeated efforts to bring interested stakeholders onto the dispersant subcommittees even if they had not shown previous or consistent interest in other Area Committee response planning work. Generally, in spite of these efforts, most dispersant subcommittees came to include those who were already the most active in their respective Area Committees. Statewide information-sharing and continuity was provided by the Office of Spill Prevention and Response (OSPR), California Coastal Commission (CCC) and the National Oceanic and Atmospheric Administration (NOAA).

In early 2001, a team of RRT representatives made a presentation at a public meeting of the California Coastal Commission; another presentation of the same material was later made at the Gulf of the Farallons Research Symposium. Throughout 2001 and 2002, there were several "Stakeholder Meetings" to distribute the dispersant response planning information to other agencies and interested members of the public. The OSPR and NOAA staff also provided the materials for the U.S. Fish and Wildlife Service and National Marine Fisheries Service reviews, and regularly briefed the RRT on progress of each dispersant subcommittee. OSPR and CCC staff regularly briefed the state Oil Spill Technical Advisory Committee.

Further public outreach was offered in public information sessions at several coastal locations in California and at a public meeting of the California Coastal Commission. The U.S. Coast Guard will also publish a Federal Register Notice of this plan once it is finalized, on which the public may comment.

APPENDIX J

RESULTS OF REVIEWS WITH OTHER AGENCIES

J.1 U.S. Fish and Wildlife Service (Endangered Species Act)

Underway. Insert when **completed**

J.2 National Marine Fisheries Service (Endangered Species Act, Marine Mammal Protection Act, Essential Fish Habitat)

- Regional Response Team Request
- Department of Commerce Review

J.3 California Coastal Commission (Coastal Zone Management Act)

Occurs at end of process. Insert when completed.

J.2 National Marine Fisheries Service (Endangered Species Act, Marine Mammal Protection Act, Essential Fish Habitat

Regional Response Team IX

National Oil and Hazardous Substances Contingency Plan

Environmental Protection Agency
United States Coast Guard
Agency for Toxic Substances and Disease Registry
Department of Agriculture
Department of Commerce
Department of Defense
Department of Energy
Department of Health and Human Services
Department of Interior
Department of Justice
Department of Labor
Department of State
Department of Transportation
Federal Emergency Management Agency
General Services Administration
Region 9 Tribes
State of Arizona
State of California
State of Nevada

November 17, 2005

Mr. Ray Bosch
U.S. Fish and Wildlife Service
Endangered Species Act Section 7
1655 Heindon Rd.
Arcata, CA 95521

Dear Mr. Bosch:

Subject: Request for Formal Consultation under ESA Section 7

In accordance with the requirements of Section 7 of the Endangered Species Act, we are requesting the initiation of Formal Consultation on the effects of the Regional Response Team IX implementation of the Pre-Approval Process of its Dispersant Use Plan. Through informal consultation with you, we have determined that proposed application of chemical dispersants under the Dispersant Use Pre-Approval Process may affect, and is likely to adversely affect, some listed species (see enclosed Biological Assessment). The Regional Response Team has also determined that the proposed use of chemical dispersants under the Pre-Approval Process may affect, but is not likely to adversely affect, several other listed species.

Please note that the Dispersant Use Plan, and the Dispersant Pre-Approval Process, has been developed with the assistance of representatives of the U.S. Fish and Wildlife Service as members of one or more of the six Coastal Zone Area Committees, and in accordance with the procedures identified at 40 CFR Part 300, the National Contingency Plan. While these actions may result in short-term adverse effects, it is our belief that the listed species will ultimately benefit from them.

To assist in completing Formal Consultation, please find attached the Biological Assessment that has been produced through the planning process described in the Inter-agency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities Under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act using the Planning Template contained in Appendix C of that Agreement.

Report Oil Spills and Chemical Releases Toll Free
1-800 424-8802

Thank you for your efforts in this matter. If you require additional information, please contact CDR Bill Robberson, US EPA Regional Response Team IX Coordinator, at (415) 972-3072.

Sincerely,

Mr. Dan Meer,
EPA RRT-IX Co-Chair

Captain Gerald Swanson,
USCG RRT-IX Co-Chair

Attached: Biological Assessment – Impacts to Species listed or Proposed for listing under the Federal Endangered Species Act

Cc: Mr. Michael Sowby, California DFG, OSPR
Ms. Patricia S. Port, REO, Department of the Interior

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administratic
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

In Reply Refer To:
F/SWR3:JJD

AUG 18

Captain Steve Thompson
DOC/NOAA Representative
Regional Response Team IX
Ft. Mason, Bldg 201
San Francisco, California 94123

Dear Captain Thompson,

Thank you for contacting the Southwest Region (SWR) oil spill response representative, Mr. Joe Dillon in our Santa Rosa Area Office, and asking for written clarification regarding the Southwest Region's position on the use of oil dispersants in the event of a spill in federal waters off the California coast. As you are aware through your coordination activities with Joe the last few years, we support the use of the latest formulations of oil spill dispersants, Corexit 9527 and Corexit 9500, to prevent the migration of spilled oil to sensitive habitats such as estuaries, rookeries and the intertidal region. In areas such as these, oil may permeate the substrate resulting in long term exposure of NOAA trust resources to the oil and its degradation products.

The Northwest Region (NWR) of NOAA's National Marine Fisheries Service concluded an Endangered Species Act (ESA) section 7 consultation for oil spill response activities in November 2003. This consultation considered the potential effects of dispersant use on large whales, Steller sea lions and salmonids. These ESA listed species also occur in the Southwest Region as well as several species of sea turtles and the white abalone. Section 7 consultation for the various oil spill response options has not been conducted in the SWR.

The use of the two dispersants mentioned above was analyzed as part of the NWR's biological opinion. The biological opinion reviewed numerous studies related to the toxicity and fate of oil and oil treated with dispersants. It concluded that the Corexit dispersants are much less toxic than most oils such that the primary factor leading to any toxic response in a spill situation is the oil itself. Field trials conducted by the National Ocean Service (NOS) have shown that dispersed oil does not penetrate below approximately 10 meters in depth in measurable concentrations. These same field trails found that the mean peak concentration of dispersed oil (10.8 parts per million (ppm) with a range of 2.2 ppm to 53.8 ppm) was reached about one hour from the application of dispersants. The concentrations rapidly declined past this point in time. Dispersed oil concentrations were not likely to exceed one ppm at depths of 10 meters or greater.

The use of the Corexit dispersants does not measurably add to the risk of effects to listed species exposed during an oil spill event. In many cases the use of dispersants helps mitigate the potential effects by reducing the time the oil spends on the surface of the water where the most vulnerable marine animals (i.e. fur seals and birds) may be exposed. The biological opinion concluded with the determination that the likelihood that response options will exacerbate the effects of oil spills is minimal. Rather, they collectively benefit listed species and habitat through minimizing the greater environmental risk from spills. The SWR has shared this opinion of oil spill response, including the use of the latest formulations of dispersants, for many years. We plan to stay up to date with developments in the field by continuing to work with the NOS and the Regional Response Team.

We would also like to take this opportunity to thank you for your efforts over the last three years to coordinate with Joe as he was assigned this duty. We hope this coordination will continue with your expected replacement as well as the new NOS Scientific Support Coordinator when that vacant position is eventually filled. We feel there is still work to be done in oil spill planning in the SWR to maximize protection to all NOAA resources and look forward to continuing the process.

Sincerely,

Anthony G Morton

for Rodney McInnis
Regional Administrator

Cc: Bill Robberson, USEPA Region IX, San Francisco, California
Mike Sowby, CDFG OSPR, Sacramento, California
Val Chambers, NMFS, Long Beach, California
Scott Hill, NMFS, Long Beach, California
Steve Edmondson, NMFS, Santa Rosa, California
Michael Aceituno, NMFS, Sacramento, California
Dick Butler, NMFS, Santa Rosa, California
Irma Lagomarsino, NMFS, Arcata, California
Craig Wingert, NMFS, Long Beach, California
Joe Dillon, NMFS, Santa Rosa, California

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APPENDIX K

UNIT CONVERSIONS

Volume

1 U.S. Gallon (gal) = 231 in^3 = 0.1337 ft^3
1 barrel(s) (bbl) = 42 U.S. gal = 5.615 ft^3
1 bbl = 158.97 liter (L) = 0.159 m^3
1 U.S. gal = 3.785 L
1 L = 0.26 gal
1 tonne of oil = 1000 L = 1m^3 = ~ 264 gal
1 m^3 = 6.29 bbl = 264.2 gal
1 ft^3 = 0.0283 m^3 = 7.48 gal
1 m^3 = 10^6 cm^3 = 10^3 L
1 Imperial gal = 1.2 U.S. gal
1 U.S. gal = 0.83 Imperial gal

Length

1 inch = 2.54 cm
1 ft = 30.38 cm
1 ft = 0.3048 m
1 m = 3.2808 feet
1 statute mile = 0.87 nautical mile (nm)
1 mile = 1610 m = 5280 ft
1 nm = 6076 feet
1 km = 0.54 nm
1 nm = 1.852 km = 1852 m
1 nm = 1.15 statute miles
1 micron = m x 10^{-6} = mm x 10^{-3}
1 fathom (6 ft) = 1.829 m
1 m = 0.547 fathoms

Volume Rate

L/hr x 0.0063 = bbl/hr
L/hr x 0.0044 = gpm
tonnes/hr (or m^3/hr) x 4.4 = gpm
tonnes/hr x 6.3 = bbl/hr
bbl/hr x 0.7 = gpm

L/sec x 15.9 = gpm

gpm x 34.29 = bbl/day
m^3/hr x 16.7 = L/min
L/min x 0.06 = m^3/hr
gpm x 3.78 = L/min
bbl/day x 0.11 = L/min
bbl/day x 0.0292 = gpm

Distance Rate

1 knot = 1.69 ft/sec
1 knot = 1.94 m/sec = 1.13 miles/hr
ft/sec x 0.593 = knots
m/sec x 1.94 = knots
miles per hour (mph) x 1.5 = ft/sec

knots (kts) x 51.4 = cm/sec

Area

1 hectare = 10000 m^2 = 100m^2
1 acre = 43560 ft^2 = 0.4047 hectares = 247 km^2
1 acre = 4047 m^2
1 hectare = 2.471 acres
1 ft^2 = 0.0929 m^2
1 mile^2 = 2.59 km^2
1 nm^2 = 847 acres

Weight

1 pound (lb) = 0.45 kilograms (kg)
1 kg = 2.2 lb
lb/ft x 1.48 = kg/m
kg/m x 0.672 = lb/ft
1 metric ton = 1000 kg (~ 1 long ton)

From ExxonMobil , 2000

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APPENDIX L

ABBREVIATIONS AND ACRONYMS

AC	Area Committee
ACP	Area Contingency Plan
ADP	Area Dispersant Plan
ADIOS	Automated Data Inquiry for Oil Spills
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
AZ	Arizona
CA	California
CDNMS	Cordell Bank National Marine Sanctuary
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CDP	California Dispersant Plan
CINMS	Channel Islands National Marine Sanctuary
COTP	Captain of the Port
CZMA	Coastal Zone Management Act
DOC	Department of Commerce
DOI	Department of Interior
DUP	Dispersant Use Policy
EADC	Emergency Aerial Dispersant Consortium
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FOSC	Federal On –Scene Coordinator
GFNMS	Gulf of the Farallons National Marine Sanctuary
GIS	Geographic Information System
GPS	Global Positioning System
HCPB	Habitat Conservation Planning Branch
LA	Los Angeles
MBNSM	Monterey Bay National Marine Sanctuary
MMPA	Marine Mammal Protection Act
MSDS	Material Safety Data Sheet
NCP	National Contingency Plan
NEBA	Net Environmental Benefit Analysis
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center <u>or</u> National Response Corporation
OCS	Outer Continental Shelf
OWCN	Oiled Wildlife Care Network
OSCA	Oil Spill Cleanup Agent
OSPR	Office of Spill Prevention and Response
OSRO	Oil Spill Response (or Removal) Organization
PPE	Personal Protective Equipment
PST	Pacific Standard Time
RCP	Regional Contingency Plan
RRT	Regional Response Team
SCB	Southern California Bight
SMART	Special Monitoring of Advanced Response Technologies
SSC	Scientific Support Coordinator

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APPENDIX M

GLOSSARY

ADIOS

Automated Data Inquiry for Oil Spills. A NOAA computer database listing the characteristics of crude oils and refined products, and predicting expected characteristics and behavior of oil spilled into the marine environment.

API gravity

A scale for measuring fluid specific gravities based on an inverse relationship with specific gravity.

Black oil

A black or very dark brown layer of oil, sometimes with a latex texture. Depending on the quantity spilled, oil tends to quickly spread out over the water surface to a thickness of about 1 millimeter (0.04 inches). Can look like kelp and other natural phenomena. From the air, it is impossible to tell how thick a black oil layer is.

Brown oil

Water-in-oil emulsion. Thickness typically is 0.1 to 1.0 millimeters, but will vary depending on wind and current conditions. Usually has a heavy or dull sheen. Brown oil can be easily confused with algal scum collecting in convergence lines, algae patches, or kelp.

Centistoke (cSt)

A unit of measurement used in defining the kinematic viscosity of a fluid.

Chemical dispersant

A chemical formulation containing surface active agents (surfactants) that lower the surface tension between oil and water, promoting the formation of oil droplets and reducing the tendency of oil to stick to other droplets or surfaces, thereby enhancing dispersion into the water column.

Clean up

Actions taken to prevent further oil releases, protect areas from oil damage, mitigate oil effects (*e.g.*, through deflection, containment, collection, chemical dispersion, or bioremediation), and clean up of oil-contaminated areas and wildlife where monitoring shows a net environmental benefit in doing so.

Coastal waters

The territorial sea from the shoreline high water mark and then offshore to 12 nautical miles.

Continental waters

The coastal waters (high water mark to 12 nautical miles offshore) and the Exclusive Economic Zone (12 to 200 nautical miles offshore), and all water over the continental shelf.

Contingency plan

An action plan prepared in anticipation of an oil spill for a site or region, containing guidelines and operating instructions to facilitate efficient and effective clean up operations, and to protect areas of biological, social and economic importance. Contingency plans affecting response planning and response in California include Area Contingency Plans (federally directed by the Oil Pollution Act of 1990, covering marine response in federal waters (3 – 200 nautical miles from shore) throughout California, and with the greatest regional detail), the State Contingency Plan (California state directed by the Lempert-Keene-Seastrand Act, covering California response in state waters (0-3 nautical miles from shore), the Regional Contingency Plan (federally directed and managed by the Region IX Regional

Response Team, covering marine and inland response in several western states), and the National Contingency Plan (federal directed and covering national response in marine and inland waters).

Convergence line
A line on the water surface where floating objects and oil collect. A convergence can be the interface between two different types or bodies of water, or it can be caused by a significant depth change, tidal changes, or other common phenomena. Convergences are common in the marine environment.

Dispersion
The breaking up of an oil slick into small droplets that are mixed into the water column by breaking waves and other sea surface turbulence.

Emulsification
The formation of a water-in-oil mixture. Different oils exhibit different tendencies to emulsify, and emulsification is more likely to occur under high energy conditions (strong winds and waves). An emulsified mixture of water in oil is commonly called "mousse"; its presence indicates a spill that has been on the water for some time.

Entrainment
The loss of oil from containment when it is pulled under a boom by a strong current. Entrainment typically occurs from booms deployed perpendicular to currents greater than 1 knot (0.5 meters per second).

Flash point
(see volatility)

Mousse
An emulsified mixture of water in oil. Mousse can range in color from dark brown to nearly red or tan, and typically has a thickened or pudding-like consistency compared to fresh oil. Incorporation of up to 75 percent water into the oil will cause the apparent volume of a given quantity of oil to increase by up to four times.

Pancakes
Isolated, roughly circular patches of oil ranging in size from a few feet across to hundreds of yards (or meters) in diameter. Sheen may or may not also be present.

Persistent oil
Oils and petroleum products such as crude oils, fuel oils and lubrication oils that, when spilled, remain in a residual form in the environment for an appreciable period.

Plume
Oil that is dispersing into the water column as a cloud of small droplets.

Pour point
The temperature below which oil will not flow.

Recoverable oil
Oil in a thick enough layer on the water to be recovered by conventional techniques and mechanical equipment. Only black or dark brown oil, mousse, and heavy sheens (which are dull brown in color) are generally considered to be thick enough to be effectively recovered by skimmers.

Sheen

A very thin layer of oil floating on the water surface. Sheen is the most commonly-observed form of oil during the later stages of a spill. Depending on thickness, sheens range in color from dull brown for the thickest sheens to rainbow, gray, silver and near-transparent in the case of the thinnest sheens.

- A light sheen is almost transparent, and is sometimes confused with windrows and natural sheen resulting from biological processes.
- A silver sheen is a slightly thicker layer of oil that appears silvery or shimmers; occasionally called gray sheen.
- A rainbow sheen reflects colors.

Slick

Oil spilled on the water, which absorbs energy and dampens out surface waves, making the oil appear smoother – or slicker – than the surrounding water.

SMART

Special Monitoring of Applied Response Technologies. A cooperatively designed monitoring program for *in situ* burning and dispersants. SMART relies on small, highly mobile teams to collect real-time data, which are subsequently channeled to the Unified Command to address critical questions, such as whether dispersants are effective in dispersing the oil.

Specific gravity

The ratio of the mass of oil to the mass of freshwater, when both are of the same volume and temperature.

Streamers

A narrow line of oil, mousse, or sheen on the water surface, surrounded on both sides by clean water. Streamers result from the combined effects of wind, currents, and/or natural convergence zones. Often, heavier concentrations of mousse or sheen will be present in the center of a streamer, with progressively lighter sheen along the edges. Streamers are also often called “fingers” or “ribbons”.

Tarballs

Weathered oil that has formed pliable balls or patches that float on the water. Tarballs can range in diameter from a few millimeters (much less than an inch) to a foot (0.3 meters). Sheen may or may not be present, depending on how weathered or hardened the outer layer of the tarball is.

Tarmats

Non-floating mats of oily debris (usually sediment and/or plant matter) that are found on beaches or in shallow water just offshore.

Unified Command

Representatives of the spiller, the federal government, and state government, who are collectively in charge of the spill response. For California marine spills, the federal representative is the U.S. Coast Guard and the state representative is the California Department of Fish and Game Office of Spill Prevention and Response.

Viscosity

An oil’s internal resistance to flow. Highly viscous oil will not flow easily.

Volatility

A property of a liquid that has a low boiling point and a high vapor pressure at ordinary pressures and temperatures.

Water-in-oil emulsion

(see mousse)

Weathering

A combination of physical and environmental processes, such as evaporation, dissolution, dispersion, and emulsification, which act on spilled oil to change its physical properties and composition.

Window of opportunity

The period of time available for undertaking a particular response. For example, the application of dispersant before the oil emulsifies to a stage where dispersant becomes ineffective.

Windrows

Streaks of oil that line up in the direction of the wind. Windrows typically form early during a spill when the wind speed is at least 10 knots (5.1 meters per second). Sheen is the form of spilled oil that most frequently forms windrows.

California Dispersant Plan
Appendix N

MSDS
(Material Safety Data Sheets)
for Dispersants

Dispersants:

COREXIT (R) EC9500A	**N- 1**
COREXIT (R) EC9527A	**N-11**

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SAFETY DATA SHEET

PRODUCT

COREXIT (R) EC9500A

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **COREXIT (R) EC9500A**

APPLICATION : OIL SPILL DISPERSANT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 1 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Distillates, petroleum, hydrotreated light	64742-47-8	10.0 - 30.0
Propylene Glycol	57-55-6	1.0 - 5.0
Organic sulfonic acid salt	Proprietary	10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Keep away from heat. Keep away from sources of ignition - No smoking. Keep container tightly closed. Do not get in eyes, on skin, on clothing. Do not take internally. Avoid breathing vapor. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of soap and water.
Wear suitable protective clothing.
Low Fire Hazard; liquids may burn upon heating to temperatures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause mild irritation.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. May cause nausea and vomiting. Can cause chemical pneumonia if aspirated into lungs following ingestion.

INHALATION :
Repeated or prolonged exposure may irritate the respiratory tract.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
Frequent or prolonged contact with product may defat and dry the skin, leading to discomfort and dermatitis.

AGGRAVATION OF EXISTING CONDITIONS :
Skin contact may aggravate an existing dermatitis condition.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. Get medical attention.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting: contains petroleum distillates and/or aromatic solvents. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 181.4 °F / 83 °C (PMCC)

This product does not sustain combustion per the method outlined in 49 CFR Appendix H.

LOWER EXPLOSION LIMIT : Not flammable

UPPER EXPLOSION LIMIT : Not flammable

EXTINGUISHING MEDIA :
Alcohol foam, Carbon dioxide, Foam, Dry powder, Other extinguishing agent suitable for Class B fires, For large fires, use water spray or fog, thoroughly drenching the burning material.
Water mist may be used to cool closed containers.

UNSUITABLE EXTINGUISHING MEDIA :
Do not use water unless flooding amounts are available.

FIRE AND EXPLOSION HAZARD :
Low Fire Hazard; liquids may burn upon heating to temperatures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Do not touch spilled material. Remove sources of ignition. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Use with adequate ventilation. Keep the containers closed when not in use. Do not take internally. Do not get in eyes, on skin, on clothing. Have emergency equipment (for fires, spills, leaks, etc.) readily available.

STORAGE CONDITIONS :
Store away from heat and sources of ignition. Store separately from oxidizers. Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use., Stainless Steel 304, Stainless Steel 316L, Aluminum, Hastelloy C-276, MDPE (medium density polyethylene), HDPE (high density polyethylene), PVC, Plexiglass, Teflon, Kalrez, Perfluoroelastomer, PTFE, TFE, FEP (encapsulated)

UNSUITABLE CONSTRUCTION MATERIAL :
Mild steel, Carbon steel, Buna-N, Brass, Copper, Natural rubber, Polyethylene, Polypropylene, Ethylene propylene, EPDM, Neoprene, Nitrile, Polyurethane, Viton, Alfax, Hypalon

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :

Substance(s)	
Oil Mist (Mineral)	TWA: 5 mg/m3 STEL: 10 mg/m3

OSHA/PEL :

Substance(s)	
Oil Mist (Mineral)	TWA: 5 mg/m3

AIHA/WEEL :

Substance(s)	
Propylene Glycol	TWA: 10 mg/m3

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Nitrile gloves, PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Hazy Amber
ODOR	Hydrocarbon
SPECIFIC GRAVITY	0.95 @ 60 °F / 15.6 °C
DENSITY	7.91 lb/gal
SOLUBILITY IN WATER	Miscible
pH (100 %)	6.2
VISCOSITY	177 cst @ 32 °F / 0 °C 70 cst @ 60 °F / 15.6 °C
POUR POINT	< -71 °F / < -57 °C
BOILING POINT	296 °F / 147 °C
VAPOR PRESSURE	15.5 mm Hg @ 100 °F / 37.8 °C

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Heat and sources of ignition including static discharges.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of sulfur

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Moderate

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Acartia tonsa	48 hrs	34 mg/l		Product
Artemia	48 hrs	20.7 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	50 - 70%

The portion in water is expected to float on the surface.

BIOACCUMULATION POTENTIAL
Component substances have a potential to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D018

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Distillates, petroleum, hydrotreated light : Irritant
Propylene Glycol : Exposure Limit
Organic sulfonic acid salt : Irritant

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Propylene Glycol	57-55-6

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

A claim has been submitted to the Hazardous Materials Information Review Commission (HMIRC) for exemption from disclosure of a substance.

HMIRC Registry Number : 6639
Filed : 06/01/2006

WHMIS CLASSIFICATION :
B3 - Combustible Liquids

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 10/22/2008
Version Number : 1.13

SAFETY DATA SHEET

PRODUCT

COREXIT(R) EC9527A

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **COREXIT(R) EC9527A**

APPLICATION : OIL SPILL DISPERSANT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
2-Butoxyethanol	111-76-2	30.0 - 60.0
Organic sulfonic acid salt	Proprietary	10.0 - 30.0
Propylene Glycol	57-55-6	1.0 - 5.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Eye and skin irritant. Repeated or excessive exposure to butoxyethanol may cause injury to red blood cells (hemolysis), kidney or the liver. Harmful by inhalation, in contact with skin and if swallowed.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Wear suitable protective clothing. Keep container tightly closed. Flush affected area with water. Keep away from heat. Keep away from sources of ignition - No smoking.
May evolve oxides of carbon (COx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause moderate irritation.

SKIN CONTACT :
Can cause moderate irritation. Harmful if absorbed through skin.

INGESTION :
May be harmful if swallowed. May cause liver and kidney effects and/or damage. There may be irritation to the gastro-intestinal tract.

INHALATION :
Harmful by inhalation. Repeated or prolonged exposure may irritate the respiratory tract.

SYMPTOMS OF EXPOSURE :
Acute :
Excessive exposure may cause central nervous system effects, nausea, vomiting, anesthetic or narcotic effects.
Chronic :
Repeated or excessive exposure to butoxyethanol may cause injury to red blood cells (hemolysis), kidney or the liver.

AGGRAVATION OF EXISTING CONDITIONS :
Skin contact may aggravate an existing dermatitis condition.

HUMAN HEALTH HAZARDS - CHRONIC :
Contains ethylene glycol monobutyl ether (butoxyethanol). Prolonged and/or repeated exposure through inhalation or extensive skin contact with EGBE may result in damage to the blood and kidneys.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. Get medical attention.

SKIN CONTACT :
Flush affected area with water. Get medical attention.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 163 °F / 72.7 °C (TCC)

This product does not sustain combustion per the method outlined in 49 CFR Appendix H.

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Do not touch spilled material. Ventilate spill area if possible. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Avoid eye and skin contact. Do not take internally. Ensure all containers are labeled. Keep the containers closed when not in use.

STORAGE CONDITIONS :
Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
Stainless Steel 316L, Hastelloy C-276, MDPE (medium density polyethylene), Nitrile, Plexiglass, Kalrez, TFE, Alfax, Teflon, HDPE (high density polyethylene), Neoprene, Aluminum, Polypropylene, Polyethylene, Carbon Steel C1018, Stainless Steel 304, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use., FEP (encapsulated), Perfluoroelastomer, PVC

UNSUITABLE CONSTRUCTION MATERIAL :
Copper, Mild steel, Brass, Nylon, Buna-N, Natural rubber, Polyurethane, Hypalon, Viton, Ethylene propylene, EPDM

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :
Substance(s)

2-Butoxyethanol	TWA: 20 ppm , 97 mg/m3
Propylene Glycol	

OSHA/PEL :
Substance(s)

2-Butoxyethanol	TWA: 50 ppm , 240 mg/m3 (Skin)
Propylene Glycol	

AIHA/WEEL :
Substance(s)
For propylene glycol, an 8 hour TWA of 10 mg/m3 (aerosol) and 50 ppm (total).

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Neoprene gloves, Nitrile gloves, Butyl gloves, PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Amber
ODOR	Mild
SPECIFIC GRAVITY	0.98 - 1.02
DENSITY	8.2 - 8.5 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	6.1
VISCOSITY	160 cst @ 32 °F / 0 °C
POUR POINT	ASTM D-97 -66.9 °F / -55 °C
POUR POINT	< -40 °F / < -40 °C
BOILING POINT	340 °F / 171 °C
VAPOR PRESSURE	< 5 mm Hg @ 100 °F / 38 °C Same as water
EVAPORATION RATE	0.1

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Extremes of temperature

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

No toxicity studies have been conducted on this product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Turbot	96 hrs	50 mg/l	

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	70 - 90%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
Component substances have a low potential to bioconcentrate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, none of the substances in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
X	Delayed (Chronic) Health Hazard
X	Fire Hazard
	Sudden Release of Pressure Hazard
	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product contains the following substance(s), (with CAS # and % range) which appear(s) on the List of Toxic Chemicals

Hazardous Substance(s)	CAS NO	% (w/w)
Glycol Ethers		30 - 60

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

2-Butoxyethanol	111-76-2
Propylene Glycol	57-55-6

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
D2B - Materials Causing Other Toxic Effects - Toxic Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 10/15/2008
Version Number : 1.7

19.0 IN SITU BURNING PLAN

19.a IN SITU BURNING EQUIPMENT

Description	Quantity	Location	Owner	Availability
1,000' PyroBoom	2 (500' each)	Long Beach, CA (Warehouse/Yard)	MSRC	Stand-By
1,000' PyroBoom	2 (500' each)	Everett, WA	MSRC	Stand-By
16,000' PyroBoom	32 (500' each)	Houston, TX	MSRC	Stand-By

The Company has ready access to 1,000' of PyroBoom in Long Beach, CA; an additional 1,000' of PyroBoom in Everett, WA; and 16,000' of PyroBoom in Houston, TX through their contract with MSRC. Additional fire-resistant boom, if needed, may be acquired through agreements with other response organizations.

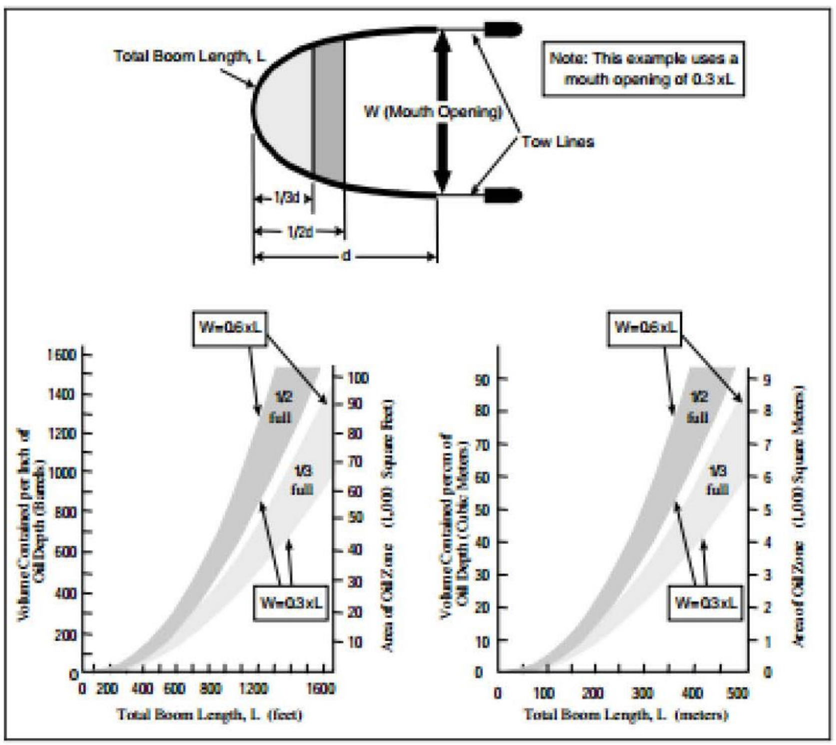

Figure 8-1 Estimating Boom Holding Capacity

https://crrc.unh.edu/sites/crrc.unh.edu/files/media/docs/Workshops/dwg/exxon_oil_spill_response_field_manual.pdf

19.b PROCEDURES

The deployment of fire boom is basically the same as any conventional boom. The fire boom can be deployed from dockside and towed at speeds of about 10 knots or less to the spill site, or deployed on location from the decks of vessels or pre-staged platforms. Once in the water, fire boom would look and behave like any other containment barrier of similar configuration. The primary difference would involve the use of longer tow lines-- typically about the same length of line for each towing vessel as the length of fire boom being used. A U-configuration of fire boom 500 feet in length, towed by two vessels each with tow lines 500 feet in length, would put the stern of each vessel approximately 600 to 700 feet from a fire contained within the lower one-third of the boom's apex. Ignition may be provided by a Heli-Torch from a helicopter, a flame gun, hand-held igniters or other ignition sources as the situation demands.

19.c ENVIRONMENTAL EFFECTS

The potential ecological impacts of ISB have not been extensively discussed or studied. Burning oil on the surface of the water could have a small adverse effect on organisms that inhabit the uppermost layers of the water column (such as fish larvae and eggs); however, the area affected would presumably be small relative to the total surface area and depth of a given body of water. In addition, burn residues may sink, potentially exposing some benthic (bottom-dwelling) plants and animals. It is possible that burn residues may foul gills, feathers, fur, or baleen. Overall, these impacts would be expected to be much less severe than those resulting from exposure to a large, uncontained oil spill.

While the main purpose of this brief review is to present the major human health and safety considerations of in-situ burning, mentioning the greater health aspects that affect our environment and, ultimately, our quality of life is definitely warranted. We will touch on a few points only. These points include the feasibility of burning the oil as opposed to leaving it to evaporate, waste generation, and possible effects on exposed wildlife.

Burning vs. Evaporation

A point to keep in mind is that leaving the oil in place will have a deleterious effect on air quality. Spilled oil left untreated would evaporate at a rate that depends on the type of oil, time elapsed from release, wind, waves, and water and air temperatures. The amount evaporated is substantial. For example, 32 percent of spilled Alberta Sweet crude would evaporate after 24 hours in 80-degree water, and after five days 42 percent would have evaporated. This evaporation pattern, similar in other oil types, emphasizes the need for quick action if in-situ burning is selected as the response tool.

The decision whether to burn or not to burn involves a tradeoff: burning the oil would reduce or eliminate the environmental impact of the oil slick and convert most of the oil to carbon dioxide and water. Burning, however, would generate particulates and cause air pollution. Not burning the oil would enable the slick to spread over a large area and impact the environment. Particulates would not be produced, but up to 50 percent of the oil would evaporate, causing a different kind of air pollution.

19.c ENVIRONMENTAL EFFECTS (Cont'd)

Waste Generation

Mechanical cleanup of oil spills generates large amounts of waste. It was estimated that 350 miles of sorbent boom was used during the first summer of the Exxon Valdez cleanup (Ferriere 1993), more than 25,000 tons of sorbent material of all kinds was sent to landfills, and oily water twice the amount of the oil spilled (from skimming a fraction of the oil) had to be treated (Fahys 1990). Enough energy was used that summer to support the energy needs of 11,000 people, power 1,300 boats of all sizes, and provide hot water equal to the need of a city of 500,000 people (Ferriere 1993).

In-situ burning of oil is going to generate waste. Even the most efficient burning will leave a taffy-like residue that will have to be collected and treated or disposed of. Burning the oil at sea will not be as efficient as burning it in engines, furnaces, or power plants, and will generate a substantial amount of particulates. However, by minimizing the solid and liquid waste generated by beach cleanup, and by reducing the energy required to support the response operation, burning even some of the oil at sea is likely to reduce the overall waste generation of a spill.

Effects on Birds and Mammals

Based on our limited experience, birds and mammals are more capable of handling the risk of a local fire and temporary smoke plume than of handling the risk posed by a spreading oil slick. Birds flying in the plume can become disoriented, and could suffer toxic effects. This risk, however, is minimal when compared to oil coating and ingestion, the result of birds' exposure to the oil slick.

The effect of in-situ burning on mammals is yet to be seen. It is not likely that sea mammals will be attracted to the fire, and the effect of smoke on marine mammals is likely to be minimal. Mammals, on the other hand, are adversely affected by oil ingestion and oil coating of their fur. Therefore, reducing the spill size by burning the spilled oil can reduce the overall hazard to mammals.

Once coated by oil, neither birds nor mammals have responded well to rehabilitation efforts, and although much has been learned and rehabilitation methods have greatly improved, the success rate of wildlife rehabilitation has been moderate at best

In-situ burning of oil may provide an efficient and rapid method of oil spill response, providing that the requirements to carry on the response are met. Burning the oil on the water generates a large amount of smoke, which contains particulates and toxic gases. Among those, particulates seem to be the major agent of concern, as their concentration in the center of the plume remains above the level of concern for the general population for several miles downwind. It was found, however, that particulates concentration under the plume does not significantly exceeds background levels. Protection of response personnel can be achieved by adequate training and personal protective equipment. The general public can be protected by establishing burning guidelines that will prevent the burn from becoming a health hazard to the public.

19.c ENVIRONMENTAL EFFECTS (Cont'd)

When compared to conventional response methods and to beach cleanup, in-situ burning can reduce the number of people required to clean the beaches, and reduce the injuries associated with this hazardous work. By eliminating the oil at the source of the spill, contact with oil by marine birds and mammals can be reduced. Burning the oil to minimize beach impact will reduce the waste generated by conventional beach cleanup. While generating substantial amounts of combustion by-products, mostly carbon dioxide, water, and particulates, in-situ burning reduces the amount of VOCs evaporating from the spilled oil.

Since in-situ burning of oil has the potential to reduce the destructive impact of oil spills, and since the risk it poses to the responders and to the population downwind are, under most circumstances, acceptable. It is acceptable as one of the response options available to combat future oil spills.

As with all response methods, the environmental tradeoffs associated with in-situ burning must be considered on a case-by-case basis and weighed with operational tradeoffs. In-situ burning can offer important advantages over other response methods in specific cases, and may not be advisable in others, depending on the circumstances of a spill. In general, these are some of the pros and cons of ISB:

Pros:

- In-situ burning is one of the few response methods that can potentially remove large quantities of oil from the surface of the water with minimal investment of equipment and manpower.

- Burning may offer the only realistic means of removal that will reduce shoreline impacts in areas where containment and storage facilities may be overwhelmed by the sheer size of a spill, or in remote or inaccessible areas where other countermeasures are not practicable.

- If properly planned and implemented, in-situ burning may prevent or significantly reduce the extent of shoreline impacts, including exposure of sensitive natural, recreational, and commercial resources.

- Burning rapidly removes oil from the environment, particularly when compared to shoreline cleanup activities that may take months or even years to complete.

- In-situ burning moves residues into the atmosphere, where they are dispersed relatively quickly.

- Control of burn activities is relatively simple, provided containment is appropriate.

19.c ENVIRONMENTAL EFFECTS (Cont'd)

Cons:

- In-situ burning, when employed in its simplest form, generates large quantities of highly visible smoke that may adversely affect humans and other exposed populations downwind.

- Burn residues may sink, making it harder to recover the product and to prevent the potential exposure of benthic (bottom-dwelling) organisms.

- Plant and animal deaths and other adverse biological impacts may result from the localized temperature elevations at the sea surface. While these affects could be expected to occur over a relatively small area, in specific bodies of water at specific times of the year, affected populations may be large enough or important enough to reconsider burning as a cleanup technique.

- The long-term effects of burn residues on exposed populations of marine organisms have not been investigated. It is not known whether these materials would be significantly toxic in the long run.

- The burn must be carefully controlled in order to maintain worker safety.

ISB Comparisons

The Newfoundland Offshore Burn Experiment (NOBE), so far the largest-scale experimental in-situ burn, took place on August 12, 1993, offshore of Newfoundland, Canada, and was organized and coordinated by Environment Canada. During each of two test burns, crude oil was poured into a U-shaped fire-proof boom, and ignited. The first test burn lasted for an hour and a half, the second for about an hour, with an average burning rate of 200 barrels of oil per hour observed during both burns.

Table 1, below, compares the rate of emissions generated by the NOBE test burns to typical rates of emissions from slash burns of agricultural debris and other emission sources, such as woodstoves and power plants. Most of the information in this table was produced by Dr. Ron Ferek of the University of Washington in Seattle. Dr. Ferek assumed an oil burning rate during the NOBE burns of 200 barrels per hour.

In Table 1, the Average Emission Factor is the quantity in grams of a particular substance, such as CO2, emitted when 1 kilogram of oil was burned during NOBE. Emission Rate is the rate of emission of a particular substance measured during NOBE, in kilograms per hour. The Comparable Emissions column displays the magnitude or number of other emission sources that would produce about the same amount of a given substance as was generated by burning 200 barrels of oil during NOBE. For example, a 2-acre slash burn would generate about as much CO2 as burning 200 barrels of oil.

19.c ENVIRONMENTAL EFFECTS (Cont'd)

Substance	Average Emission Factor for NOBE (g/kg fuel burned)	Emission Rate (kg/hr)	Comparable Emissions from Other Known Sources
CO2	2,800	75,600	Approx. 2-acre slash burn
CO	17.5	470	Approx. 0.1-acre slash burn or ~1,400 wood stoves
SO2	~15	405	7,400 kg/hr. (avg. coal-fired power plant)
Total smoke particle	150	4,050	Approx. 9-acre slash burn or 58,000 wood stoves
Sub-3.5-micrometer smoke particle	113	3,050	Approx. 9-acre slash burn
Sub-3.5-micrometer soot	55	1,480	Approx. 38-acre slash burn
PAHs	0.04	1.1	Approx. 7-acre slash burn or ~1,800 wood stoves

References

You can learn more about NOBE by reading the following reference:

Fingas, M.F., G. Halley, F. Ackerman, R. Nelson, M.C. Bissonnette, N. Laroche, Z. Wang, P. Lambert, K. Li, P. Jokuty, G. Sergy, W. Halley, J. Latour, R. Galarneau, B. Ryan, P.R. Campagna, R.D. Turpin, E.J. Tennyson, J. Mullin, L. Hannon, D. Aurand and R. Hiltabrand, "The Newfoundland Offshore Burn Experiment", in Proceedings of the 1995 International Oil Spill Conference, American Petroleum Institute, Washington, D.C., pp. 123-132, 1995.

You can learn more about Dr. Ferek's research from:

Ross, J. L., R. J. Ferek, and P. V. Hobbs. 1996. Particle and Gas Emission from an In Situ Burn of Crude Oil on the Ocean. Journal of the Air and Waste Management Association: 46 251-259.

19.d SAFETY PROVISIONS

Safety Considerations

Due to the intense heat, the resulting smoke plume usually rises several hundreds to several thousands of feet.

If…	Then…
The wind is blowing away from a populated area	A burn may be able to be conducted immediately adjacent to the area.
The wind is blowing toward a populated area	There must be reasonable assurances that people will not be exposed to excessive concentrations of pollutants.

The risk that in-situ burning may pose to the general public located downwind should be considered before any burning is initiated. In most cases, three miles from populated areas is considered to be a reasonably safe distance, in case the plume dips down to land.

Burning may be done under stable wind conditions, however, data on the inversion layer should be known. Optimal wind conditions are 5-10 knots preferably not exceeding 20 knots. Burning may be done with winds exceeding 20 knots, however the lofting effect will be reduced, and the smoke may hug the ground. This decision is acceptable if the plume is not expected over a population center.

The responsible party should implement a site safety work plan with a section specifically addressing in-situ burning. Personnel conducting the burn should be trained, provided with the necessary protective equipment, and monitored as needed.

19.e CONDITIONS FOR USE

The Company incorporates the RRT IX Coastal Plan Enclosure 4800 California On-Water In-Situ Burn (ISB) Plan, 2008 (Plan) or the most current version by reference. The Company intends to follow the procedures outlined within the Plan that pertain to actions to be undertaken by the responsible party in the event of a spill. The **Incident Commander (IC) is responsible for activating in-situ burn approval procedures** as soon as possible during the response effort. The Planning Section Chief is responsible for collecting and submitting the necessary information. The IC alerts Logistics Section Chief and MSRC, interacts with the Coast Guard and OSPR representatives until a decision has been reached and notifies the Cleanup Supervisor to begin field application when approval is received.

CALIFORNIA ON-WATER IN-SITU BURN (ISB) PLAN

REGIONAL RESPONSE TEAM IX (RRT IX) COASTAL AREA PLAN

ENCLOSURE 4800

CALIFORNIA ON-WATER *IN-SITU* BURN (ISB) PLAN

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ENCLOSURE 4800

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Enclosure 4800a	Pre-Approval Zone – Letter of Agreement General Overview; Purpose; Authority; Scope; Geographical Boundaries; Protocols; Guidelines; Documentation, Monitoring and Evaluation; Amendments
Enclosure 4800b	Case-by-Case RRT Approval Required Zone General Overview; Background; Regional Philosophy; Authority; Annual Review; Case-by-Case Process; Air Quality Standards; Local Air Pollution Control Districts/Air Quality Management Districts; Violation of Containment Zone Standards; Trustee Agency Coordination; Observation and Monitoring; Procedures for a Case-by-Case Request
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ENCLOSURE 4800a

LETTER OF AGREEMENT (LOA)

Among

US COAST GUARD (USCG),

US ENVIRONMENTAL PROTECTION AGENCY (USEPA), US DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA),

And

US DEPARTMENT OF THE INTERIOR CONCERNING THE USE of

***IN-SITU* BURNING**

AS A RESPONSE METHOD TO OIL POLLUTION

FOR THE AREA 35-200 NAUTICAL MILES OFF THE CALIFORNIA COAST

PURPOSE

The Region IX Mainland Regional Response Team (RRT-IX Mainland) recognizes that mechanical recovery, *in-situ* burning and chemical dispersants are the three primary means of dealing with oil discharges into the waters of the United States. While mechanical removal is the preferred method, the RRT-IX Mainland recognizes that *in- situ* burning is a viable option in conjunction with, or in lieu of mechanical or other types of recovery. The purpose of this Letter of Agreement is to provide concurrence of the US Environmental Protection Agency (USEPA) representative, the US Department of the Interior (DOI) representative, and the US Department of Commerce (DOC)-National Oceanic and Atmospheric Administration (NOAA) representative for the use of *in-situ* burning for oil discharges on the waters within the jurisdiction of the RRT-IX Mainland 35-200 nautical miles off the Coast of California within the geographical boundaries described in Geographical Boundaries, below. This concurrence is given to the federally pre-designated US Coast Guard Federal On-Scene Coordinators (FOSC).

This agreement gives guidelines to allow the FOSC to use *in-situ* burning in a timely manner to: (1) prevent or substantially reduce a hazard to human life; (2) minimize the adverse environmental impact of the spilled oil, and (3) reduce or eliminate, the economic or aesthetic losses of recreational areas.

This agreement for pre-approval is necessary due to the time constraints under which burning is a viable option. In developing this pre-approval agreement, the environmental impacts associated with an on-water oil burn have been evaluated in relationship to other mechanical and chemical alternatives. It is the view of the signatories that the overall environmental benefits of *in-situ* burning out weigh the relative environmental costs, except in those circumstances noted in this agreement.

If the conditions for pre-approval are not met, selected representatives in the RRT-IX Mainland must be involved prior to commencing with any *in-situ* burn. In accordance with the provisions of the National Contingency Plan, this means that the concurrence of the US EPA representative to the RRT, in consultation with the natural resource trustee Federal agencies, is required. If the burn is being considered within the area 0-35 nautical miles off the California Coast, consultation with the State of Califomia representative to the RRT-IX Mainland is also required. If the burn is being considered within State waters, the concurrence of the State of California representative is required.

AUTHORITY

Subpart J of the National Oil and Hazardous Substances Pollution Contingency Plan (the National Contingency Plan or NCP) provides that the Federal On-Scene Coordinator (FOSC) with the concurrence of the US Environmental Protection Agency (USEPA) representative to the Regional Response Team (RRT) and the concurrence of the State with jurisdiction over the navigable waters polluted by the oil discharge, may authorize the use of *in-situ* burning of oil spills. The Commandant of the US Coast Guard has predesignated the USCG Captains of the Port under his jurisdiction as On- Scene Coordinators for oil spills, and has delegated authority and responsibility for compliance with Section 311 of the Federal Water Pollution Control Act (FWPCA), as amended, to them. The Governor of the State of California has delegated responsibility to coordinate State approval for proper usage of *in-situ* burning for control of oil spills within State waters to the State of California Office of Oil Spill Prevention and Response (OSPR), within the Department of Fish and Game (DFG). The USEPA has been delegated authority under Subpart J of the NCP to authorize use of *in-situ* burning for control of oil spills.

SCOPE

The USCG, USEPA, NOAA, and DOI agree that the physical removal of discharged or spilled oil from the water surface is the primary method of control. Furthermore, it is recognized that the most effective response to an oil spill may include a combination of mechanical recovery, *in-situ* burning and dispersant or other chemical use. As such, this Letter of Agreement sets guidelines under which *in-situ* burning may be used by the USCG Federal On-Scene Coordinator on or in Federal waters 35-200 nautical miles off the Coast of California - waters which are also within the boundaries of the Eleventh Coast Guard District.

GEOGRAPHICAL BOUNDARIES

The geographical area covered by this Agreement is the Pacific Ocean at a distance 35- 200 nautical miles from the Mainland California Coast.

PROTOCOLS

As attested to by the signatures set forth below, the USEPA, the USDOC-NOAA, and the USDOI agree with the USCG that the pre-designated USCG FOSC may consider the use of *in-situ* burning of oil discharges, as defined in the NCP, in accordance with the following guidelines.

GUIDELINES

1. As per the NCP, 40 CFR Part 300.120, the authority to use *in-situ* burning of oil discharges in accordance with this Agreement is vested in the pre-designated USCG FOSC. The pre-designated USCG FOSCs along the California Coast are the Captain of the Port of San Francisco, the Captain of the Port of Los Angeles-Long Beach, and the Captain of the Port San Diego. This authority may not be delegated.

2. The USCG FOSC may authorize the use of *in-situ* burning without obtaining the concurrence of the USEPA representative or the Federal natural resource trustee representatives to the RRT-IX Mainland, when, in the FOSC's judgment, human life is threatened or when all of the following three conditions are met:

   a. *In-situ* burning is a viable option for oil removal; and

   b. The potential plume caused by the burn will not expose unprotected human populations to more than 150 ug/m3 of particulates less than 10 microns in diameter averaged over a one-hour period as determined by the FOSC (on- scene worker safety shall be addressed by the Site Safety Plan, meeting OSHA requirements); and

   c. The plume or heat from the burn will not result in greater impact to sensitive wildlife resources than would the spilled oil (*in-situ* Burning Checklist information shall be compiled by the FOSC in advance of the burn).

3. Mechanical recovery equipment shall be mobilized on scene, when feasible, as a backup capability should *in-situ* burning prove ineffective.

4. Wind patterns will be predicted by the NOAA SSC, and will be monitored in real time prior to and during the burn by the FOSC. If the prevailing wind direction is either parallel to the shore or away from the shore, it will be assumed that there is no unprotected human exposure above 150 $\mu g/M^3$ of particulates less than 10 microns in diameter averaged over a one-hour period as determined by the FOSC.

5. A designated Federal agency representative will be on scene to observe the burn and the prevailing wind direction. If practical, so as not to create an unnecessary delay, monitors from the DOI and DOC-NOAA will be provided to observe the burn and record results. Any of these observers/monitors has the authority to halt any burn if he observes that the conditions in Paragraph 2 are no longer true. The protocol for observing and halting a burn is described in the *In-situ* Burning Monitoring Plan (Attachment III).

6. In any case where the circumstances do not meet the criteria set forth in Paragraph 2, the pre-authorized use of *in-situ* burning is not authorized.

7. If the FOSC feels *in-situ* burning should be used in areas not met by Paragraphs 2.A, 2.B, 2.C, or in areas not part of the pre-authorized geographical boundaries, the FOSC must request approval from the pertinent RRT-IX Mainland member agencies, in accordance with the NCP requirements. The FOSC shall submit the request along with the required information listed in the provided *in-situ* Burning Checklist.

8. Burning will be conducted by trained professionals using recognized techniques and technology.

9. Burning will be conducted in a way that allows for rapid controlling and stopping of the burn to account for wind shifts. When a decision is made to conduct a burn operation, the FOSC shall notify the USCG Co-Chair for the RRT-IX Mainland. The Co-chair shall notify the signatories of this agreement immediately.

10. Contained burning is recognized as the preferred method of burning, using burn resistant boom or similar technology. The ignition of slicks is not permitted if there is a significant chance of igniting the source or if there is a significant hazard to adjacent structures or vessels.

DOCUMENTATION, MONITORING AND EVALUATION

1. NOTIFICATION AND REPORTING TO THE RRT. If the FOSC decides to conduct an *in-situ* burn, a description of the operation shall be documented and submitted to the RRT-IX Mainland as soon as possible following the burn. Typical information to be included is listed in Attachment II (an example of the *In-situ* Burning Plan from the Oceania RRT), Attachment III (an example of the *In-situ* Burning Monitoring Plan from the Oceania RRT), and Attachment IV (an example of the *In-situ* Burn SiteSafety and Health Plan from the Oceania RRT). These appendices must be modified as appropriate so that information provided is geographically pertinent to the given *in-situ* burn conditions. The evaluation noted in Paragraph 3 of this section will be completed as part of the FOSC Report. An FOSC Report shall be required whenever an *in-situ* burn is conducted.

2. DOCUMENTATION. The FOSC will ensure that all information described in the previous Paragraph 1 is documented.

3. MONITORING. The Federal natural resource agencies and the USCG will conduct monitoring of the *in-situ* burn in general accordance with the example *In-situ* Burning Monitoring Plan, attached as Attachment III. As part of the Monitoring Plan, oil samples shall be taken prior to the burn and samples of any floating residue shall be taken following the burn.

4. EVALUATION. The FOSC shall include a full evaluation of all *in-situ* burning applications in any FOSC report following an incident. The report should comment on burn (s), supported by visual record (video, photos) and parties. Data should include estimates of product and analysis of oil residue.

   Federal resource agencies shall evaluate the *in-situ* burning to assess environmental and endangered species impacts after ignition.

5. NOTIFICATION OF STATE AGENCIES. The State of Califomia representative to the RRT-IX Mainland (representative from OSPR, DFG) will be notified, along with the other RRT representatives in accordance with Paragraph 1. of this Section. The State representative will be responsible for notifying other appropriate State and, local agencies.

6. OTHER NOTIFICATIONS. The USCG is responsible for notification of neighboring regions (RRT-Region X) and Mexico - depending upon the location of the *in-situ* burn site.

AMENDMENTS

This Letter of Agreement will be reviewed annually and amended as appropriate.

This Letter of Agreement may be amended in writing in whole or in part as is mutually agreeable to all parties thereto.

This Letter of Agreement may be canceled by any party hereto upon thirty (30) days written notice to the other parties.

	DATE
//s// KATHLEEN G. SHIMMIN USEPA REGION IX CO-CHAIR, RRT-IX MAINLAND	4/10/97
//s// WILLIAM H. BOLAND CAPTAIN, US COAST GUARD CO- CHAIR, RRT-IX MAINLAND	4/10/97
//s// DAVID M. KENNEDY US DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION REPRESENTATIVE TO THE RRT-IX MAINLAND	4/10/97
//s// PATRICIA SANDERSON PORT US DEPARTMENT OF THE INTERIOR REPRESENTATIVE TO THE RRT-IX MAINLAND	4/10/97

Attachment I	Overview of *In-situ* Burning as an Oil Spill Response
Tool Attachment II	*In-situ* Burning Plan [this appendix is an example of the information pertinent to *in-situ* burning; it was developed for Oceania and must be adapted for the area off the California Coast]
Attachment III	*In-situ* Burning Monitoring Plan [this is an example from Oceania, and it must be adapted for the area off the California Coast]
Attachment IV	Site Safety Plan for *In-situ* Burning - [Oceania Site Safety Plan included as example; some language has been adapted for the area off the California Coast]
Attachment V	*In-situ* Burn Boom Operations Procedures [Oceania version included as example; Region IX-Mainland version to be developed by those involved in Unified Command Operations phase]
(Not included)	Resolution of 1997 Questions Re LOA

ENCLOSURE 4800b

IN-SITU BURN CASE-BY-CASE RRT APPROVAL REQUIRED ZONE OVERVIEW AND CASE-BY-CASE DECISION PROCESS

BACKGROUND

There are presently two commonly recognized approaches to remove significant quantities of spilled petroleum from marine surface waters. The most common technique involves mechanical skimming devices which, for large spills, typically remove less than 20% of the spilled petroleum (National Research Council, 1989). The second and more controversial method is the use of chemical agents (*e.g*., dispersants) to disperse oil into the water column. The effectiveness of chemical dispersants has been reported to range from zero to 100% depending on the type of petroleum spilled, the dispersant used, and the approach employed to estimate effectiveness (National Research Council, 1989).

Burning has distinct advantages over other oil spill countermeasures. It offers the potential to rapidly convert large quantities of oil into its primary combustion products with a small percentage of other unburned and residue byproducts (Evans *et al*., 1992). This technique could be the most effective of all in dealing with a large spill at sea and in removing large quantities of oil from the water environment before it comes ashore (S.L. Ross Environmental, 1990). Until recently, this response technology has not been regularly used, due largely to the lack of understanding of the combustion products and the principles governing the combustibility of oil-on-water (Evans *et al*., 1992) as well as the lack of the equipment necessary to carry out a burn within the window of opportunity. Much of the renewed interest in *in-situ* burning has resulted from years of study of both the dynamics of burning oil on the water and the combustion products produced during an *in-situ* burn.

In-situ burning removes the surface oil by driving much of it into the atmosphere in the form of combustion gases and soot. As such, *in-situ* burning reduces the environmental threat and impacts posed by on-water spills but only at the cost of increasing the potential threat posed by the airborne plume. *In-situ* burning, however, does have the potential to accelerate cleanup of spilled petroleum on the surface of the water and at the same time reduce the risk of petroleum-related impacts on environmentally sensitive areas. In the case of California, environmentally sensitive areas include the productive intertidal regions, tidal inlets, tidal marshes and other wetland areas of the coastal islands and mainland, and the surface waters where endangered marine mammals and large concentrations of sea birds might exist. The problem for decision makers is to compare the effects of burning versus not burning and choose the option that provides the greatest net benefit to the environment, without causing undue public health impacts. Every oil spill situation is unique. The weather and sea state conditions that are most favorable for mechanical cleanup (calm winds and sea state) are not favorable for dispersants. However, dispersants might be the best response option in remote off- coast areas with choppy seas. Although limited by the need to first contain the oil, *in- situ* burning might be the best option in areas where it is imperative to quickly remove large quantities of oil to protect on-water resources, such as within the sea otter range or the Farallon Islands. It is important that all response options be available for use at the time of a spill so that the best and most appropriate response can be used.

REGIONAL PHILOSOPHY

The primary object of oil spill abatement and cleanup is to reduce the adverse effect of spilled oil on the environment. Physical removal and subsequent disposal or recycling/re-use is the preferred method. However, mechanical recovery may be limited by equipment capability, weather and sea state, storage and disposal problems, and spill magnitude. Use of *in-situ* burning may be considered by the FOSC when the preferred recovery techniques are inadequate and *in-situ* burning will lessen the environmental impacts of the spill.

AUTHORITY

The National Contingency Plan, Section 300.910 authorizes the FOSC, with the concurrence of the EPA representative to the RRT and, as appropriate, the concurrence of the State representative to the RRT with jurisdiction over navigable waters threatened by the release of discharge (of oil) and in consultation with the DOC and DOI natural resource trustees, when practicable, to authorize the use of *in-situ* burning on a case- by-case basis. The Commandant of the USCG has predesignated the USCG Captains of the Port under his jurisdiction as Federal On-Scene Coordinators for oil spills, and has delegated authority and responsibility for compliance with Section 311 of the Federal Water Pollution Control Act to them. The USEPA has been delegated authority under Subpart J of the NCP to authorize use of *in-situ* burning for control of oil spills.

California Government Code Section 8670.7(f) delineates the Administrator of the Office of Spill Prevention and Response, Department of Fish and Wildlife as having the State authority over the use of all response methods, including, but not limited to, *in-situ* burning. The Governor of the State of California has delegated state representation on the RRT to the Administrator of the OSPR.

ANNUAL REVIEW

It will be the charge of the RRT ART Working Group to annually review the use of *in-situ* burning and report its findings to the RRT at a scheduled meeting. The group will be responsible for the administrative upkeep of the contact list as well as insuring that the plan is updated to reflect any changes in regional polices (including those of Region X, the state of Oregon and Mexico), and technological advances.

CASE-BY-CASE AREAS

Case-by-case areas are defined as those areas not designated within the preapproval zones. This includes all marine waters within 35 miles off the California coast as well as areas of special jurisdiction as detailed above. The FOSC will obtain approval from the EPA representative to the RRT and the California Department of Fish and Wildlife (CDFW) representing the State of California. Whenever fish or wildlife resources may be affected, the EPA and State representative to the RRT may consult with the DOI and DOC natural resource trustee agencies.

CASE-BY-CASE PROCESS

If *in-situ* burning is to be successful it must typically be undertaken within a small window of opportunity following the release of oil, which often can be measured in hours. In order to accomplish such a task, the FOSC/UC must have a mechanism at its disposal to expedite the *in-situ* burning use decision. An accelerated review process will be conducted by the Planning Section (generally, the ART Technical Specialist(s) within the Environmental Unit) of the ICS and is designed to provide the FOSC/UC with sufficient information to determine if an *in-situ* burning use request should be made and to provide members of the RRT with sufficient information to approve or disapprove within the first two hours of its receipt. The Administrator of the OSPR is committed to ensuring that stakeholders, including State and Federal trustee agencies as well as local air districts, have input into any recommendation made for the use of *in-situ* burning. As the review process will be conducted by the Planning Unit, it is within this structure that the stakeholders will fit into the ICS. There is also a need for the petroleum industry to commit and stock necessary resources to successfully implement a timely *in-situ* burn response. These resources will be secured through the Operations Section of the ICS, with which the Planning Section will also coordinate on *in-situ* burn decision-making and operational approach.

AIR QUALITY STANDARDS

Since burning will almost always provide for the greatest degree of environmental protection for on-water and nearshore resources (given the ability to remove on-water oil so quickly), a key issue is for the FOSC/UC to ensure that substances from an *in-situ* burn do not have a significant adverse impact to human health. The primary substance of concern is PM_{10}, the small particulate matter contained in the smoke plume. It is generally accepted that other substances dissipate, reaching background levels well before PM_{10} does. An *in-situ* smoke plume usually stays well above ground level hundreds to thousands of feet but can reach the ground under certain atmospheric conditions. An action level for PM_{10} has been established for these guidelines. It is recommended that *in-situ* burning should not be approved if there is significant risk that the standard would be exceeded where people could be exposed. As a general guideline, a decision to burn should not be made where humans would be exposed to concentrations greater than 50 $\mu g/m^3$, averaged over a 24-hour period. However, the FOSC/UC must also consider the risk to humans from the volatiles that evaporate since in some circumstances, the adverse impact to humans may be greater from the volatiles than from the particulate matter generated from a burn.

LOCAL AIR POLLUTION CONTROL DISTRICTS/AIR QUALITY MANAGEMENT DISTRICTS AND QUICK APPROVAL ZONES

Within California, local air districts bear the primary responsibility for control of air pollution from all sources except motor vehicles, which remain the responsibility of the Air Resources Board (California Health and Safety Code 4000, *et seq*.). Air districts are required to adopt and enforce rules and regulations and to prepare plans which make reasonable provisions to achieve and maintain State and Federal ambient air quality standards in all areas affected by emission sources under their jurisdiction, as well as enforcing all applicable provisions of State and Federal law. California has several different air basins within the State and each basin has an "attainment zone standard" that is to be attained and maintained within the air basin. If attainment zone standards are exceeded, districts can impose several different regulatory mechanisms aimed at reducing air emissions and bringing the air basin back into compliance.

Under California law, the Administrator is responsible for the use of all ARTs in response to an oil spill in marine waters, and he or she serves as the State representative on the RRT. During an oil spill, the Air Pollution Control Officer and/or staff members will be requested to take part in *in-situ* burn use decision through their participation in the ICS Planning Unit's ART section. The air districts can provide meteorological data and insight to air/flow dynamics and dispersion patterns that are necessary for the FOSC/UC to make appropriate *in-situ* burn decisions in a timely manner.

VIOLATION OF CONTAINMENT ZONE STANDARDS

Local air districts will be concerned if an *in-situ* burn results in the exceeding of local ambient air quality standards, as this could jeopardize their attainment status. The USEPA issued a letter indicating that *in-situ* burning as an emergency response would be exempt from the general conformity requirements and may be considered as an exceptional event when considering the area's overall compliance status. A copy of this letter can be found in Appendix 1. This letter simply makes clear that there is a mechanism to exclude the *in-situ* burning air quality impacts from the data used to determine an area's ambient quality standard attainment status.

TRUSTEE AGENCY COORDINATION

Marine Sanctuaries

Marine Sanctuaries comprise a significant portion of the coastal waters off California. The use of *in-situ* burning in the Sanctuaries will require coordination with the Sanctuary Managers and their staff. Though Sanctuaries are represented by the Department of Commerce delegate on the RRT, the Sanctuary Manager and/or staff members will be requested to take part in the *In-situ* Burning Decision-Making process through their participation in the ICS Planning Unit's Alternative Response Technology (ART) section. The Sanctuaries can provide resource data and insight necessary to make decisions that may otherwise not be available to the UC in a timely manner.

OBSERVATION AND MONITORING

Air quality monitoring is not a requisite for the approval of an *in-situ* burn use. However, a case-by-case approval of *in-situ* burning should be done in a manner that fully considers any potential impact to public health and safety. Monitoring will be instituted as quickly as feasible after the approval to burn. Lack of a monitoring program will not delay a burn after the RRT gives approval.

Until recently, there has not been a standardized approach to monitoring alternative response technology use. A working group of federal scientist and oil spill responders has recently developed the Special Monitoring of Advanced Response Technologies (SMART) program to monitor the effectiveness of alternative response technologies including dispersants. The *in-situ* SMART program provides a process to rapidly gather information on the emissions from an *in-situ* burn and provide the information to the UC in a timely manner. Once this program is finalized, it will provide a practical and cost effective approach to monitoring and should be incorporated into the *in-situ* burn policy.

PROCEDURES FOR A CASE-BY-CASE REQUEST

1. The FOSC (via the ART group within the Planning Section of the ICS) contacts the proper agency representatives on the RRT (Attachment VIII) and informs them that a request to use *in-situ* burning may be forthcoming. The FOSC will have the RRT remain on standby for the conference call in step 3.

2. The ART group of the Planning Section completes the *In-situ* Burning Decision- Making Process submits summary of findings and information to FOSC/UC on Case-by-Case Checklist Form and Supplemental Information Form.

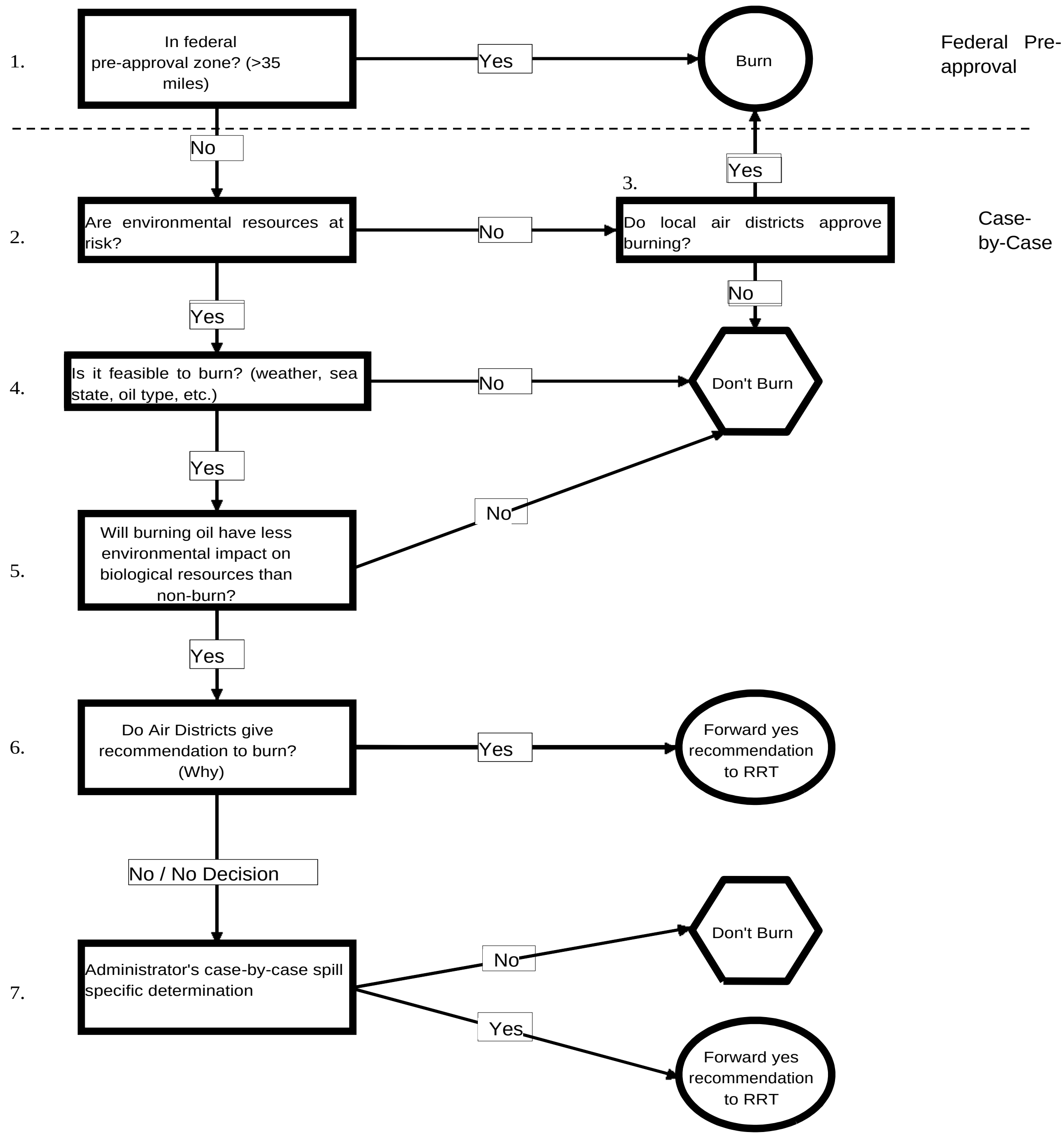
3. If the FOSC, based on information submitted by the ARTgroup, decides that a request for *in-situ* burning is appropriate, the FOSC schedules conference call with RRT representatives or alternates at first reasonable opportunity.

4. The FOSC/UC/RRT conference call is conducted and a Yes/No decision made based on information provided on FOSC Checklist, Supplemental Information Form or any other sources requested by the RRT, including information from the local air district.

5. The ART group of the Planning Section will communicate the RRT decision to the Operations Section and continue coordinating with Operations if a YES Decision has been reached.

FIGURE 1

PROPOSED IN-SITU BURNING DECISION-MAKING PROCESS DECISION TREE



Explanation of Figure 1 Decision-Making Points

The following discussion addresses the seven decision-making points that are a part of the approval process for the use of *in-situ* burning in marine waters. The discussion briefly identifies the nature of each point and also provides the rationale for each decision point. The number points correspond to the numbers aside the boxes in the *In- situ* Burning Decision Tree (previous page).

1. If the proposed zone of *in-situ* burn is 35 miles off-shore and falls within the criteria of the Federal pre-approval zone, then an *in-situ* burn has already been federally authorized by the RRT. State and local jurisdictions will be notified consistent with the provisions outlined in the LOA.

2. Most of the marine waters off California must be considered environmentally sensitive areas due primarily to the presence of foraging seabirds, migrating marine mammals, offshore islands (with bird colonies and marine mammal rookeries and haul outs), and the productive rocky intertidal and subtidal regions and associated kelp forests.

3. This specific path of the decision-making process would be rarely taken but it is included for purposes of completeness. There are no foreseeable situations under which an oil spill would not pose a threat to environmental resources. If the unlikely situation occurred where environmental resources were not threatened, the FOSC/UC would rely heavily on the recommendation of the local air districts for a burn/no burn decision.

Local Air District Quick Approval Zones

Local Air Districts may have stipulated areas of their offshore air jurisdiction where they will consider that area as falling into a "Quick Approval Zone" <u>if prevailing winds during a proposed *in-situ* burn operation are blowing offshore or parallel to shore</u>. These distances from shore for each Air District are shown below:

Air District	**Quick Approval Zone (minimum distance from shore)**
North Coast AQMD	≥ .5 miles from shore
Mendocino AQMD	≥ .5 miles from shore
Bay Area AQMD	≥ .5 miles from shore
Northern Sonoma AQMD	≥ .5 miles from shore
Monterey Bay Unified	No Quick Approval Zone
San Luis Obispo County	≥ 3 miles from shore
Santa Barbara County	≥ 3 miles from shore
Ventura County APCD	≥ .5 miles from shore
South Coast AQMD	≥ 8 miles from shore
San Diego AQMD	≥ .5 miles from shore

4. Weather and sea state conditions can greatly affect the ability to burn oil on water. A minimum burn thickness is necessary to sustain combustion, so containment is always an issue. As this will mostly likely be accomplished by booming operations, those weather and sea state conditions that limit booming operations will operationally limit the ability to burn. As a general guideline, wave heights above 4-5 feet and wind speeds between 15-20 knots are generally the upper limits for boom operations.

5. The selection of *in-situ* burning as a cleanup/response tool would consider whether the spilled petroleum on the surface of the water (and eventually on the shoreline), and/or dispersal into the water column, would pose greater threats to natural resources than would ISB combustion products in the airstream. This consideration includes evaluation of the resources at risk both on the surface of the water and within the surface microlayer and airstreams, by season, and evaluates how exposure to oil might affect the exposed species at a population level. All local, state and federal trustee agencies will work within the UC to determine if an *in-situ* burn will provide a net environmental benefit and result in the overall greater protection of highly sensitive environmental resources.

6. Meteorological and other air dispersion characteristics will be an important component in the local APCD recommendations and decisions regarding an incident-specific *in-situ* burn. Although vertical mixing is not usually a concern on the open water, plume dynamics can change if the wind direction changes and the plume contacts land. For purposes of a case-by-case determination, the local air districts will provide their best professional judgment with respect to potential public health concerns and assist the ART group in forwarding a recommendation to the FOSC/UC.

7. There may be times when *in-situ* burning may be considered when local air districts are not in full support of the operation. Such circumstances would include the following:

   a) If onshore contact with human populations is expected to be small enough to limit the level of concern; or

   b) The FOSC/UC needs to take advantage of the rapid elimination of oil that *in- situ* burning affords, and before weather conditions change in a manner that leads to very difficult cleanup and extensive environmental damage.

   If the local air districts do not recommend the use of *in-situ* burning, they must document their reasons and provide those for review by the FOSC/UC and possibly the RRT. This documentation (the supplemental case-by-case form can be used) should include projected air mixing capability, any modeling and/or air quality exposure information and if concerns can be alleviated by means other than a non-burn decision (*e.g.*, having people stay in houses for duration of burn, burning at night, burning at non-peak hours).

8. Once the RRT IX Case-by-Case Checklist is completed and a decision for *in-situ* burning use is generated, the FOSC/UC will forward their request, along with any requested data, to the RRT via a phone conference call. (The ART Technical Specialists within the Planning Section can assist with briefings, before-and-after documentation, communications with trustee agencies and local air districts, and any necessary coordination with the Operations Section). Based on the information provided, the RRT will provide an approval/disapproval decision (Appendix IX) to the FOSC regarding the incident-specific use of *in-situ* burning.

ENCLOSURE 4800 ATTACHMENT I

OVERVIEW OF *IN-SITU* BURNING AS AN OIL SPILL RESPONSE TOOL

Burning has distinct advantages over other spill response tools. First, it offers the potential to rapidly remove large quantities of oil from the environment. *In-situ* burning could potentially remove as much oil in one day as mechanical methods could in one month. In addition, *in-situ* burning could prevent a large amount of shoreline contamination and injury to biota by removing oil before it spreads and moves to other areas. Second, *in-situ* burning requires less equipment and personnel than do other response tools. It can be used in areas where other methods cannot because of distances and lack of infrastructure. Third, compared to mechanical recovery, burning significantly reduces the volume of material requiring disposal. Mechanically recovered oil still requires transport, storage, and proper disposal. This involves equipment, personnel, time, money, and an approved Resource Conservation and Recovery Act (RCRA) disposal site. Often, these resources are not available in sufficient quantities when large spills occur.

Burning also has disadvantages. The most obvious is the large black smoke plume that is produced by burning oil and concerns about potential associated health effects. Additionally, oil must be a minimum thickness of 2 to 3 millimeters (mm) to burn efficiently; thin slicks will not burn. This can be partially countered with the use of fire booms to concentrate oils into thicker slicks before burning. However, as oil spreading and dispersion take place over time, the ability to achieve this minimum thickness becomes increasingly difficult.

In-situ burning is considered a trade-off between the ability to remove large amounts of spilled oil from the water surface in a short period of time and the human health effects and ecological impacts of burn by-products. Preliminary data from test burns and actual spills indicate that airborne emissions are not a serious concern at distances greater than a few miles, given the proper atmospheric conditions.

OPERATIONAL LIMITATIONS

1. FIRE BOOM. The application of *in-situ* burning requires the physical collection and containment of oil to maximize the efficiency of the burning process and to provide a means to control the burn. Generally, this is accomplished by the use of a fire boom or some other type of boom.

2. IGNITION. Heavy oils require longer heating times and a hotter flame to ignite compared to lighter oils. Many ignition sources can supply sufficient heat. These include pyrotechnic igniters, laser ignition systems, and aerial ignition systems. Each has pros and cons to their use. Whichever method is used, considerations of safety and efficiency must enter into the decision process.

3. OIL THICKNESS. The rule of thumb of *in-situ* burning is that oils can be effectively burned if they are consistently 2 to 3 mm thick.

4. GATHERING. Igniting weathered oil is generally not a problem with most ignition sources because they have sufficient temperature and burn time to ignite most oils. Weathered oil requires a longer ignition time and higher ignition temperatures.

5. EMULSIFICATION. The effect of water content on oil ignition is thought to be similar to that of weathering. It is certain that oil containing some water can be ignited and burned. It is suspected that burning may break down the water-in-oil emulsion. If a burn can be started, then water content is likely not a problem.

SAFETY CONCERNS

1. FIRE HAZARD. Care must be taken that the burn be controlled at all times to ensure the safety of personnel and property. This precludes burning at sources such as tankers, ships, or tank farms unless means are taken to ensure thatthe flame cannot propagate from the burn location to the source.
2. IGNITION HAZARD. Personnel and equipment involved in ignition of the oil slick must be well coordinated. Weather and sea conditions need to be kept in mind and adequate safety distances be kept at all times. Specialized ignition equipment, unknown fire behavior and uncertain flask-points introduce safety risks.

3. VESSEL SAFETY. Burning at sea may involve the use of several vessels operating in close proximity, perhaps at night or in conditions of poorvisibility. These conditions are hazardous by nature and generally require training and close coordination. Maneuverability while towing boom or positioning other containment equipment will require skilled personnel.

4. TRAINING. Training of personnel to operate equipment for *in-situ* burning should be developed to minimize the risk of injury and accident. Training should meet all applicable OSHA regulations and guidelines. Workers may require respiratory protection and protective clothing, based on risk evaluations by trained site safety or industrial hygiene personnel.

Other hazards can include the exposure of personnel to extreme heat conditions, smoke and fumes; working under time constraints or extended periods of time.
Personnel involved with burning operations must be well briefed on the plan of operations, with site safety stressed, and must be notified of all changes from the approved burn plan. The need for burning could be questioned and should be reconsidered if conditions (*e.g*., weather, operations, equipment) pose a threat or danger to human health and safety, or facilities. This section is not inclusive of all safety concerns. As more knowledge is gained from burning, it is most likely that additional safety concerns will be identified. The site safety plan shall specify worker safety practices and equipment requirements.

HUMAN HEALTH/TOXICITY CONCERNS

Many experts believe that the human health risk from oil fire smoke is relatively small, particularly when compared to health and safety risks associated with mechanical remediation. This assessment, coupled with the likelihood that the lighter fraction of a spill will evaporate unless burned (thereby imposing its own set of health concerns) suggests that the risk is worth considering.

Burning oil produces a visible smoke plume containing smoke particulates, combustion gases, unburned hydrocarbons, residue left at the burn site and other products of combustion. It also results in the evaporation and release of volatile compounds from the oil. There will be public health concerns related to the chemical content of the smoke plume and the downwind deposition of particulates. It should be noted that <u>not</u> burning an oil spill also introduces its own air quality concerns. Analysis of the physical behavior of spilled oil has shown that 50 percent of a light crude oil spill can evaporate fairly readily, and it is the acutely-toxic lighter fractions of a crude oil mix that quickly move into the atmosphere.

Results of recent burn tests indicate that burning *in-situ* does not yield significant emissions above that expected for similar types of combustion, such as forest fires. Many human health experts feel that the most significant human health risk resulting from *in-situ* burning is inhalation of the fine particulate material that is a major constituent of the smoke produced. The extent to which these particles present a health risk during an *in-situ* burn depends on the concentration and duration of exposure. It is important to remember that particulates in these concentrations are so small that they do not settle readily. They will be carried by the prevailing wind over large distances, over which their concentrations will rapidly decline.

Polynuclear aromatic hydrocarbons (PAHS) are a group of hydrocarbons produced during *in-situ* burning. They are found in oil and oil smoke, where their relative concentrations in the latter tend to be higher than in the oil itself. Possible carcinogenicity of some members make this group a serious health concern, although it is generally long-term exposure to the higher molecular-weight PAHs that is the basis for concern. Sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) are eye-and-respiratory- tract irritants that are produced by oil combustion. Concentration of PAHs decline downwind as smoke from the fire is diluted by clean air. The concentrations of other by-products of burning oil (*i.e.*, combustible gases) also decline downwind.

ECOLOGICAL EFFECTS

Potential ecological impacts resulting from the use of *in-situ* burning have not been extensively studied. Whether *in-situ* burning does result in ecological impacts cannot be directly determined based on existing information. Potential biological impacts are the subject of planned field and laboratory tests.

The surface area affected by burning oil is usually small relative to the total surface area of a given body of water, relative to the total depth of the water body, and is less than the area impacted by the oil slick. This does not preclude adverse ecological effects.
Contamination at the sea surface could possibly affect certain unique populations as well as organisms that use surface layers of the water column at certain times to spawn or feed. However, because the distribution of these populations is patchy, these impacts would most likely be localized. The same populations would also be adversely affected to some degree by an oil slick. The plume or heat from the burn will not result in greater overall impact to populations.

The residual material of an *in-situ* burn is a hydrocarbon compound with little structural change other than the loss of the more volatile groups. It resembles weathered oil of the same source type.

Burn residues could be ingested by fish, birds, mammals, etc., and could be a source of fouling of wildlife. However, it should be noted that the water surface is already adversely affected by oil, and any additional adverse effects from burning would be comparatively small. The extent of these spatial and temporal effects would be expected to be much less severe than those from a large oil spill being addressed only by traditional mechanical methods. Burn residue should be removed as soon as possible, and this could be accomplished using traditional spill containment and cleanup equipment and techniques.

Measurements conducted during test burns show that water temperature is not raised significantly, even in shallow confined test tanks. Thermal transfer to the water is limited by the insulating oil layer and is actually the mechanism by which the combustion of oil slicks is extinguished.

Except where conditions of pre-approval are met, the appropriate State and the Federal trustees (*e.g*., NOAA, DOI) are to be consulted before using *in-situ* burning on oil spills. They can identify resources of concern in the area that could be potentially adversely affected by burning *in-situ*. Interests include but are not limited to:

- The proximity of occurrence of the proposed burn in coastal marshes and estuaries and inland marsh/wetland environments;

- The occurrence and location of threatened and endangered species in relation to the proposed burn site;

- The occurrence and location of sensitive/critical habitat or resources (*e.g*., land) in relation to the proposed burn site; and

- The benefits to sensitive habitats of burning versus the effects resulting from the land fall of oil.

ENCLOSURE 4800 ATTACHMENT II

***IN-SITU* BURN PLAN – On-Water ISB General Checklist**

This checklist is provided as a summary of important information to be considered by the FOSC/Unified Command/RRT in reviewing any request to conduct *in-situ* burning in response to an oil spill in California waters. This burning plan is divided into several sections of information about the spill, weather, oil behavior and proposed burning plan. It is intended that this burning plan be filled in to the degree possible to assist with a feasibility assessment of *in-situ* burning for the immediate situation. This burning plan, in conjunction with monitoring plan, will serve as the post- burn operations report.

ISB Plan of:	**This ISB Plan completed by:**	
Date:	Printed name:	Organization/Agency:
Time:	Contact phone and email:	
SPILL DATA		
Date/time of incident:	Responsible party:	
Incident location:		Latitude: Longitude:
Incident type:	☐ Grounding ☐ Collision ☐ Transfer Operation ☐ Pipeline ☐ Explosion ☐ Other (specify):	
Vessel, facility or pipeline involved:		
Nearest coastal county:	Distance to it (in miles):	Compass direction to it:
Name of nearest population center:	Distance to it (in miles):	Compass direction to it:
Type and quantity/volume (give units) of oil spilled:		
Release status:	☐ Continuous, at estimated rate of: ☐ Intermittent, at estimated rate of: ☐ One time only, flow now stopped. Estimated quantity (give units):	
Emulsification status:	Product easily emulsified? ☐ Yes ☐ No ☐ Uncertain	Emulsified on release? ☐ Yes ☐ No ☐ Uncertain
Degree emulsified: (if known)	☐ Light (0-20%) ☐ Moderate (21-50%) ☐ Heavy (>50%)	As of (date/time):
ADIOS prediction of emulsification rate:	_______% emulsified within_____hours of incident start _______% emulsified within_____hours of incident start	
Surface area of spill:	Square miles:	As of: (date/time):
Source burning now?	☐ Yes ☐ No	
FEASIBILITY (based on spilled oil type)	☐ Yes ☐ No Oil less than 60% emulsified?	
	☐ Yes ☐ No Oil thickness > 1/10 inch?	

Any additional comments/questions/issues at this point in the checklist:

WEATHER AND WATER CONDITIONS			
Current weather:	☐ Sunny ☐ Fog ☐ High overcast	☐ Partly cloudy ☐ Cloudy	☐ Intermittent showers ☐ Steady showers ☐ Heavy offshore squalls
24-hr weather forecast:			
48-hr weather forecast:			
Current winds:	☐ Winds onshore ☐ Winds offshore ☐ Winds parallel to shore	Knots: Knots: Knots:	From direction: From direction: From direction:
24-hr winds forecast:	Speed and direction:		
48-hr winds forecast:	Speed and direction:		
Sea state:	☐ Calm ☐ Choppy	Swell or waves ☐ < 1 ft ☐ 1-3 ft ☐ > 3 ft	
24-hr sea state forecast:			
48-hr sea state forecast:			
Surface currents:	Speed (knots):	(To) direction:	
Water depth (give units):			
Tides: (relevant for nearshore or inland ISB)	Date:	Time:	☐ Low ☐ High Feet (+/-):
	Date:	Time:	☐ Low ☐ High Feet (+/-):
	Date:	Time:	☐ Low ☐ High Feet (+/-):
	Date:	Time:	☐ Low ☐ High Feet (+/-):
Daylight hours:	Day 1:	Sunrise at:	Sunset at:
	Day 2:	Sunrise at:	Sunset at:
ESTIMATED SMOKE TRAJECTORY			
Describe plume: (e.g., trajectory, height, size)			
If wind trajectory toward human populations:	Primary impact location:		
	Date/time plume arrives:		
	Particulate matter (PM) size in most concentrated part of plume: ☐ < 2.5 microns ☐ 2.6-10 microns ☐ >10 microns		
	Expected duration of exposure (minutes/hours):		
If wind trajectory toward environmentally sensitive populations:	Primary impact location:		
	Location used by/for (*e.g.*, pinniped haul out):		
	Date/time plume arrives:		
	Particulate matter (PM) size in most concentrated part of plume: ☐ < 2.5 microns ☐ 2.6-10 microns ☐ >10 microns		
	Expected duration of exposure (minutes/hours):		
FEASIBILITY (based on physical factors)	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	Wind speed < 25 knots Wave height < 2-3 feet Visibility > 500 feet vertical, > ½ mile horizontal Rain forecasts favorable for ignition	

Any additional comments/questions/issues at this point in the checklist:

ADDITIONAL BURN CONSIDERATIONS			
Location of proposed burn relative to:			
Spill source:			
Nearest uncontrolled ignitable slick(s):			
Nearest sizable downwind human population:			
Nearest downwind concentrated wildlife population:			
Potential for reducing visibility at nearby airport(s) or freeway(s): ☐ Low ☐ Medium ☐ High Which ones:			
Public broadcast notifications to human populations required: ☐ Yes ☐ No If "Yes", describe how/by whom this will be coordinated:			
Will fire boom to be used:	☐ Yes ☐ No	Has it been ordered:	☐ Yes ☐ No
Boom source location:		Expected boom arrival time at burn location:	Date: Time:
Will air monitoring occur:	☐ Yes ☐ No	Monitoring team ordered:	☐ Yes ☐ No
Monitoring team location:		Expected team arrival time at burn location:	Date: Time:
Proposed ignition method:			
Will burn promoters be used:	☐ Yes ☐ No	If "yes", describe type and whether RRT approval given:	
Will de-emulsifiers be used:	☐ Yes ☐ No	If "yes", describe type and whether RRT approval given:	
Will another other OSCA (herders, solidifiers) be used to manage the ISB:	☐ Yes ☐ No	If "yes", describe type and whether RRT approval given:	
Proposed burning strategy:	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	ISB in fire boom under tow ISB of static oil within fire boom Burning of derelict or hazardous vessel Burning of static oil in natural collection site on/near shore Burning of oiled debris at remote areas Other (specify):	
Methods for controlling the burn:			
Estimated amount oil to be burned (give units):		Estimated burn duration:	
Method for collecting residue:		Storage/disposal of collected residue:	
Feasibility (operational factors)	☐ Yes ☐ No	Burn at safe distance from other response operations, public, recreational and commercial activities	
	☐ Yes ☐ No	Smoke plume unlikely to impact large concentrations of people or wildlife	
	☐ Yes ☐ No	Adequate fire boom, tow boats, igniter resources	
	☐ Yes ☐ No	Adequate notice possible for mariners, pilots, public	
	☐ Yes ☐ No	ISB resources and personnel w/i window of opportunity	

(Can use above materials for FOSC briefings. FOSC Plan Sign-Off Form is in Attachment IX).

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ENCLOSURE 4800 – ATTACHMENT III

RRT IX CASE-BY-CASE APPROVAL CHECKLIST

The Case-by-Case Checklist is used by the FOSC/Unified Command to determine whether a request should be forwarded to the RRT IX for their incident-specific review and approval of *in-situ* burning. If the answer to any of the questions below is NO, further information must be gathered and summarized to support the position that an *in- situ* burn should be considered. This information, as well as all other information, should be forwarded as possible to the RRT IX in advance of the conference call.

May use the "*IN-SITU* BURNING PLAN – ON-WATER GENERAL CHECKLIST" (ATTACHMENT II) as much as possible to assist in answering the following:

1. Is the spilled petroleum burnable? Y/N
   Comments:

2. Can the appropriate equipment be made available in a timely manner to effectively conduct an *in-situ* burn? Y/N
   Comments:

3. Are weather and oceanographic conditions favorable for an *in-situ* burn? Y/N
   Comments:

4. Does the *in-situ* burn pose less of an environmental risk than leaving the petroleum on the water surface? (*Use the consultation information captured on the following page to assist with this answer*). Y/N
   Comments:

5. If required, have state and international boundary considerations been addressed? Y/N
   Comments:

6. Has the local air district recommended the use of *in-situ* burning? Y/N
   (*Use the consultation information captured on the following page to assist with this answer*). *Comments:*

7. Has the ART group within the Planning Section recommended the use of *in-situ* burning? Y/N
   Comments:

SUMMARY OF OTHER AGENCY CONCERNS

Use the Contact List in Attachment VIII to contact and confer with trustee agencies and local air districts, as needed, before and during the RRT conference call.

Detail any issues, concerns, or reservations that may exist on the part of the local air district or any other trustee agencies, response agencies, or technical specialists with respect to a proposed *in-situ* burn, and any suggested monitoring, mitigations or best management practices that can be used to address those concerns.

Nature of the Objections and Organization Raising a Concern or Objection:

Ways to Address these Concerns:

(Can use above materials to assist in RRT Conference call. RRT Informal Record of Decision is in Attachment IX)

ENCLOSURE 4800 ATTACHMENT IV

FIELD SITE CHARACTERIZATION CHECKLIST
(Could also be considered part of overall Site Safety and Health Plan, Attachment V)

Date:	**Time:**	**Location**:
Type of petroleum involved:		

SPECIAL *IN-SITU* BURN CONSIDERATIONS

The objective is to avoid the smoke by-products of *in-situ* burning. Keep vessels and personnel upwind of the smoke plume. This is also the basic precaution required for emitted gases. Studies show that the danger from gases emitted during *in-situ* burning remains significantly below exposure limits. It is intended that by avoiding the smoke these possible emissions will not be a problem. Emissions can include:

- Sulfur dioxide (SO_2, with PEL = 0.2 ppm)
- Nitrogen dioxide (NO_2, PEL = 0.1 ppm)
- Carbon monoxide (CO, PEL = 35 ppm)

PERSONAL PROTECTIVE EQUIPMENT

During active *in-situ* burning operations:

1. APRs suitable for both organic vapors and particulates shall be worn by all persons on vessels in proximity to the smoke.
2. Check additional equipment that will need to be provided:

☐ Outer gloves	☐ Face shield	☐ Air Purifying Respirator	☐ Sun hat
☐ Inner gloves	☐ Hard hat	☐ Supplied Air Respirator	☐ Sun screen
☐ 2/3 body cover	☐ Rubber boots	☐ Outer gloves	☐ Benzene monitors
☐ Full body cover	☐ Taped leg joints	☐ Outer gloves	☐
☐ Safety glasses	☐ Taped glove gauntlets	☐ Outer gloves	☐

MONITORING EQUIPMENT

☐ Industrial Scientific Model MX 251 Gas Detector for LEL and O
☐ Aim Model 3350 Gas Detector for H_2S
☐ Photobac "Snap Shot" portable Gas Chromatograph (for benzene)
☐
☐
☐

LEL reading: (must be < 10%)		**H_2S reading**:		**Benzene reading:**	

Additional observations or comments:

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ENCLOSURE 4800 ATTACHMENT V

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

Responsible Party:			Plan # (optional): Plan Status: New Revised	
Incident Facts:	Name: Location: Date: Time:		Operational Period:	<u>From</u> Date: Time: <u>To</u> Date: Time:

CHAIN OF COMMAND			
Division:		Group:	
ON-SCENE COMMANDER / BURN SUPERVISOR			
Name (print)	Organization	Phone/Radio Info	Operational Area
SITE SAFETY OFFICER(s)			
Name (print)	Organization	Phone/Radio Info	Operational Area
ON-VESSEL SAFETY SUPERVISORS			
Name (print)	Organization	Phone/Radio Info	Operational Area
SITE OPERATING COMPANIES			
Name (print) & Address	Vessel Name	Phone/Radio Info	Operational Area

HEALTH AND PPE REQUIREMENTS			
Gear		**Training**	**Site**
☐ Outer gloves	☐ Hard hat	☐ 24-hr Hazwoper	☐ Site characterization
☐ Inner gloves	☐ USCG life vest	☐ 40-hr Hazwoper	☐ Zone control
☐ Rubber boots	☐ Air purifying respirator	☐ Pre-work medical	☐ Enclosed space entry permit
☐ 2/3 body cover	☐ Supplied air respirator	☐ Heat stress program	☐ First aid station
☐ Full body cover	☐ Sun hat		☐ Shade station
☐ Taped leg joints	☐ Sun screen		☐ Personnel department
☐ Safety glasses	☐ Rain gear		☐ Security
☐ Face shield			

SITE DESCRIPTION		
Location:	Lat:	Long:
Description of site:		
Description of surrounding area:		
Description of surrounding population:		

COMMUNICATIONS

Routine:
The Command vessel will provide general command functions for burn operations, and it will serve as the primary communications post. All radio frequencies will be continuously monitored by Command, personnel aboard the Command vessel, and safety personnel.

Emergency:
An emergency can be communicated or declared using any assigned communications method.
All working frequencies will be monitored throughout the response effort by the Command and safety vessel(s).

CONTACT LIST			
Function	**Name**	**Phone**	**Radio**
FOSC			
SOSC			
Burn Supervisor			
Site Safety Officer			
Comms Officer			
SSC			
Trustees	 From:		
	 From:		
Local Govt.	 From:		

VESSEL LIST		
Name (print): Position:	Vessel Name	Phone: Radio:
Name (print): Position:	Vessel Name	Phone: Radio:
Name (print): Position:	Vessel Name	Phone: Radio:
Name (print): Position:	Vessel Name	Phone: Radio:
Name (print): Position:	Vessel Name	Phone: Radio:
Name (print): Position:	Vessel Name	Phone: Radio:
Name (print): Position:	Vessel Name	Phone: Radio:
Name (print): Position:	Vessel Name	Phone: Radio:

COMMUNICATION METHODS

Command and Control:

The primary method of communications for the Command and trustees group is assigned cell phones The Burn Supervisor and Communications post shall also have cell phones.

Burn and Vessel Operations:

The primary method of communications will be assigned Marine VHF channels/frequencies.

- Aviation communications between vessel and aircraft will be on marine channel 18A, which is 156.900 MHz.
- The working marine VHF channel for the Lead Burn Boat and the second boom towing vessel shall be determined prior to operations. In addition, all vessels shall monitor marine VHF channel 6, the designated spill response hailing channel.

In the event of communications equipment failure:

1. A whistle will be used to indicate a need for assistance.
2. Three (3) short repeated blasts form a vessel horn shall indicate an emergency.

GO / NO-GO POLICY	
• Each vessel commander (CDR), Operational CDR, or trustee agency representative can stop the commencement or continuation of the burn based on the safety concerns within each area of responsibility. • Immediately prior to igniting the burn, the following personnel shall be polled to determine GO / NO-GO status: FOSC, SOSC, Burn Supervisor, Site Safety Officer and participating trustees. • Any of these identified personnel may request the FOSC terminate the burn if the initial conditions supporting the burn decision have changed and are no longer beingmet.	
PERSONNEL RESPONSIBILITIES	
Burn Supervisor	• Reports directly to the FOSC. • Is responsible for the overall burn operation, including but not limited to ignition and termination, pre-ignition checklist, GO/NO GO polling of designated personnel, sample taking and record keeping. • Is the designated boom Commander.
Site Safety Officer	• Reports directly to the Burn Supervisor. • Charged with the overall responsibility of ensuring worker health and safety during burn operations. • Conducts pre-burn safety briefing on operational procedures and goals. • Identifies potential emergencies. • Coordinates implementation of this Plan. • Assigns and monitors all associated safety personnel.
VESSEL RESPONSIBILITIES	
Command Vessel	• Shall serve as the On-Site Command and Communications Post. • Burn Supervisor and FOSC shall conduct burn operations from this vessel Command Post. • Shall be appropriate in size and manning to serve as Operations Communications and Command platform. • Shall serve as the lead boom towing vessel.
Safety Boat	• Monitors and maintains fire-free zones. • Tasked with fire watch and maintaining a limited fire-fighting capability. • Assists with burn observation and effectiveness monitoring. • Tasked with debris recovery.

OPERATIONAL OBJECTIVES	
1. Work with the combined ICS to coordinate burning activities with all other offshore/nearshore response operations. 2. Perform on-water *in-situ* burning operations in accordance with the *In-situ* Burning Plan. 3. On-water response vessels are to avoid the smoke plume during burning operations.	
SITE CONTROL	
• The main work decks of the vessel(s) are in the Exclusion Zone during active oil spill operations. • The other sections and decks of the vessel(s) are support areas.	
SITE SECURITY	
• The Captain of each ISB vessel is responsible for vessel security on his vessel. • On-water burn zone security will be imposed and controlled by the US Coast Guard	
SITE CHARACTERIZATION AND MONITORING	
Exposure Potential:	• Zone control will be established prior to entering a response area, dependent on the spill exposure potentials, including TBX (benzene) and H_2S (hydrogen sulfide) and LEL (Lower Explosive Limit). • No entry into an excessive TBX or H_2S environment. • Entry into an excessive benzene environment may be considered or special purposed in compliance with APR/SAR regulations. • During ISB activities, all personnel will have APRs available.
Required Characterization Testing:	• Testing for TBX, H_2S and LEL are minimum requirements. • See also Field Characterization Checklist (pg.)
Exposure Limits:	• Benzene: Occupational carcinogen. Limit exposures to lowest feasible concentration. • H_2S: OSHA PEL = 10 ppm, IDLH = 300 ppm • O_2: PEL = 10%, STEL = , IDLH =
Required Monitoring:	After site characterization, benzene, H_2S and LEL will be measured once per hour unless: 1. Any measurement reflects a reasonable possibility that an STEL will be reached. At this point, continuous monitoring will take effect. 2. The Site Safety Officer and FOSC decide that monitoring intervals should be altered based on their judgment from prior reading and continuous job site assessment.

EMERGENCY PRODECURES	
Emergency Fire Procedure:	A fire emergency shall include any non-controlled burning within the burn operation area. The Site Safety Officer or other qualified personnel must: 1. Take charge of the situation. 2. Notify Burn Supervisor of the emergency. 3. Notify Fire Department and Safety Boat of type of assistance needed. 4. Sound appropriate fire signal (three short blasts of vessel horn). The Burn Supervisor will ensure that the fire is extinguished prior to re-starting the controlled ISB.
Emergency Termination Of Burn:	In the event that the fundamental safety conditions change or an emergency situation arises after initiation of the burn, the following methods may be used to terminate the burn: 1. Releasing the tow line from one of the tow vessels while the other tow vessel moves ahead at several knots. 2. Move both vessels ahead at several knots, forcing the oil beneath the boom and removing it from the combustion zone. Although the FOSC has overall burn termination authority, any designated Safety Supervisor may request the burn be terminated.
Emergency Medical Procedures:	When a person is injured, the Site Safety Officer or other qualified personnel must: 1. Take charge of the situation. 2. Provide necessary decontamination. 3. Administer first aid. 4. Arrange for additional medical assistance as necessary. 5. If a serious injury of life-threatening condition exists, notify the USCG Operations Center at: MSO SF Bay (510-437-3073), MSO LALB (562-980-4444 or MSO San Diego (619-683-6470.
Reporting an Emergency:	Provide the following information when calling for help: Your name, location, telephone number at your location, name of person(s) exposed or injured, actions already taken.

EMERGENCY RESPONSE RESOURCES	
Ambulance:	In an offshore emergency, either a local water taxi company or the USCG Search and Rescue Center will provide transportation to the nearest ambulance/medical facility. Due to the transient nature of this operation, the Site Safety Office will need to conduct incident-specific inquiries to locate the nearest ambulance service. Ambulance service to be used:
Fire Department:	Depending on the site location, **Dialing 911** may suffice for Fire Department contact. A fire boat can respond if within their service area. Describe this area: If the emergency is outside this area, call the USCG at: ____________________________.
Oil Spill Response:	For additional response assistance, call: ____________________________
Hospital/Emergency Medical:	Due to the transient nature of oil spill response operations, the Site Safety Office will need to conduct incident-specific inquiries to locate the nearest hospital/emergency medical service.
EMERGENCY PHONE NUMBERS	
USCG:	
USCG Search and Rescue:	
Local Police Department:	
Local Fire Department:	
California EOC:	
NRC Spill Report Hotline:	
Poison Control Center:	
Chemtrec:	

THERMAL STRESS REDUCTION PROGRAM	
Operational Requirements:	• To reduce the effects of heat stress, 2/3 slicker bottoms are a standard requirement. • Upper torso exposure is minimal during normal operations, but during overhead operations with dripping oil, or when splashing occurs, full PPE will be worn. • If necessary to reduce heat stress, shade hats may be required to be worn when on the vessel's work deck, except during lifting operations when hard hats must be worn. • Hard hats colors that reflect level of HAZWOPER training (*e.g.*, Green = 24-48 hr training, Yellow = 4-23 hr training, White = no training or not current). • Use of cooling vests and/or work time limits will be implemented if temperatures exceed 85 F.
HAZARD REDUCTION PROCEDURES	
Prior to the vessel dispatching from the pier, the ship's Captain (or designate) will give on-board personnel a pre-departure vessel operations safety briefing. Prior to beginning any on-site ISB work, the Site Safety Officer will give a Site & Job Specific Safety Briefing to all workers on board the vessel.	

ENCLOSURE 4800 ATTACHMENT VI

***IN-SITU* BURN BOOM OPERATIONS PROCEDURES**

PRE-IGNITION CHECKLIST	
Communications Officer:	☐ Perform radio check with each vessel and participating trustee ☐ Verify each vessel is aware of burn trajectory and time of ignition
Burn Supervisor:	☐ Verify clear burn path to aircraft is clear ☐ Ensure boats and booms are pointed upwind ☐ Designate oil-free safe area for vessels to use in emergency ☐ Obtain final burn approval from FOSC

BOOM TOWING SAFETY INSTRUCTIONS

1. Contained oil should be ignited only after the requirements of the on-water *In-situ* Burn Pre-Approval and/or Case-by-Case RRT Approval have been met, and confirmed by all key participants via radio link.
2. All vessels must remain at least (5) fire diameters from the flame perimeter.
3. When using 660 feet or less of boom, use tow lines equal to the length of the boom. For longer boom, tow lines may be shorter than the length of the boom.
4. Prior to ignition, ensure that all personnel on-site are positioned upwind or cross-wind form the target slick.

FIRE CONTROL

The Burn Supervisor will be positioned on the Command vessel. He/she will:

☐ Control the burn rate by coordinating the forward speed of boom towing vessels

BURN EFFECTIVENESS MONITORING

The Site Safety Officer will be positioned aboard a dedicated Safety vessel. He/she will:

☐ Assist the Command vessel with monitoring the burn's effectiveness.
☐ Monitor the status of the burn in relation to the proximity of the burn to towing vessels and other response vessels.
☐ Monitor and maintain pre-designated "fire-free" zones between response vessels or between the burn and specified sensitive areas.
☐ Provide back-up support for deployment and containment operations.
☐ Provide extra personnel and equipment, where needed.

TERMINATIN OF BURN AND EMERGENCY TERMINATION OF BURN	
In most circumstances, the FOSC should plan to allow an oil slick to burn to completion once it has ignited. However, premature termination of a burn may be necessary if the wind or weather shifts unexpectedly, or if secondary ignition of another slick is a possibility. As part of the GO/NO GO policy, the Burn Supervisor, Site Safety Officer, participating trustee agency representatives or designated safety personnel may stop the ISB response effort by declaring an emergency. **If an emergency is declared, the person declaring the emergency will:** ☐ Provide a description of the problem to the Burn Supervisor and FOSC. **The FOSC will determine the course of action. If the burn is terminated, the Burn Supervisor will:**	
Primary method:	☐ Order one of the towing vessels to release the tow line form the vessel ☐ Order the other towing vessel to move ahead at several knots. This forces oil to spread to a thickness that cannot support combustion.
Secondary Method:	☐ Order both vessels to move ahead at several knots. This forces oil under the boom, removing it from the combustion zone.

Additional observations or comments:

ENCLOSURE 4800 – ATTACHMENT VII

IN-SITU BURN MONITORING PLAN

The primary operational purpose in monitoring in-situ burning of spilled oil is to determine if burning requirements and objectives are met. Each operational use provides an opportunity to gather data. The FOSC/UC/RRT will be able to use these data to refine *in-situ* burning practices for both this and future spill responses.

It is intended that this form should be completed after every *in-situ* burn episode. There is a form for the burn supervisors and another for the casually trained observers to complete. Accumulated data are to be submitted together, with the in- situ burn plan, to form the post-burn operations report.

<table>
<tr><th colspan="5">BURN SUPERVISOR REPORT FORM</th></tr>
<tr><td colspan="5">Name (printed) of Burn Supervisor:</td></tr>
<tr><td colspan="2">Organization:</td><td colspan="3">Contact info:</td></tr>
<tr><td colspan="2">Date and time of report:</td><td colspan="3">Report for: Burn(s)_________of________today</td></tr>
<tr><td>One oil sample taken before first burn at start of this operational period:</td><td>☐ Yes
☐ No</td><td>Ignition method:</td><td colspan="2"></td></tr>
<tr><td>Time at start of burn:</td><td></td><td colspan="2">Wind speed (give units) during burn:</td><td></td></tr>
<tr><td>Time at end of burn:</td><td></td><td colspan="2">Wind (from) direction during burn:</td><td></td></tr>
<tr><td>Smoke plume avoided large human or wildlife concentrations:</td><td>☐ Yes
☐ No</td><td colspan="3">Describe variation from expected:</td></tr>
<tr><td colspan="5">Describe smoke plume:
(e.g., dimensions of outer and concentrated areas of plume, general dispersion effects, general heading of plume, upper air layer height where greater dispersion began to be seen)</td></tr>
<tr><td colspan="5">Describe whether wildlife monitoring occurred, and whether wildlife effects avoidance measures were needed and/or used:</td></tr>
<tr><td colspan="5">Describe if/whether/what air monitoring occurred:</td></tr>
<tr><td colspan="5">Observation of burn effectiveness:</td></tr>
<tr><td colspan="5">Observation of effectiveness of burn residue collection:</td></tr>
</table>

<table>
<tr><th colspan="4">SUPPLEMENTAL IN-SITU BURN OBSERVERS MONITORING REPORT FORM

Provide one form per observer per observation day</th></tr>
<tr><td>(Printed) Observer Name:</td><td></td><td>Date:</td><td>Time:</td></tr>
<tr><td colspan="2">Agency/Organization:</td><td colspan="2">Contact info:</td></tr>
<tr><td colspan="4">Burn episode(s) observed: Burn(s)_____________of________today</td></tr>
<tr><td colspan="4">(Printed name) Burn Supervisor:</td></tr>
<tr><td>Vantage point:</td><td colspan="3">☐ Yes ☐ No On board one of the burn vessels
☐ Yes ☐ No From another vessel within the general burn area
☐ Yes ☐ No From land (give location):
☐ Yes ☐ No From air (state aircraft type):
☐ Yes ☐ No Other (specify):</td></tr>
<tr><td>Vantage point quality:</td><td colspan="3">☐ High Mostly unobstructed
☐ Medium Sometimes obstructed
☐ Low Mostly obstructed</td></tr>
<tr><td>Estimated average observation distance or altitude (give units):</td><td></td><td colspan="2">Your estimated total burn observation time today:</td></tr>
<tr><td>Smoke plume avoided large human
or wildlife concentrations:</td><td>☐ Yes ☐ No</td><td colspan="2">Comments on this:</td></tr>
<tr><td colspan="4">Describe whether you observed wildlife in the area, whether wildlife monitoring occurred, or whether wildlife effects avoidance measures were taken:</td></tr>
<tr><td colspan="4">Your observation of whether the burning appeared effective:</td></tr>
<tr><td colspan="4">Other general observations and comments:</td></tr>
</table>

ENCLOSURE 4800 – ATTACHMENT VIII

Contact List

Agency	Function	Web and/or email	Phone
Air Districts	North Coast AQMD Rick Martin, Jr.	rmartin@ncuaqmd.org	707-443-3093 707-443-3099 (fax)
	Mendocino AQMD Christopher Brown	browncd@co.mendocino.ca.us	707-463-4354 707-272-3572 (cell) 707-463-5707 (fax)
	N. Sonoma AQMD Barbara Lee	barbara.lee@sonoma-county.org	707-433-5911 707-953-1634 (cell) 707-433-4823 (fax)
	Bay Area AQMD Wayne Kino	wkino@baaqmd.gov	415-749-4789 415-928-8560 (fax)
	Monterey Bay Unified Richard Stedman	rstedman@mbuapcd.org	831-647-9411 (x206) 831-647-8501 (fax)
	San Luis Obispo County Karen Brooks	kbrooks_apcd@co.slo.ca.us	805-781-5912 805-781-1002 (fax)
	Santa Barbara County Ron Tan	tanr@sbcapcd.org	805-961-8800 805-961-8801 (fax)
	Ventura County APCD Kent Field	kent@vcapcd.org	805-662-6960 805-645-1444 (fax)
	South Coast AQMD Mohsen Nazemi	mnazemi1@aqmd.gov	909-396-2000 909-396-3340 (fax)
	San Diego AQMD Jon Adams	jon.adams@adcounty.ca.gov	858-586-2653 858-586-2701 (fax)
National Response Center (NRC)	Spill Reporting (National); SMART call-out	http://www.nrc.uscg.mil/nrchp.html	800-424-8802
California Emergency Management Agency (Cal-EMA)	Spill Reporting (State): Incident reports:	http://www.calema.ca.gov/hazardousmater ials/pages/hazardous-materials.aspx# http://w3.calema.ca.gov/operational/malha z.nsf/$defaultview	800-852-7550

Contact List, (Cont'd)

Agency	Function	Web and/or email	Phone
USCG	San Francisco Sector	http://homeport.uscg.mil/sanfrancisco	415-399-3547/ 415-399-3300
	Los Angeles-Long Beach Sector	http://homeport.uscg.mil/lalb	310-521-3600/ 800-221-8724
	San Diego Sector	http://homeport.uscg.mil/sandiego	619-278-7033/ 619-295-3121
	District 11	http://www.uscg.mil/d11/	510-437-3701
	Pacific Strike Team (for SMART team request)	http://www.uscg.mil/hq/nsfweb/docs/foscq uadfold2077.pdf	415-883-3311 Can also contact NRC: 800-424-8802

Contact List, (Cont'd)

Agency	Function	Web and/or email	Phone
NOAA	Scientific Support Coordinator (Jordan Stout)	jordan.stout@noaa.gov	510-437-5344 206-321-3320 (cell) 510-437-3247 (fax)
	Ocean Prediction Center	http://www.opc.ncep.noaa.gov/pac_ta b.s html	
	Tide Predictions	http://www.co-ops.nos.noaa/gov/tides11/tpred2.htm l#C A	
	Coastal Water Temperature Guide	http://www.nodc.noaa.gov/dsdt/wtg 12/ht ml	
	Nautical Charts	http://www.nauticalcharts.noaa.gov/ mcd/ onlineviewer.html	
	Physical, chemical and geological ocean data	http://www.nodc.noaa/gov	
	Trajectories, ESI maps, job aids, etc.	http://response.restoration.noaa.gov/	
	National Weather Service Eureka SF/Monterey Oxnard/Los Angeles San Diego Sacramento (CA HQ)	http://www.wrh.noaa.gov/ eka http://www.wrh.noaa.gov/ mtr http://www.wrh.noaa.gov/l ox http://www.wrh.noaa.gov/ sgx http://www.wrh.noaa.gov/ sto	707-443-6484 831-656-1725 805-988-6610 858-675-8700 916-979-3051
	National Marine Fisheries Service Southwest Region Elizabeth Petras Santa Rosa Field Office Joe Dillon	http://swr.ucsd.edu elizabeth.petras@noaa.gov http://swr.nmfs.noaa.gov/sroprd. htm joseph.j.dillon@noaa.gov	562-980-4000 562-980-3238 206-619-1547 (cell) 562-980-4027 (fax) 707-575-6050 707-480-3496 (cell) 707-578-3435 (fax)
	National Marine Sanctuaries Headquarters Lisa Symons Cordell Bank Dan Howard Gulf of Farallones Maria Brown Monterey Paul Michel Channel Islands Chris Mobley	http://sanctuaries.noaa.g ov lisa.symons@noaa.gov http://cordellbank.noaa.g ov dan.howard@noaa.gov http://farallones.noaa.g ov maria.brown@noaa.gov http://montereybay.noaa.g ov paul.michel@noaa.gov http://channelislands.noaa.g ov chris.mobley@noaa.gov	301-713-3125 415-663-0314 415-561-6622 831-647-4201 805-966-7107

Contact List, (Cont'd)

Agency	Function	Web and/or email	Phone
Other Key Federal Agency Contacts	USFWS Damian Higgins (Sacramento) John Henderson (Sacramento) Randy Brown (Arcata) Nancy Finley (Arcata) Jenny Marek (Ventura) Judy Gibson (Carlsbad) Nancy Ferguson (Carlsbad)	damian_higgins@fws.gov john_henderson@fws.gov randy_brown@fws.gov nancy_finley@fws.gov Jenny_marek@fws.gov judy_gibson@fws.gov nancy_ferguson@fws.gov	916-414-6548 916-414-6595 707-882-7201 707-825-5100 805-644-1766x325 760-431-9440x260 760-431-9440x244
Regional Response Team (RRT) IX	USCG Command Center (to convene incident-specific RRT)		510-437-3701
	USCG RRT Co-chair: USCG RRT Alt. Co-chair: USCG RRT Coordinator: Susan Krala	timothy.p.holmes@uscg.mil arthur.j.snyder@uscg.mil susan.e.krala@uscg.mil	510-437-2949 510-437-3316 510-437-2794
	USEPA RRT Co-chair: Dan Meer USEPA RRT Alt. Co-chair: Kathryn Lawrence USEPA RRT Coordinator: Lance Richman	meer.dan@epa.gov lawrence.kathryn@epa.gov richman.lance@epamail.epa.gov	415-972-3132 415-971-6792 (cell) 415-972-3022
	CA DFW-OSPR Primary: Yvonne Addassi CA DFW-OSPR Alternate: Ellen Faurot-Daniels Cal-EMA Primary: Brian Abeel Cal-EMA Alternate: Trevor Anderson	yvonne.addassi@wildlife.ca.gov ellen.faurot-daniels@wildlife.ca.gov brian.abeel@calema.ca.gov trevor.anderson@calema.ca.gov	916-445-9326 916-798-2158 (cell) 916-324-8829 (fax) 831-649-2888 831-233-0723 (cell) 831-649-2894 (fax)
	DOC/NOAA Primary: Jordan Stout DOC/NOAA Alternate: Doug Helton	jordan.stout@noaa.gov doug.helton@noaa.gov	510-437-5344
	DOI Primary: Patricia Port DOI Alternate: Susmita Pendurthi	oepcsfn@aol.com patricia_port@ios.doi.gov susmita_pendurthi@ios.doi.gov	415-296-3355 415-420-0524 (cell) 415-773-8334 (fax)

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ENCLOSURE 4800 – ATTACHMENT IX

IN-SITU BURN DECISION FORMS

IN-SITU BURN PRE-APPROVAL ZONE: PLAN SIGN-OFF AND COMMENTS (2 Pages)

Plan Number:

Date/Time of Decision: Date: Time:

Operational Period: From Date: Time: To Date: Time:

Operational Sub-Plan Development and Sign-Off Status:

Sub-Plan:	Site Safety and Health	Burn Boom Operations	Burn Monitoring
Status:	☐ Draft pending ☐ Draft completed ☐ Signed off by Planning ☐ Signed off by Operations ☐ Signed off by Safety	☐ Draft pending ☐ Draft completed ☐ Signed off by Planning ☐ Signed off by Operations ☐ Signed off by Safety	☐ Draft pending ☐ Draft completed ☐ Signed off by Planning ☐ Signed off by Operations ☐ Signed off by Safety

Comments or Additional Actions Needed Before Sign-Off:

Comment or Action	**Person Tasked with any Action**

FOSC has: ☐ Approved ☐ Not Approved

PLAN APPROVALS (if in ISB Pre-Approval Zone)				
Agency	Role	Printed Name:	Date	Time
USCG	FOSC	Signature:		
ADDITIONAL UC & TRUSTEE AGENCY CONSULTATION/SUPPORT SIGNATURES				
Agency	Role	Printed Name:	Date	Time
	RP	Signature:		
Agency	Role	Printed Name:	Date	Time
		Signature:		
Agency	Role	Printed Name:	Date	Time
		Signature:		
Agency	Role	Printed Name:	Date	Time
		Signature:		

NOTIFICATION AND DISTRIBUTION		
ISB Plan Distribution: (list those receiving copies)	☐ Operations	☐ RRT
	☐ Documentation	☐
	☐ Planning	☐
	☐ ART Lead Technical Specialist	☐

Person distributing copies (printed

name): ICS Role/Section:

IN-SITU RRT CASE-BY-CASE APPROVAL ZONE:	INFORMAL RRT RECORD OF DECISION AND COMMENTS (1 Page)

RRT IX CONFERENCE CALL AND INFORMAL RECORD OF DECISION

Use the Contact List in Attachment VIII to contact and confer with the following entities as needed before and during the RRT conference call.

The ART Lead Technical Specialist or NOAA SSC can assist the FOSC/UC in briefing the RRT IX and also convey results and recommendations of trustee agency and air district consultations and/or coordination efforts to date with the Operations Section.

Summary of RRT IX conference call:

Informal Record of Decision (*CG or EPA Coordinators to RRT IX may follow with formal ROD*)

Agency	Representative (print name)	Contact Information (phone or email)	Decision
EPA			Y/N
USCG			Y/N
DOC			Y/N
DOI			Y/N
OSPR			Y/N
Air District(s)			Y/N
			Y/N
Bordering entity:			Y/N
			Y/N

Follow-up Actions

Action	Person Responsible

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20.0 ALTERNATIVE CHEMICAL AND BIOLOGICAL RESPONSE STRATEGIES (OPTIONAL)

ALTERNATIVE RESPONSE TECHNOLOGIES (ART)

The potential to use ART during an incident is considered during the initial stages of a response. These technologies include:

- In Situ Burning
- Dispersants
- Chemical
- Biological

In depth procedures and forms for In-Situ Burning and Dispersants are located in Sections 18 and 19. Although specific resources or procedures have not been identified in this Plan, any use of chemical or biological technologies will be at the discretion of the Federal On-scene Coordinator. These technologies will be considered on a case-by-case basis.

21.0 DOCUMENTATION

DOCUMENTATION OF RESPONSE ACTIONS

Overview

It is difficult, particularly during the first few minutes of an initial response operation to think about the importance of documentation. A log should be maintained which documents the history of the events and communications that occur during the response. When recording this information, it is important to remember that the log may become instrumental in legal proceedings, therefore:

- Record only facts, do not speculate.
- Do not criticize the efforts and/or methods of other people/operations.
- Do not speculate on the cause of the spill.
- Do not skip lines between entries or make erasures. If an error is made, draw a line through it, add the correct entry above or below it, and initial the change.
- Record the recommendations, instructions, and actions taken by government/ regulatory officials.
- Document conversations (telephone or in person) with government/regulatory officials.
- Request that government/regulatory officials document and sign their recommendations or orders (especially if company personnel do not agree with the suggestions, instructions, and/or actions).

Forms

To assist the organization and collection of data, selected forms have been included in this section.

Incident Action Plan

During significant response activities, development of an Incident Action Plan (IAP) is critical for identifying objectives and strategies and implementing tactics for each operational period. Sections 1.0 and 21.0 include selected Incident Command System (ICS) forms, which are basic and key to the production of an IAP. The number, type and frequency of the IAP forms used is dependent on the complexity of the incident and determined by the Incident Commander in conjunction with the Unified Command (if activated). In cases of very minor spills, a written IAP may not even be appropriate. A complete set of ICS forms is available from NOAA, and details of the IAP development process are presented in the U.S. Coast Guard Incident Management Handbook.

NOTIFICATION DATA SHEET

Date: ______ ***Time:*** ______

INCIDENT DESCRIPTION

Reporter's Full Name: ______ ***Position:*** ______
Day Phone Number: ______ ***Evening Phone Number:*** ______
Company: ______ ***Organization Type:*** ______
Facility Address: ______ ***Owner's Address:*** ______

Facility Latitude: ______ ***Facility Longitude:*** ______
Spill Location (if not at Facility): ______
Responsible Party's Name: ______ ***Phone Number:*** ______
Responsible Party's Address: ______
Source and/or cause of discharge (Description): ______
Nearest City: ______ ***Distance from City:*** ______ ***Unit of Measure:*** ______
County: ______ ***State:*** ______ ***Zip code:*** ______
Section: ______ ***Township:*** ______ ***Range:*** ______ ***Borough:*** ______
Distance from City: ______ ***Direction from City:*** ______
Container Type: ______ ***Container Storage Capacity:*** ______
Facility Oil Storage Capacity: ______ ***Unit of Measure:*** ______
Were Materials Discharged? ______ ***(Y/N) Confidential?*** ______ ***(Y/N) Material:*** ______

CHRIS Code	Total Quantity Released	Unit of Measure	Water Impact (*YES or NO*)	Quantity into Water	Unit of Measure

RESPONSE ACTION(S)

Action(s) taken to Correct, Control, or Mitigate Incident: ______

Number of Injuries: ______ ***Number of Deaths:*** ______
Evacuation(s): ______ ***Number Evacuated:*** ______
Damage in Dollars (approximate): ______
Medium Affected: ______
Description: ______
More Information about Medium: ______

CALLER NOTIFICATIONS

National Response Center (NRC): 1-800-424-8802
Additional Notifications (Circle all applicable): ***USCG*** ***EPA*** ***State*** ***Other***
Describe: ______
NRC Incident Assigned No: ______

ADDITIONAL INFORMATION

Any information about the incident not recorded elsewhere in this report: ______

Meeting Federal Obligations to Report? ______ ***(Y/N) Date Called:*** ______
Calling for Responsible Party? ______ ***(Y/N) Time Called:*** ______

NOTE: DO NOT DELAY NOTIFICATION PENDING COLLECTION OF ALL INFORMATION.

RESPONDER LOG

INCIDENT: ______________________ **PAGE:** ______________

NAME: ______________________ **POSITION:** ______________

LOCATION: ______________________ **DATE:** ______________

Time	Contact/Subject	NOTES/ACTIONS PENDING

ICS FORMS

The following are examples of forms that may be used during an event however Beta Offshore reserves the right to use other versions of the forms when the plan is being activated/used.

NRC Incident No. #______________________________________

1. Incident Name	**2. Prepared by: (name)** Date: Time:	INCIDENT BRIEFING ICS 201-CG
3. Map/Sketch (include sketch, showing the total area of operations, the incident site/area, overflight results, trajectories, impacted shorelines, or other graphics depicting situational and response status)		
4. Current Situation:		

NRC Incident No. #____________________________________

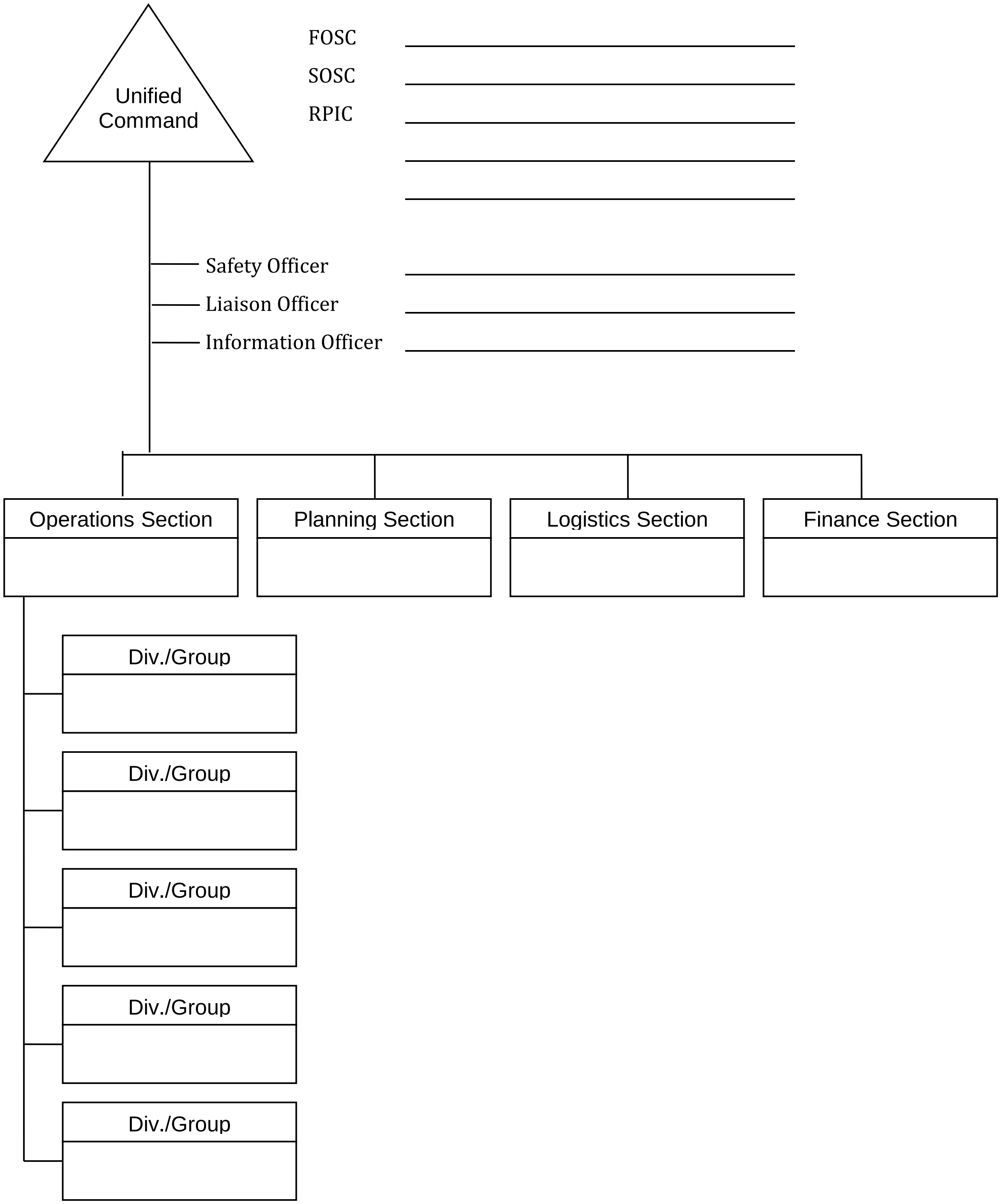
1. Incident Name	**2. Prepared by: (name)** Date: Time:	INCIDENT BRIEFING ICS 201-CG

5. Initial Response Objectives, Current Actions, Planned Actions

NRC Incident No. #____

1. Incident Name	2. Prepared by: (name) Date: Time:	INCIDENT BRIEFING ICS 201-CG

6. Current Organization



NRC Incident No. #______________________________________

1. Incident Name	**2. Prepared by: (name)** Date: Time:	INCIDENT BRIEFING ICS 201-CG

7. Resources Summary

Resource	Resource Identifier	Date Time Ordered	ETA	On-Scene (X)	NOTES: (Location/Assignment/Status)

NRC Incident No. #______________________________

1. Incident Name	2. Operational Period (Date/Time) From: To:	INCIDENT OBJECTIVES ICS 202-CG

3. Objective(s)

4. Operational Period Command Emphasis (Safety Message, Priorities, Key Decisions/Directions)

Approved Site Safety Plan Located at:

5. Prepared by: (Planning Section Chief)	Date/Time

NRC Incident No. #________________________________

1. Incident Name	2. Operational Period (Date/Time) From: To:	ORGANIZATION ASSIGNMENT LIST ICS 203-CG

3. Incident Commander(s) and Staff

Agency	IC	Deputy

Safety Officer:	
Information Officer:	
Liaison Officer:	

4. Agency Representatives

Agency	Name

5. PLANNING/INTEL SECTION

Chief	
Deputy	
Resources Unit	
Situation Unit	
Environmental Unit	
Documentation Unit	
Demobilization Unit	
Technical Specialists	

6. LOGISTICS SECTION

Chief	
Deputy	

a. Support Branch

Director	
Supply Unit	
Facilities Unit	
Vessel Support Unit	
Ground Support Unit	

b. Service Branch

Director	
Communications Unit	
Medical Unit	
Food Unit	

7. OPERATION SECTION

Chief	
Deputy	
Deputy	
Staging Area Manager	
Staging Area Manager	
Staging Area Manager	

a. Branch – Division Groups

Branch Director		
Deputy		
Division Group		
Division Group		
Division Group		
Division/Group		
Division/Group		

b. Branch – Division/Groups

Branch Director		
Deputy		
Division/Group		
Division/Group		
Division/Group		
Division/Group		
Division/Group		

c. Branch – Division/Groups

Branch Director		
Deputy		
Division/Group		
Division/Group		
Division/Group		
Division/Group		
Division/Group		

d. Air Operations Branch

Air Operations Br. Dir	
Helicopter Coordinator	

8. FINANCE/ADMINISTRATION SECTION

Chief	
Deputy	
Time Unit	
Procurement Unit	
Compensation/Claims Unit	
Cost Unit	

9. Prepared By: (Resources Unit)	Date/Time

NRC Incident No. #______________________________

1. Incident Name	**2. Operational Period (Date/Time)** From: To:	**Assignment List ICS 204-CG**
3. Branch	**4. Division/Group/Staging**	

5. Operations Personnel Name Affiliation Contact # (s)

Operations Section Chief: ____________________

Branch Director: ____________________

Division/Group Supervisor/STAM: ____________________

6. Resources Assigned "X" indicates 204a attachment with additional instructions

Strike Team/Task Force/Resource Identifier	Leader	Contact Info. #	# Of Persons	Reporting Info/Notes/Remarks	
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐

7. Work Assignments

8. Special Instructions

9. Communications (radio and/or phone contact numbers needed for this assignment)

Name/Function	Radio: Freq./System/Channel	Phone	Cell/Pager	

Emergency Communications

Medical ________________ Evacuation ________________ Other ________________

10. Prepared by: **Date/Time**	**11. Reviewed by (PSC):** **Date/Time**	**12. Reviewed by (OSC):** **Date/Time**

NRC Incident No. #________________________________

1. Incident Name	2. Operational Period (Date/Time) From: To:	ASSIGNMENT LIST ATTACHMENT ICS 204a-CG
3. Branch	4. Division/Group	
5. Strike Team/Task Force/Resource (Identifier)	6. Leader	7. Assignment Location
8. Work Assignment Special Instructions, Special Equipment/Supplies Needed for Assignment, Special Environmental Considerations, Special Site Specific Safety Considerations		
Approved Site Safety Plan Located at:		
9. Other Attachments (as needed) ☐ Map/Chart ☐ Weather Forecast/Tides/Currents ☐ ________ ☐ ________ ☐ ________ ☐ ________		
10. Prepared by: Date/Time	11. Reviewed by (PSC): Date/Time	12. Reviewed by (OSC): Date/Time

NRC Incident No. #___________________________

1. Incident Name	2. Operational Period (Date / Time) From: To:	INCIDENT RADIO COMMUNICATIONS PLAN ICS 205-CG

3. BASIC RADIO CHANNEL USE

SYSTEM / CACHE	CHANNEL	FUNCTION	FREQUENCY	ASSIGNMENT	REMARKS

4. Prepared by: (Communications Unit)	Date / Time

NRC Incident No. #________________________________

1. Incident Name	**2. Operational Period (Date / Time)** From: To:	**COMMUNICATIONS LIST** **ICS 205A-CG**

3. Basic Local Communications Information

Assignment	Name	Method(s) of contact (radio frequency, phone, pager, cell #(s), etc.)

4. Prepared by: (Communications Unit) **Date / Time**

1. Incident Name	2. Operational Period (Date / Time) From: To:	MEDICAL PLAN ICS 206-CG

3. Medical Aid Stations

Name	Location	Contact #	Paramedics On site (Y/N)

4. Transportation

Ambulance Service	Address	Contact #	Paramedics On board (Y/N)

5. Hospitals

Hospital Name	Address	Contact #	Travel Time		Burn Ctr?	Heli-Pad?
			Air	Ground		

6. Special Medical Emergency Procedures

7. Prepared by: (Medical Unit Leader) Date/Time	8. Reviewed by: (Safety Officer) Date/Time

INCIDENT STATUS SUMMARY

1. Incident Name	2. Period Covered by Report From: To:	Time of Report	INCIDENT STATUS SUMMARY ICS 209-OS

3. Spill Status (Estimated, In Barrels) [Ops & EUL/SSC]

Source Status: Remaining Potential (bbl):

Rate of Spillage (bbl/hr):

Secured ☐

Unsecured ☐

	Since Last Report	Total
Volume Spilled		
Mass Balance / Oil Budget		
Recovered Oil		
Evaporation		
Natural Dispersion		
Chemical Dispersion		
Burned		
Floating, Contained		
Floating, Uncontained		
Onshore		
Total spilled oil accounted for:		

4. Waste Management (Estimated) [Ops / Disposal]

	Recoverd	Stored	Disposed
Oil (bbl)			
Oily Liquids (bbl)			
Liquids (bbl)			
Oily Solids (tons)			
Solids (tons)			

5. Shoreline Impacts (Estimated, in miles) [PSC/EUL/SSC]

Degree of Oiling	Affected	Cleaned	To be Cleaned
Light			
Medium			
Heavy			
Total			

6. Wildlife Impacts [Ops / Wildlife Br.]

Numbers in ( ) indicate subtotal that are threatened / endangered species.

	Captured	Cleaned	Released	DOA	Died in Facility: Euth.	Died in Facility: Other
Birds						
Mammals						
Reptiles						
Fish						
Total						

7. Safety Status [Safety Officer]

	Since Last Report	Total
Responder Injury		
Public Injury		

8. Equipment Resources [RUL]

Description	Ordered	Available/ Staged	Assigned	Out of Service
Spill Resp. Vsls				
Fishing Vessels				
Tugs				
Barges				
Other Vessels				
Skimmers				
Boom (ft.)				
Sbnt/Snr Bm. (ft.)				
Vacuum Trucks				
Helicopters				
Fixed Wing				

9. Personnel Resources [RUL]

Organization	People in Cmd. Post	People in the Field	Total People On Scene
Federal			
State			
Local			
RP			
Contract Personnel			
Volunteers			
Total Response Personnel from all Organizations:			

10. Special Notes

11. Prepared by (Situation Unit Leader)

1. Incident Name	**2. Date and Time of Message**	**GENERAL MESSAGE** **ICS 213-CG**
3. TO:	ICS Position	
4. FROM:	ICS Position	
5. Subject:		
6. Message		
7 Reply		
8. Signature/Position (person replying)	**Date/Time of reply**	

1. Incident Name	2. Operational Period (Date / Time) From: To:	UNIT LOG ICS 214-OS

3. Unit Name / Designators	4. Unit Leader (Name and ICS Position)

5. Personnel Assigned

NAME	ICS POSITION	HOME BASE

6. Activity Log (Continue on Reverse)

TIME	MAJOR EVENTS

7. Prepared by:	Date / Time

Electronic version: NOAA 1.0 June 1, 2000

1. Incident Name	2. Operational Period (Date / Time) From: To:	INDIVIDUAL LOG ICS 214a-OS

3. Individual Name	4. ICS Section	5. Assignment / Location

6. Activity Log	Page of

Time	Major Events

7. Prepared by:	Date / Time

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
OFFICE OF SPILL PREVENTION AND RESPONSE

INITIAL SITE SAFETY PLAN

SECTION A: SITE INFORMATION

SITE NAME	DATA COLLECTOR	DATE	TIME
SOSC	PHONE NUMBER	SAFETY OFFICER	PHONE NUMBER
☐ Inland Response ☐ Marine Response ☐ Drill/Training ☐ Other		PCA	INDEX

WEATHER

☐ Calm ☐ Breezy ☐ Windy Temp. Range ______________ ☐ Clear ☐ Fog ☐ Snow ☐

SECTION B: CHEMICAL INFORMATION

CHEMICAL NAME	CHEMICAL STATE ☐ Solid ☐ Liquid ☐ Gas/Vapor	APPROX. VOLUME RELEASED

CHEMICAL PROPERTIES

☐ Flammable LEL ________ % UEL ________ % Flashpoint______ Current Level _______ %

☐Toxic PEL _____ ppm – mg/m^3 STEL/Ceiling: _______ ppm – mg/m^3 Current Level _____ ppm – mg/m^3

☐ Reactive Incompatible(s):

☐ Corrosive pH ________ (If known) ☐ Acid ☐ Base ☐ Neutral

DIRECT READING LEVELS ....

OTHER CHEMICALS PRESENT

CO ________ VOCs ________ H_2S ________ ____________________

LEL ________ O_2________ ____________________

EXPOSURE / TOXICOLOGY

☐Inhalation ☐ Absorption ☐ Ingestion ☐ Injection ☐ Open wounds ☐ Other: ________

☐Asphyxiant ☐ Corrosive ☐Sensitizer ☐Eye/Skin /Respiratory Irritant ☐Carcinogen/Teratogen/Mutagen

SECTION C: EMERGENCY RESPONSE

	NAME	PHONE
Medical Facility		
Med. Facility Location		
Phone / Comm Sys. Available		
First Aid Kit Location		
Fire Extinguisher Location		
Eye Wash / Deluge Shower Location		
Evacuation Area		
Evacuation Route		

SECTION D: HAZARD IDENTIFICATION

HAZARD TYPE	HAZARD DESCRIPTION
☐ Slips / Trips / Falls	
☐ Lifting / Material Handling	
☐ Equipment / Machinery	
☐ Open Trench	
☐ Electrical	
☐ Insect	
☐ Animal	
☐ Other Biological	
☐ Heat Stress	
☐ Hypothermia	
☐ On / Over Water	
☐ Overhead Hazards	
☐ High Pressure (tanks / lines)	
☐ Elevated Work / Falls	
☐ Traffic	
☐ Night Operations	
☐ Noise	
☐	
☐	
☐	

SECTION E: PPE

□ Level D □ Level C □ Hard Hat □ Nomex □ Work Gloves □ PFD □ Safety Boots
□ Safety Glasses / Goggles □ Ear Plugs □ Safety Vest □ Respirator □ CPC □ Chem. Boots
□ Chem. Gloves □ Respirator □ Other: ____________________

SECTION F: DECONTAMINATION

☐ None ☐ Limited ☐ Dry ☐ Full ☐ Emergency ☐ Equipment

Location

____

SIGNATURE DATE

22.0 SPILL PREVENTION

Platform Design

The Company employs many measures to mitigate and prevent the unauthorized discharge of oil into offshore waters, including:

The drilling/production Platform Ellen is a standard eight–leg jacket located in 265 feet of water. The platform has two deck levels, each about 145 feet by 177 feet, and is equipped with a drilling/workover rig, accommodations for crew quarters, helicopter pad, and space for the drilling of up to 80 wells. At any time, the well status might vary as much as 20 percent.

The processing platform Elly is a 12–leg jacket situated in 255 feet of water. Platform Elly's lower deck has dimensions of 168 feet by 213 feet. The upper deck is 100 feet by 197 feet in dimension. A 200–foot-long bridge links Platforms Ellen and Elly.

Electric power for the three platforms is generated by dual–fueled (diesel or produced gas), turbine-driven generators located on Platform Elly. The natural gas is extracted from the field. Power from the generators is distributed from Platform Elly to Platform Eureka via two 34.5 kv subsea cables and to Platform Ellen via one standard high-voltage cable. Refer to Facility diagrams in this Section.

Platform Processes and Equipment

Platform Eureka is equipped with a drilling/workover rig and production facilities for the primary separation of gas from liquid and for well testing. Production fluids and gas are sent via a subsea pipeline to Platform Elly for processing. Eureka receives produced water via subsea pipelines from Elly for injection into waterflood wells.

Activities on Platform Ellen consist of well production, well injection, drilling, and well workover. The oil, water, and gas produced from the wells is sent to Platform Elly for dehydration, gas conditioning, and water treating. Produced water is pumped from Platform Elly to Ellen and injected into the waterflood wells.

Platform Elly (the Central Facilities Platform) provides the majority of oil, water, and gas processing. The platform provides facilities for:

- Oil dehydration
- Oil shipping
- Water treating
- Water injection
- Vapor recovery gas compression
- Gas treating
- Electric power generation

Platform Processes and Equipment (Cont'd)

The production facilities on Platform Elly are designed to be self-sufficient in the following manner:

- Crude oil is dehydrated and pipeline quality oil is pumped to shore through the 16- inch San Pedro Bay Pipeline a common carrier pipeline.

- Produced water is filtered and reinjected into the reservoir.

- Produced gas is compressed and used as fuel to power turbine-driven generators to supply the platform's electrical needs and pumps to reinject produced water.

Heat exchangers and separation equipment (treaters, FWKOs, etc.) treat the oil emulsion. Waste heat is recovered from the turbines and is utilized in a series of heat exchangers and vessels to assist in separating the produced oil, water, and gas streams. A generalized schematic (see Annex A.8) shows the basic flow patterns on Platform Elly. Produced water, following separation from the oil, is treated in a series of vessels and filters on Platform Elly to remove essentially all remaining oil and solids and is then reinjected into the formation.

Platform Flow Diagrams are provided below.

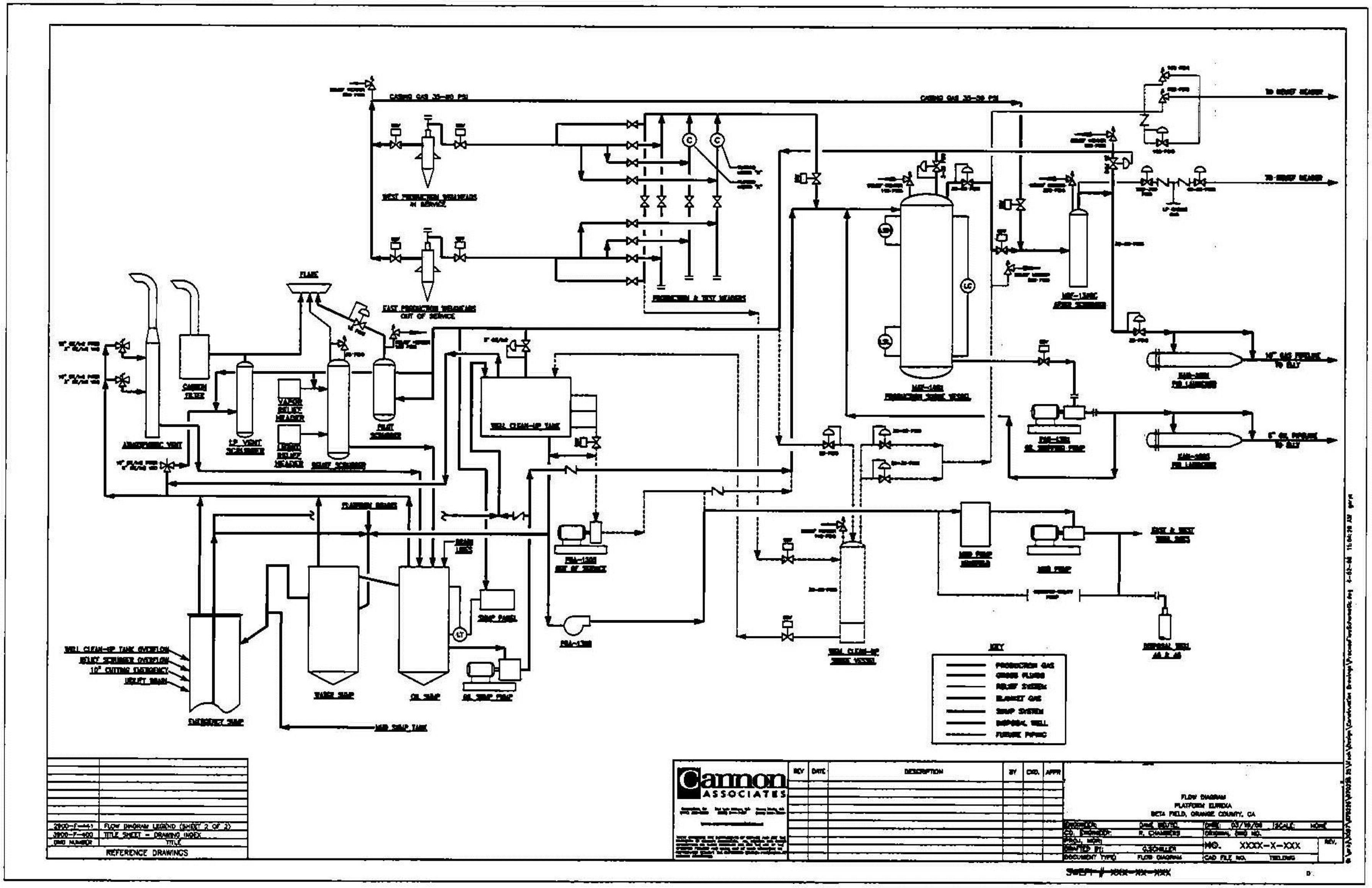
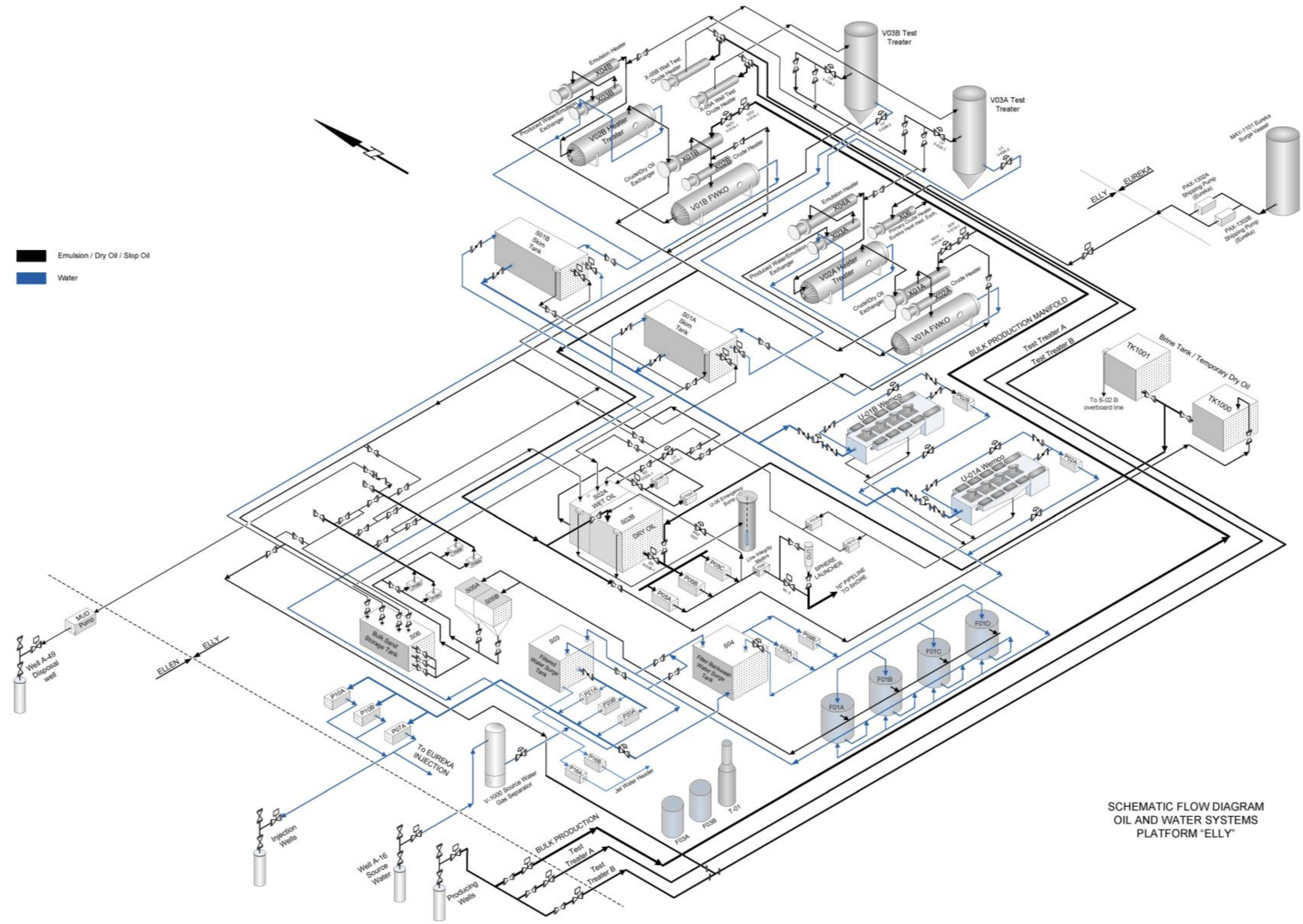


Figure A-9 Platform Eureka Flow Diagram


Emulsion / Dry Oil / Slop Oil
Water
V03B Test Treater
V03A Test Treater
MAV-1101 Eureka Surge Vessel
ELLY
EUREKA
V02B Heater Treater
V01B FWKO
V02A Heater Treater
V01A FWKO
S01B Skim Tank
S01A Skim Tank
BULK PRODUCTION MANIFOLD
Test Treater A
Test Treater B
TK1001
Brine Tank / Temporary Dry Oil
TK1000
U-01B Wemco
U-01A Wemco
S02A WET OIL
S02B DRY OIL
SPHERE LAUNCHER
16" PIPELINE TO SHORE
S05A
S05B
S06
Bulk Sand Storage Tank
MUD Pump
Well A-49 Disposal well
ELLEN
ELLY
S03
S04
F01A
F01B
F01C
F01D
To EUREKA INJECTION
V-1000 Source Water Gas Separator
Jet Water Header
Injection Wells
Well A-16 Source Water
Producing Wells
BULK PRODUCTION
Test Treater A
Test Treater B
F03A
F03B
T-01
SCHEMATIC FLOW DIAGRAM
OIL AND WATER SYSTEMS
PLATFORM "ELLY"

Normal Daily Throughput

Current throughputs for the Beta Unit Complex platforms are as follows:

CURRENT THROUGHPUTS			
Platform	BOPD	BWPD	MCFD (Gas)
Eureka (production)	2,000 – 4,000	4,000 – 9,000	200 – 900
Ellen (production)	1,800 – 4,000	5,500 – 15,000	500 – 1,500
Elly (processing)	3,000 – 8,000[1]	8,000 – 20,000	700 – 1,500
Notes: [1] Throughput on Platform Elly can include up to 600 barrels per day of dry oil from Platform Edith.			

Crude oil gravities for Platform Eureka range from 9° to 19° API gravity with an average composite of approximately 12.5° API gravity. Crude oil gravities for Platform Ellen range from 9° to 19° API gravity with an average composite of approximately 15° API gravity.

Hydrocarbons Handled and Transferred

The characteristics of the oil and gas produced at the platforms are summarized on the Safety Data Sheets (SDS) found in Appendix L of this OSPRP. Diesel fuel is transferred (from a supply boat via a pump on the boat) through a three–inch petroleum transfer hose equipped with dry disconnect couplings to a standpipe on the platform (either Ellen or Eureka). The diesel fuel system is provided on the platforms to furnish fuel to the emergency generators, rig engines, cranes, injection turbine drivers, utility engines, and/or the main power turbine generators. Total diesel fuel usage for all three platforms can vary from 3,000 to 5,000 bbls/month. A written fuel transfer procedure is available on Platform Ellen that details personnel duties and responsibilities throughout the transfer process, emergencies, and communications. A summary of the fuel transfer procedures is provided later in this Section.

Except during tests, the fuel hose is not disconnected. In this configuration, the potential for fuel dripping into the sea is minimized. When the hose is changed, the line must first be flushed. Sorbent material is pre–positioned under the connection prior to changing hoses.

Bulk Storage

Estimated hydrocarbon volumes for the platforms and pump station are provided below:

ESTIMATED HYDROCARBON VOLUMES (bbls)			
Platform/Station	**Platform Piping**	**Tank and Vessels**	**Totals**
Ellen	116.3	1,715.7	1,832
Elly	473.6	9,562.5	10,036.1
Eureka	362.2	3,452.72	3,814.92
Beta Pump Station	---	10,000	10,000

Supporting documentation for estimated hydrocarbon volumes is provided in Figures 22.1 through 22.4.

FIGURE 22.1

Platform Ellen Estimated Hydrocarbon Volumes – Pipelines							
Nominal Diameter (inches)	**Description**	**Schedule**	**Inside Diameter (inches)**	**X-Sectional Area (sq. inches)**	**Length (ft.)**	**Volume (cu. ft.)**	**Volume (bbls)**
3	Well flowlines – West Side/West Well Bay (typical of 17)	80	2.900	6.61	850	38.99	6.9
2	Well flowlines – West Side/West Well Bay (typical of 17)	80	1.939	2.95	850	17.43	3.1
6	"A" test treater header – West Side/West Well Bay	80	5.761	26.07	25	4.53	0.8
4	PL-005 – West Side/West Well Bay	80	3.826	11.50	25	2.00	0.4
6	"B" test treater header – West Side/West Well Bay	80	5.761	26.07	25	4.53	0.8
4	PL-006 – West Side/West Well Bay	80	3.826	11.50	25	2.00	0.4
6	Bulk header – West Side/West Well Bay	80	5.761	26.07	25	4.53	0.8
6	PL-007 – West Side/West Well Bay	80	5.761	26.07	25	4.53	0.8
3	Well flowlines – East Side/West Well Bay (typical of 13)	80	2.900	6.61	650	29.81	5.3
2	Well flowlines – East Side/West Well Bay (typical of 13)	80	1.939	2.95	650	13.33	2.4
6	"A" test treater header – East Side/West Well Bay	80	5.761	26.07	25	4.53	0.8
4	PL-008 – East Side/West Well Bay	80	3.826	11.50	25	2.00	0.4
6	"B" test treater header – East Side/West Well Bay	80	5.761	26.07	25	4.53	0.8
4	PL-009 – East Side/West Well Bay	80	3.826	11.50	25	2.00	0.4
6	Bulk header – East Side/West Well Bay	80	5.761	26.07	25	4.53	0.8
6	PL-013 – East Side/West Well Bay	80	5.761	26.07	25	4.53	0.8
3	Well flowlines – West Side/East Well Bay (typical of 12)	80	2.900	6.61	600	27.52	4.9
2	Well flowlines – West Side/East Well Bay (typical of 12)	80	1.939	2.95	600	12.30	2.2
6	"A" test treater header – West Side/East Well Bay	80	5.761	26.07	25	4.53	0.8
4	PL-011 – West Side/East Well Bay	80	3.825	11.50	25	2.00	0.4
6	"B" test treater header – West Side/East Well Bay	80	5.761	26.07	25	4.53	0.8
4	PL-012 – West Side/East Well Bay	80	3.826	11.50	25	2.00	0.4
6	Bulk header – West Side/East Well Bay	80	5.761	26.07	25	4.53	0.8
6	PL-010 - West Side/East Well Bay	80	5.761	26.07	25	4.53	0.8
3	Well flowlines – East Side/East Well Bay (typical of 15)	80	2.900	6.61	750	34.40	6.1
2	Well flowlines – East Side/East Well Bay (typical of 15)	80	1.939	2.95	750	15.38	2.7
6	"A" test treater header – East Side/East Well Bay	80	5.761	26.07	25	4.53	0.8
4	PL-014 - East Side/East Well Bay	80	3.826	11.50	25	2.00	0.4
6	"B" test treater header - East Side/East Well Bay	80	5.761	26.07	25	4.53	0.8
4	PL-015 - East Side/East Well Bay	80	3.826	11.50	25	2.00	0.4
6	Bulk header - East Side/East Well Bay	80	5.761	26.07	25	4.53	0.8

FIGURE 22.1 (Cont'd)

Platform Ellen Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	X-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
6	PL-016 - East Side/East Well Bay	80	5.761	26.07	25	4.53	0.8
3	PL-300-J line to Blowdown Vessel	80	2.900	6.61	200	9.17	1.6
4	PL-005 "A" test treater transfer line	80	3.826	11.50	200	15.97	2.8
4	PL-006 "B" test treater transfer line	80	3.826	11.50	200	15.97	2.8
12	PL-007 bulk line	80	11.374	101.64	200	141.17	25.1
4	FD-023-A diesel line from Ellen east boat landing	80	3.826	11.50	200	15.97	2.8
4	FD-021-A diesel line from diesel header to Diesel Fuel Tank V-010-L1	80	3.826	11.50	25	2.00	0.4
4	FD-022-A diesel line from diesel header to Diesel Fuel Tank V-010-L2	80	3.826	11.50	25	2.00	0.4
2	FD-025-A diesel line from Diesel Fuel Tank V-101-L2 to Elect/Welding Building	80	1.939	2.95	50	1.03	0.2
2	FD-028-A diesel line from Diesel Fuel Tank V-101-L2 to Elect/Welding Building	80	1.939	2.95	100	2.05	0.4
2	FD-026-A diesel header	80	1.939	2.95	150	3.08	0.5
2	FD-029-A diesel line from diesel header to Engine Package E-1	80	1.939	2.95	50	1.03	0.2
2	FD-027-A diesel line from diesel header to Pump Package P-1	80	1.939	2.95	50	1.03	0.2
3	FD-035-A diesel drain line from Engine Package E-1 to Diesel Fuel Tank V-010-L1	80	2.900	6.61	150	6.88	1.2
2	FD-008-A diesel switching line	80	1.939	2.95	200	4.10	0.7
4	FD-008-A diesel switching line to/from Elly	80	3.826	11.50	25	2.00	0.4
2	FD-024-A diesel switching line from Diesel Fuel Tank V-010-L1 to Pump Package P-1	80	1.939	2.95	25	0.51	0.1
3	FD-037-A diesel fuel equalizing line between Diesel Fuel Tanks V-010-L1 and V-010-L2	80	2.900	6.61	200	9.17	1.6
8	PL-106-A suction line to oil sump pump P25A	80	7.625	45.66	25	7.93	1.4
8	PL-107-A suction line to oil sump pump P25B	80	7.625	45.66	100	31.71	5.6
6	PL-081-A discharge lines from Oil Sump Pumps P-25A/P-25B to Wet/Dry Oil Tank	80	5.761	26.07	150	27.16	4.8
TOTAL							**99.2**

FIGURE 22.1 (Cont'd)

Platform Ellen Estimated Hydrocarbon Volumes – Tanks/Vessels						
Description	**Diameter (inches)**	**Length S/S (inches)**	**Shell Volume (cu. ft.)**	**Head Volume (cu. ft.)**	**Total Volume (cu. ft.)**	**Total Volume (bbls)**
V-010-L2 West Main Diesel Storage Tank						307.77
V-010-L1 East Main Diesel Storage Tank						307.77
V-020-E1 Standby Diesel Day Tank						11.40
V-410-E1 Rig Engine Diesel Supply Tank						6.23
V-420-E1 Emergency Rig Diesel Supply Tank						3.06
V-010-E1 Rig Generator Diesel Day Tank						57.71
Gel Tank						56.50
Slugging Tank						23.00
Active Tank No. 3						130.00
Active Tank No. 2						131.13
Active Tank No. 1						246.00
Reserve Tank						278.50
Holding Tanks						50.00
Slop Tank						50.00
Completion Tanks						
U-18-A Oil Sump	36	180	106.03	28.27	134.30	23.88
U-18-B Oil Sump	36	180	106.03	28.27	134.30	23.88
TOTAL						**1,700.6**

FIGURE 22.2

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	X-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
Platform Elly Estimated Hydrocarbon Volumes – Pipelines							
4	PL-026-A bypass around X-04A (Dwg. No. C6-1737)	80	3.826	11.50	50	3.99	0.7
6	PL-027-A dry oil from V-02A outlet to X-01A inlet (Dwg. No. C6-1737/C6-1736)	80	5.761	26.07	100	18.10	3.2
10	Dry oil out of X-01A to 12 PL-029-A/12" PL-101-A (Dwg. No. C6-1736)	80	9.750	74.66	150	77.77	13.8
6	Dry oil bypass around X-01A (Dwg. No. C6-1736)	80	5.761	26.07	50	9.05	1.6
12	PL-029-A dry oil to S-02B (Dwg. No. C6-1736/C6-1738/C6-1742)	80	11.374	101.64	200	141.17	25.1
4	PL-040-A wet test treater from branch to V-02A to V-02B heater treater inlet piping (Dwg. No. C6-1737/C6-1739)	80	3.826	11.50	150	11.98	2.1
3	PL-055-A wet oil from 4" PL-040-A to 6" PL-035-A (Dwg. No. C6-1739)	80	2.900	6.61	25	1.15	0.2
10	PL-031-A emulsion from X-01B crude/dry oil exchanger to X-02B crude heater (Dwg. No. C6-1738)	80	9.750	74.66	50	25.92	4.6
10	Emulsion bypass of X-01B crude dry oil exchanger to inlet of X-02B crude heater (Dwg. No. C6-1738)	80	9.750	74.66	50	25.92	4.6
10	PL-032-A from X-02B crude heater outlet to V-01B FWKO inlet (Dwg. No. C6-1738)	80	9.750	74.66	50	25.92	4.6
6	PL-032-A emulsion bypass around X-02B from outlet of X-01A crude/dry oil exchanger outlet (Dwg. No. C6-1736)	80	5.761	26.07	50	9.05	1.6
3	V-01B FWKO level gage bridle (Dwg. No. C6-1738)	80	2.900	6.61	40	1.83	0.3
3	V-01B FWKO level switch bridle (Dwg. No. C6-1738)	80	2.900	6.61	40	1.83	0.3
8	PL-033-A emulsion from V-01B FWKO to X-03B produced water/emulsion exchanger (Dwg. No. C6-1738/C6-1739)	80	7.625	45.66	100	31.71	5.6
8	V-01B FWKO bypass to 8" PL-033-A (Dwg. No. C6-1738)	80	7.625	45.66	75	23.78	4.2
6	PL-034-A emulsion from X-03B outlet to X-04B emulsion heater inlet (Dwg. No. C6-1739)	80	5.761	26.07	50	9.05	1.6
4	PL-034A bypass around X-03B (Dwg. No. C6-1739)	80	3.826	11.50	50	3.99	0.7
6	PL-035-A emulsion from X-04B to V-02B heater treater (Dwg. No. C6-1739)	80	5.761	26.07	100	18.10	3.2
4	PL-035-A bypass around X-04B (Dwg. No. C6-1739)	80	3.826	11.50	50	3.99	0.7
6	PL-036-A dry oil from V-02B outlet to X-01B inlet (Dwg. No. C6-1739/C6-1738)	80	5.761	26.07	100	18.10	3.2
10	Dry oil out of X-01B to 12" PL-029-A (Dwg. No. C6-1738)	80	9.750	74.66	150	77.77	13.8
4	Dry oil bypass around X-01B (Dwg. No. C6-1738)	80	3.826	11.50	50	3.99	0.7
2	PL-086-A rag layer blowdown header to S-02A wet oil tank (Dwg. No. C6-1736/ C6-1737/C6-1738/C6-1739/C6-1742)	80	1.939	2.95	250	5.13	0.9
2	PL-043-A rag layer blowdown from V-01A (Dwg. No. C6-1736)	80	1.939	2.95	50	1.03	0.2
2	PL-059-A rag layer blowdown from V-02A (Dwg. No. C6-1737)	80	1.939	2.95	50	1.03	0.2
2	PL-061-A rag layer blowdown from V-01B (Dwg. No. C6-1738)	80	1.939	2.95	50	1.03	0.2
2	PL-063-A rag layer blowdown from V-02B (Dwg. No. C6-1739)	80	1.939	2.95	50	1.03	0.2
3	S-02A level gage bridle (Dwg. No. C6-1742)	80	2.900	6.61	25	1.15	0.2
6	PL-051-A suction line from S-02A wet oil tank to P-03A/B wet oil recycle pumps (Dwg. No. C6-1742)	80	5.761	26.07	50	9.05	1.6

FIGURE 22.2 (Cont'd)

Platform Elly Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	X-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
2	PL-065-A discharge line from P-03A/B wet oil recycle pumps to S-02A wet oil tank (Dwg. No. C6-1742)	80	1.939	2.95	50	1.03	0.2
4	PL-052-A discharge line from P-03A/B wet oil recycle pumps to 4" x 10" reducer (Dwg. No. C6-1742/C6-1735)	80	3.826	11.50	150	11.98	2.1
10	PL-020-A wet oil recycle from 10" x 4" reducer to 10" bypass of X-06 (Dwg. No. C6-1735)	80	9.750	74.66	100	51.85	9.2
10	Emulsion out of X-06 to 10" PL-020-A (Dwg. No. C6-1735)	80	9.750	74.66	100	51.85	9.2
4	Jumper from 4" PL-052-A to 4" PL-069 (Dwg. No. C6-1742)	80	3.826	11.50	25	2.00	0.4
4	PL-069-A from jumper to 10" PL-031-A inlet to X-02B crude heater (Dwg. No. C6-1742/C6-1738)	80	3.826	11.50	200	15.97	2.8
4	PL-069-A from jumper to S-06 bulk sand storage tank (Dwg. No. C6-1742/C6-1756)	80	3.826	11.50	100	7.99	1.4
4	PL-069-A from branch to S-06 to 4" PL-044-A inlet to X-05B well test crude heater (Dwg. No. C6-1756/C66-1734)	80	3.826	11.50	150	11.98	2.1
4	Suction line from S-02B dry oil tank to P-09 dry oil recycle pump (Dwg. No. C6-1742)	80	3.826	11.50	25	2.00	0.4
2	Discharge line from P-09 dry oil recycle pump to 4" PL-052-A (Dwg. No. C6-1742)	80	1.939	2.95	75	1.54	0.3
3	Bypass from P-09 suction line to 6" PL-051-A (Dwg. No. C6-1742)	80	2.900	6.61	25	1.15	0.2
10	PL-046-A suction header to shipping pumps (Dwg. No. C6-1742/C6-1743)	80	9.750	74.66	50	25.92	4.6
6	PL-070-C suction line from 10" PL-046-A suction header to P-05A shipping pump (Dwg. No. C6-1743)	80	5.761	26.07	15	2.72	0.5
6	PL-071-C suction line from 10" PL-046-A suction header to P-05B shipping pump (Dwg. No. C6-1743)	80	5.761	26.07	15	2.72	0.5
6	PL-072-C suction line from 10" PL-046-A suction header to P-05C shipping pump (Dwg. No. C6-1743)	80	5.761	26.07	15	2.72	0.5
4	Discharge line from P-05A shipping pump to 8" PL-048-C discharge header (Dwg. No. C6-1743)	80	3.826	11.50	15	1.20	0.2
4	Discharge line from P-05B shipping pump to 8" PL-048-C discharge header (Dwg. No. C6-1743)	80	3.826	11.50	15	1.20	0.2
4	Discharge line from P-05C shipping pump to 8" PL-048-C discharge header (Dwg. No. C6-1743)	80	3.826	11.50	15	1.20	0.2
8	PL-048-C discharge header (Dwg. No. C6-1743)	80	7.625	45.66	50	15.85	2.8
4	PL-099-A dry oil bypass from PL-048-C shipping pump discharge header to 6" PL-099-A (Dwg. No. C6-1743)	80	3.826	11.50	75	5.99	1.1
6	PL-099-A dry oil bypass from 4" PL-099-A to 12" PL-029-A inlet to S-02B dry oil tank (Dwg. No. C6-1743/C6-1742)	80	5.761	26.07	75	13.58	2.4
6	"A" P.A.M. dry oil line to 8" PL-049-C (Dwg. No. C6-1743)	80	5.761	26.07	75	13.58	2.4
6	"B" P.A.M. dry oil line to 8" PL-049-C (Dwg. No. C6-1743)	80	5.761	26.07	75	13.58	2.4
8	PL-049-C to 16" dry oil pipeline to shore (Dwg. No. C6-1743/C6-1743 Supp 1)	80	7.625	45.66	150	47.56	8.5
8	PL-047-A slop oil from oil sump to oil sump pump P-23 suction (Dwg. No. C6-1791)	80	7.625	45.66	10	3.17	0.6
6	Slop oil from oil sump pump P-23 discharge (Dwg. No. C6-1791)	80	5.761	26.07	50	9.05	1.6
4	Slop oil to wet oil tank (Dwg. No. C6-1791/C6-1742)	80	3.826	11.50	100	7.99	1.4
8	PL-081-A slop oil tie-in from Ellen oil sump (Dwg. No. C6-1791/C6-1799)	80	7.625	45.66	200	63.42	11.3
8	PL-073-A liquid dump line from high pressure flare drum V-10 to oil sump U-05 (Dwg. No. C6-1794/C6-1793/C6-1791)	80	7.625	45.66	200	63.42	11.3

FIGURE 22.2 (Cont'd)

Platform Elly Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	X-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
2	PL-073-A liquid dump line form low pressure flare drum V-09 to oil sump U-05 (Dwg. No. C6-1792)	80	1.939	2.95	25	0.51	0.1
2	Lube oil refill line from lube oil refill tank to injection pump Saturn turbine drivers (Dwg. No. 008-93-014)	80	1.939	2.95	200	4.10	0.7
2	Lube oil refill line from lube oil refill tank to 2.5 MW generator Centaur turbine drivers (Dwg. No. 008-93-014)	80	1.939	2.95	200	4.10	0.7
0.75	Lube oil from lube oil reservoir T-1A to shipping pump P-05A (Dwg. No. 008-93-015)	80	0.742	0.43	15	0.05	0.0
0.75	Lube oil to lube oil reservoir T-1A from shipping pump P-05A (Dwg. No. 008-93-015)	80	0.742	0.43	15	0.05	0.0
0.75	Lube oil from lube oil reservoir T-1B to shipping pump P-05B (Dwg. No. 008-93-015)	80	0.742	0.43	15	0.05	0.0
0.75	Lube oil to lube oil reservoir T-1B from shipping pump P-05B (Dwg. No. 008-93-015)	80	0.742	0.43	15	0.05	0.0
0.75	Lube oil from lube oil reservoir T-1C to shipping pump P-05C (Dwg. No. 008-93-015)	80	0.742	0.43	15	0.05	0.0
0.75	Lube oil to lube oil reservoir T-1C from shipping pump P-05C (Dwg. No. 008-93-015)	80	0.742	0.43	15	0.05	0.0
4	PL-038-A emulsion from Ellen "A" test header to X-05A well test crude heater (Dwg. No. C6-1733)	80	3.826	11.50	300	23.96	4.3
4	PL-039-A emulsion from Ellen "A" well test crude heater to "A" well test treater (Dwg. No. C6-1733)	80	3.826	11.50	100	7.99	1.4
3	PL-039-A emulsion bypass of Ellen "A" well test crude heater (Dwg. No. C6-1733)	80	2.900	6.61	25	1.15	0.2
3	Well test treater V-03A level gage bridles (Dwg. No. C6-1733)	80	2.900	6.61	25	1.15	0.2
3	PL-040-A wet oil from well test treater V-03A to piping tie-in with well test treater V-03B (Dwg. No. C6-1733/C6-1734)	80	2.900	6.61	50	2.29	0.4
3	Dry oil piping from well test treater V-03A to piping tie-in with well test treater V-03B (Dwg. No. C6-1733/C6-1734)	80	2.900	6.61	50	2.29	0.4
4	PL-044-A emulsion from Ellen "B" test header to X-05B well test crude heater (Dwg. No. C6-1734)	80	3.826	11.50	300	23.96	4.3
4	PL-045-A emulsion from Ellen "B" well test crude heater to "B" well test treater (Dwg. No. C6-1734)	80	3.826	11.50	100	7.99	1.4
3	PL-045-A emulsion bypass of Ellen "B" well test crude heater (Dwg. No. C6-1733)	80	2.900	6.61	25	1.15	0.2
3	PL-041-A wet oil from well test treater V-03B to piping tie-in with well test treater V-03A (Dwg. No. C6-1734)	80	2.900	6.61	50	2.29	0.4
3	Dry oil piping from well test treater V-03B to piping tie-in with well test treater V-03A (Dwg. No. C6-1734)	80	2.900	6.61	50	2.29	0.4
4	PL-040-A wet oil from test treaters to V-02A heater treater inlet piping (Dwg. No. C6-1737)	80	3.826	11.50	100	7.99	1.4
3	Dry oil from test treaters to dry oil tank inlet piping (Dwg. No. C6-1734/C6-1742)	80	2.900	6.61	150	6.88	1.2
12	PL-018 emulsion from Eureka to inlet to U-08 sphere receiver-oil (Dwg. No. C6-1735)	80	11.374	101.64	150	105.88	18.8
10	PL-019-C bypass line for Eureka emulsion around U-08 sphere receiver to X-06 Eureka crude heater (Dwg. C6-1735)	80	9.750	74.66	150	77.77	13.8
10	Bypass for X-06 Eureka crude heater to 18" PL-017-A (Dwg. No. C6-1735)	80	9.750	74.66	100	51.85	9.2
6	U-08 sphere receiver for Eureka emulsion bypass to 8" x 6" reducer in PL-068-A to X-02A crude heater (No. C6-1735)	80	5.761	26.07	100	18.10	3.2
8	U-08 sphere receiver bypass from 8" x 6" reducer in PL-068-A to 10" PL-023-A (Dwg. No. C6-1735/C6-1736)	80	7.625	45.66	100	31.71	5.6
8	PL-068-A from upstream of X-02A to 10" PL-032-A downstream of X-02B (Dwg. No. C6-1738)	80	7.625	45.66	100	31.71	5.6

FIGURE 22.2 (Cont'd)

Platform Elly Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	X-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
10	Emulsion piping from X-06 Eureka crude heater to 14" PL-017-A (Dwg. No. C6-1735/ C6-1736)	80	9.750	74.66	100	51.85	9.2
2	PL-066-A from U-08 Eureka oil sphere receiver to 8" PL-068-A (Dwg. No. C6-1736)	80	1.939	2.95	200	4.10	0.7
14	PL-017-A emulsion from Ellen bulk manifold to 18" x 14" reducer	80	12.500	122.75	200	170.44	30.3
18	PL-017-A emulsion from 18" x 14" reducer to branches to X-01A and X-01B exchangers (Dwg. No. C6-1735/C6-1736)	80	16.124	204.24	300	425.50	75.7
14	PL-017-A emulsion to X-01A crude/dry oil exchanger (Dwg. No. C6-1736)	80	12.500	122.72	100	85.22	15.2
10	PL-022-A emulsion from X-01A crude/dry oil exchanger to X-02A crude heater (Dwg. No. C6-1736)	80	9.750	74.66	50	25.92	4.6
10	Emulsion bypass of X-01A crude dry oil exchanger to inlet of X-02A crude heater (Dwg. No. C6-1736)	80	9.750	74.66	50	25.92	4.6
10	PL-023-A from X-02A crude heater outlet to V-01A FWKO inlet (Dwg. No. C6-1736)	80	9.750	74.66	50	25.92	4.6
6	PL-023-A emulsion bypass around X-02A from outlet of X-01A crude/dry oil exchanger outlet (Dwg. No. C6-1736)	80	5.761	26.07	50	9.05	1.6
3	V-01A FWKO level gage bridle (Dwg. No. C6-1736)	80	2.900	6.61	40	1.83	0.3
3	V-01A FWKO level switch bridle (Dwg. No. C6-1736)	80	2.900	6.61	40	1.83	0.3
8	PL-024-A emulsion from V-01A FWKO to X-03A produced water/emulsion exchanger (Dwg. No. C6-1736/C6-1737)	80	7.625	45.66	100	31.71	5.6
8	V-01A FWKO bypass to 8" PL-024-A (Dwg. No. C6-1736)	80	7.625	45.66	75	23.78	4.2
14	PL-017-A emulsion to X-01B crude/dry oil exchanger (Dwg. No. C6-1736/C6-1738)	80	12.500	122.72	200	170.44	30.3
6	PL-025-A emulsion from X-03A outlet to X-04A emulsion heater inlet (Dwg. No. C6-1737)	80	5.761	26.07	50	9.05	1.6
4	PL-025-A bypass around X-03A (Dwg. No. C6-1737)	80	3.826	11.50	50	3.99	0.7
6	PL-026-A emulsion from X-04A to V-02A heater treater (Dwg. No. C6-1737)	80	5.761	26.07	100	18.10	3.2
1.5	Lube oil piping – injection pump turbine driver skid NP-07A (Dwg. No. C6-1767)	80	1.500	1.77	50	0.61	0.1
2	Diesel fuel supply piping – injection pump turbine driver skid NP-07A (Dwg. No. C6-1767)	80	1.939	2.95	50	1.03	0.2
0.5	Diesel fuel bypass piping – injection pump turbine driver skid NP-07A (Dwg. No. C6-1767)	80	0.546	0.23	25	0.04	0.0
2	FD-016-A diesel fuel supply piping – injection pump turbine driver NP-07A (Dwg. No. C6-1767)	80	1.939	2.95	50	1.03	0.2
0.5	FD-041-A diesel fuel bypass piping – injection pump turbine driver NP-07A (Dwg. No. C6-1767)	80	0.546	0.23	25	0.04	0.0
1.5	Lube oil piping – injection pump turbine driver skid NP-07A (Dwg. No. C6-1768)	80	1.500	1.77	50	0.61	0.1
2	Diesel fuel supply piping – injection pump turbine driver skid NP-10A (Dwg. No. C6-1768)	80	1.939	2.95	50	1.03	0.2
0.5	Diesel fuel bypass piping – injection pump turbine driver skid NP-10A (Dwg. No. C6-1768)	80	0.546	0.23	25	0.04	0.0
2	FD-014-A diesel fuel supply piping – injection pump turbine driver NP-10A (Dwg. No. C6-1768)	80	1.939	2.95	50	1.03	0.2
0.5	FD-039-A diesel fuel bypass piping – injection pump turbine driver NP-10A (Dwg. No. C6-1768)	80	0.546	0.23	25	0.04	0.0
1.5	Lube oil piping – injection pump turbine driver skid NP-10B (Dwg. No. C6-1769)	80	1.500	1.77	50	0.61	0.1
2	Diesel fuel supply piping – injection pump turbine driver skid NP-10B (Dwg. No. C6-1769)	80	1.939	2.95	50	1.03	0.2

FIGURE 22.2 (Cont'd)

Platform Elly Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	X-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
0.5	Diesel fuel bypass piping – injection pump turbine driver skid NP-10B (Dwg. No. C6-1769)	80	0.546	0.23	25	0.04	0.0
2	FD-015-A diesel fuel supply piping – injection pump turbine driver NP-10B (Dwg. No. C6-1769)	80	1.939	2.95	50	1.03	0.2
0.5	FD-040-A diesel fuel bypass piping – injection pump turbine driver NP-10B (Dwg. No. C6-1769)	80	0.546	0.23	25	0.04	0.0
2	OL-10A lube oil piping – 2.5 MW generator Centaur turbine driver skid NJ-01A (Dwg. No. C6-1776)	80	1.939	2.95	40	0.82	0.1
1	Diesel fuel supply piping – 2.5 MW generator Centaur turbine driver skid NJ-01A (Dwg. No. C6-1776)	80	0.957	0.72	40	0.20	0.0
2	OL-02A-A lube oil bypass piping – 2.5 MW generator Centaur turbine driver skid NJ-01A (Dwg. No. C6-1776)	80	1.939	2.95	25	0.51	0.1
1	FD-017-A diesel fuel supply piping – 2.5 MW generator Centaur turbine driver NJ-01A (Dwg. No. C6-1776)	80	0.957	0.72	50	0.25	0.0
2	FD-017-A diesel fuel supply piping – 2.5 MW generator Centaur turbine driver NJ-01A (Dwg. No. C6-1776)	80	1.939	2.95	150	3.07	0.5
2	OL-01B lube oil piping – 2.5 MW generator Centaur turbine driver skid NJ-01B (Dwg. No. C6-1777)	80	1.939	2.95	40	0.82	0.1
1	FD-019B-A diesel fuel supply piping – 2.5 MW generator Centaur turbine driver skid NJ-01B (Dwg. No. C6-1777)	80	0.957	0.72	40	0.20	0.0
2	OL-02B-A lube oil bypass piping – 2.5 MW generator Centaur turbine driver skid NJ-01B (Dwg. No. C6-1777)	80	1.939	2.95	25	0.51	0.1
1	FD-018-A diesel fuel supply piping – 2.5 MW generator Centaur turbine driver NJ-01B (Dwg. No. C6-1777)	80	0.957	0.72	50	0.25	0.0
2	FD-018-A diesel fuel supply piping – 2.5 MW generator Centaur turbine driver NJ-01B (Dwg. No. C6-1777)	80	1.939	2.95	150	3.07	0.5
2	OL-01C lube oil piping – 2.5 MW generator Centaur turbine driver skid NJ-01C (Dwg. No. C6-1778)	80	1.939	2.95	25	0.51	0.1
1	FD-019C-A diesel fuel supply piping – 2.5 MW generator Centaur turbine driver skid NJ-01C (Dwg. No. C6-1778)	80	0.957	0.72	25	0.12	0.0
2	OL-02C-A lube oil bypass piping – 2.5 MW generator Centaur turbine driver skid NJ-01C (Dwg. No. C6-1778)	80	1.939	2.95	750	15.36	2.7
1	FD-019-A diesel fuel supply piping – 2.5 MW generator Centaur turbine driver NJ-01C (Dwg. No. C6-1778)	80	0.957	0.72	750	3.74	0.7
2	FD-019-A diesel fuel supply piping – 2.5 MW generator Centaur turbine driver NJ-01C (Dwg. No. C6-1778)	80	1.939	2.95	25	0.51	0.1
4	FD-001-A diesel fuel unloading line (Dwg. No. C6-1787)	80	3.826	11.50	100	7.99	1.4
4	FD-002-A diesel fuel unloading line (Dwg. No. C6-1787)	80	3.826	11.50	50	3.99	0.7
4	FD-008-A diesel fuel transfer line to/from Platform Ellen (Dwg. No. C6-1787/ C6-1797)	80	3.826	11.50	300	23.96	4.3
4	FD-003-A diesel fuel transfer line to suction of diesel transfer pumps P-11A/P-11B (Dwg. No. C6-1787)	80	3.826	11.50	25	2.00	0.4
4	FD-004-A diesel fuel transfer line – discharge of diesel transfer pumps to transfer filter (Dwg. No. C6-1787)	80	3.826	11.50	50	3.99	0.7
2	FD-005-A diesel fuel recycle line to diesel fuel tank (Dwg. No. C6-1787)	80	1.939	2.95	50	1.02	0.2
2	Diesel tank level gage main bridle (Dwg. No. C6-1787)	80	1.939	2.95	25	0.51	0.1
0.5	Diesel tank individual level gage piping (Dwg. No. C6-1787)	80	0.546	0.23	25	0.04	0.0
0.5	Diesel tank individual level transmitter gage piping (Dwg. No. C6-1787)	80	0.546	0.23	25	0.04	0.0
2	FD-005-A diesel fuel transfer line form transfer filter to injection pump diesel day tank (Dwg. No. C6-1787)	80	1.939	2.95	100	2.05	0.4
2	FD-005-A diesel transfer line to deck crane L-01A (Dwg. No. C6-1787)	80	1.9396	2.95	100	2.05	0.4
2	FD-005-A diesel transfer line to deck crane L-01B (Dwg. No. C6-1787)	80	1.939	2.95	100	2.05	0.4

FIGURE 22.2 (Cont'd)

Platform Elly Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	X-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
3	FD-009-A injection pump diesel transfer header (Dwg. No. C6-1788)	80	2.900	6.61	200	9.17	1.6
3	FD-007-A diesel transfer line to generator diesel day tank (Dwg. No. C6-1787)	80	2.900	6.61	200	9.17	1.6
3	FD-010-A diesel transfer line to standby generator JZ-01X (Dwg. No. C6-1787)	80	2.900	6.61	200	9.17	1.6
3	FD-010-A generator diesel header (Dwg. No. C6-1787/C6-1788)	80	2.900	6.61	200	9.17	1.6
2	FD-038-A diesel return header (Dwg. No. C6-1787/C6-1788)	80	1.939	2.95	200	4.10	0.7
1.5	FD-050-A diesel transfer line to standby generator ZAN-9007 (Dwg. No. C6-1787/ 4000-F-006)	80	1.500	1.77	50	0.61	0.1
3	FD-008-A diesel crossover line from transfer filter to transfer line to/from Ellen (Dwg. No. C6-1787)	80	2.900	6.61	50	2.29	0.4
1.5	Diesel fuel piping on standby generator skid JZ-02X (Dwg. No. C6-1787)	80	1.500	1.77	25	0.31	0.1
2	FD-045-A diesel fuel piping to Mars turbine driver for 6 MW generators (Dwg. No. C6-1787/4000-F-002)	80	1.939	2.95	200	4.10	0.7
2	Diesel fuel piping to liquid fuel booster pumps and Mars turbine driver for 6 MW generator ZAN-9005 (No. 400-F-002)	80	1.939	2.95	75	1.54	0.3
2	Diesel fuel piping to liquid fuel booster pumps and Mars turbine driver for 6 MW generator ZAN-9006 (No. 4000-F-002)	80	1.939	2.95	75	1.54	0.3
8	Dry oil line from 8" PL-049-C to inlet to U-10 sphere launcher for 16" oil line to shore (Dwg. No. C6-1743 Supp 1)	80	7.625	45.66	75	23.78	4.2
6	Dry oil line from Edith to inlet of M-4 oil pig receiver (Dwg. No. C6-1743 Supp 1)	80	5.761	26.07	75	13.58	2.4
6	1243-C-6" bypass of M-5 Edith oil pig receiver to 6" x 3" reducer	80	5.761	26.07	25	4.53	0.8
4	1249-C-4" outlet from M-5 Edith oil pig receiver to 1243-C-6" (Dwg. No. C6-1743 Supp 1)	80	3.826	11.50	25	2.00	0.4
3	1245-C-3" from 6" x 3" reducer to inlet to F-1 filter (Dwg. No. C6-1743 Supp 1)	80	2.900	6.61	10	0.46	0.1
3	1245-C-3" from F-1 filter outlet to FM M-6A meter inlet (Dwg. No. C6-1743 Supp 1)	80	2.900	6.61	10	0.46	0.1
3	1246-C-3" from 6" x 3" reducer to inlet to F-2 filter (Dwg. No. C6-1743 Supp 1)	80	2.900	6.61	10	0.46	0.1
3	1246-C-3" from F-2 filter outlet to FM M-6B meter inlet (Dwg. No. C6-1743 Supp 1)	80	2.900	6.61	10	0.46	0.1
3	1245-C-3" from FM M-6A outlet to bypass of filters/meters (Dwg. No. C6-1743 Supp 1)	80	2.900	6.61	10	0.46	0.1
3	1245-C-3" from FM M-6A outlet to bypass of filters/meters (Dwg. No. C6-1743 Supp 1)	80	2.900	6.61	10	0.46	0.1
3	Bypass of filters/meters (Dwg. No. C6-1743 Supp 1)	80	2.900	6.61	25	1.15	0.2
6	Line with Edith oil to 16" dry oil shipping line to shore (Dwg. No. C6-1743 Supp 1)	80	5.761	26.07	25	4.53	0.8
4	PL-107-A Edith oil to dry oil tanks (Dwg. No. C6-1743 Supp 1)	80	3.826	11.50	150	11.98	2.1
16	Dry oil line form U-10 sphere receiver to +12 level (Dwg. No. C6-1743 Supp 1)	80	14.312	160.92	75	83.81	14.9
2	PL-305-A liquid discharge from V-1004 35# gas scrubber to 3" PL-057 (Dwg. No. C6-1744 Supp 1/C6-1744)	80	1.939	2.95	100	2.05	0.4
3	PL-057-A from VZ-04X vapor recovery compressor suction scrubber to S-02A wet oil tank (No. C6-1744/C6-1742)	80	2.900	6.61	150	6.88	1.2
2	3" PL-057-A to U-05 oil sump (Dwg. No. C6-1744-C6-1742)	80	2.900	6.61	150	6.88	1.2
4	PL-053-A header for vessel liquid dumps to V-10 H.P. scrubber (Dwg. No. C6-1744/ C6-1745/C6-1794)	80	3.826	11.50	200	15.97	2.8

FIGURE 22.2 (Cont'd)

Platform Elly Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	X-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
3	PL-053-A liquid dump from V-18 slug catcher to 4" PL-053-A (Dwg. No. C6-1744)	80	2.900	6.61	50	2.29	0.4
2	Liquid dump from VZ-05AX "A" fuel gas compressor suction scrubber to 4" PL-053-A (Dwg. No. C6-1745)	80	1.939	2.95	50	1.03	0.2
2	Liquid dump from VZ-06AX "A" fuel gas compressor interstage scrubber to 4" PL-053-A (Dwg. No. C6-1745)	80	1.939	2.95	50	1.03	0.2
2	PL-053-A liquid dump from VZ-05BX "B" fuel gas compressor suction scrubber to 4" PL-053-A (Dwg. No. C6-1746)	80	1.939	2.95	50	1.03	0.2
2	PL-053-A liquid dump from VZ-06BX "B" fuel gas compressor interstage scrubber to 4" PL-053-A (Dwg. No. C6-1746)	80	1.939	2.95	50	1.03	0.2
1	PL-138-B liquid out of MAK-9003 fuel gas filter separator to 1" PL-142-B (Dwg. No. 4000-F-001)	80	0.957	0.72	25	0.12	0.0
1	PL-139-B liquid out of MAK-9003 fuel gas filter separator to 1" PL-142-B (Dwg. No. 4000-F-001)	80	0.957	0.72	25	0.12	0.0
1	PL-140-B liquid out of MAK-9004 fuel gas filter separator to 1" PL-144-B (Dwg. No. 4000-F-001)	80	0.957	0.72	25	0.12	0.0
1	PL-141-B liquid out of MAK-9004 fuel gas separator to 1" PL-144-B (Dwg. No. 4000-F-001)	80	0.957	0.72	25	0.12	0.0
1	PL-142-B liquid from MAK-9003 fuel gas filter separator to 2" PL-143-A (Dwg. No. 4000-F-001)	80	0.957	0.72	25	0.12	0.0
1	PL-144-B liquid from MAK-9004 fuel gas filter separator to 2" PL-143-A (Dwg. No. 4000-F-001)	80	0.957	0.72	25	0.12	0.0
1	PL-137-B liquid out of MBL-1003 fuel gas receiver to 1" PL-143-A (Dwg. No. 4000-F-001)	80	0.957	0.72	25	0.12	0.0
1	PL-143-A liquid from MBL-1003 fuel gas receiver to 2" PL-143-A (Dwg. No. 4000-F-001)	80	0.957	0.72	25	0.12	0.0
2	PL-143-A liquid dump header to 3" PL-058-A (Dwg. No. 4000-F-001/C6-1747)	80	1.939	2.95	100	2.05	0.4
3	PL-058-A liquid dump header from 2" PL-143-A to 18" PL-017 bulk manifold (Dwg. No. C6-1747/C6-1736)	80	2.900	6.61	200	9.17	1.6
2	PL-101-A V-15A fuel gas scrubber liquid dump to 3" PL-058-A (Dwg. No. C6-1747)	80	1.939	2.95	25	0.51	0.1
2	PL-102-A V-15B fuel gas scrubber liquid dump to 3" PL-058-A (Dwg. No. C6-1747)	80	1.939	2.95	25	0.51	0.1
2	PL-121-A liquid dump header to 3" PL-058-A (Dwg. No. C6-1788/C6-1747)	80	1.939	2.95	200	4.10	0.7
1	Liquid dump line from F-14A injection pump turbine fuel gas filter to 2" PL-121 (Dwg. No. C6-1788)	80	0.957	0.72	25	0.12	0.0
1	Liquid dump line form F-14B injection pump turbine fuel gas filter to 2" PL-121 (Dwg. No. C6-1788)	80	0.957	0.72	25	0.12	0.0
2	PL-120-A liquid dump header to 3" PL-058-A (Dwg. No. C6-1788/C6-1747)	80	1.939	2.95	200	4.10	0.7
1	Liquid dump line from F-13A generator turbine fuel gas filter to 2" PL-121 (Dwg. No. C6-1788)	80	0.957	0.72	25	0.12	0.0
1	Liquid dump line from F-13B generator turbine fuel gas filter to 2" PL-121 (Dwg. No. C6-1788)	80	0.957	0.72	25	0.12	0.0
TOTAL							**468.8**

FIGURE 22.2 (Cont'd)

Platform Elly Estimated Hydrocarbon Volumes – Tanks/Vessels						
Description	**Diameter (inches)**	**Length S/S (inches)**	**Shell Volume (cu. ft.)**	**Head Volume (cu. ft.)**	**Total Volume (cu. ft.)**	**Total Volume (bbls)**
Lube oil tank – injection pump turbine driver NP-07A						1.79
Lube oil tank – injection pump turbine driver NP-10A						1.79
Lube oil tank – injection pump turbine driver NP-10B						1.79
Lube oil tank – Centaur turbine generator driver NJ-01A						5.19
Lube oil tank – Centaur turbine generator driver NJ-01B						5.19
Lube oil tank – Centaur turbine generator driver NJ-01C						5.19
S-10 diesel fuel tank (Dwg. No. C6-1787)						1,000.00
S-11 injection pump diesel day tank (Dwg. No. C6-1787)						150.00
S-12 generator diesel day tank (Dwg. No. C6-1787)						150.00
SZ-13X standby generator diesel day tank (Dwg. No. C6-1787)						12.62
F-07 diesel fuel unloading filter (Dwg. No. C6-1787)	10	37	1.68	0.00	1.68	0.30
F-11 diesel fuel transfer filter (Dwg. No. C6-1787)	10	37	1.68	0.00	1.68	0.30
U-05 oil sump (Dwg. No. C6-1791)	48	192	201.06	16.59	217.65	38.77
V-10 high pressure flare drum (Dwg. No. C6-1794)	72	120	282.74	56.55	339.29	60.43
V-09 low pressure flare drum (Dwg. No. C6-1792)	48	108	113.10	16.76	129.85	23.13
Turbine lube oil refill tank (Dwg. No. 008-93-014)						5.95
V-09 low pressure flare drum (Dwg. No. C6-1792)	48	108	113.10	16.76	129.85	23.13
Turbine lube oil refill tank (Dwg. No. 008-93-014)						5.95
T-1A shipping pump "A" lube oil tank (Dwg. No. 008-93-015)						0.60
T-1B shipping pump "B" lube oil tank (Dwg. No. 008-93-015)						0.60
T-1C shipping pump "C" lube oil tank (Dwg. No. 008-93-015)						0.60
X-05A well test crude heater (Dwg. No. C6-1733)						3.17
V-03A well test treater (Dwg. No. C6-1733)	96	204	854.51	134.04	988.55	176.07
X-05B well test crude heater (Dwg. No. C6-1734)						3.17
V-03B well test treater (Dwg. No. C6-1734)	96	204	854.51	134.04	988.55	176.07
U-08 sphere receiver-oil (Dwg. No. C6-1735)	12/16	12/7	20.89	0.53	21.42	3.82
X-06 Eureka crude heater (Dwg. No. C6-1735)						1.79
X-01A crude/dry oil exchanger (Dwg. No. C6-1736)	42	240	192.42	5.61	198.03	35.27
X-02A crude heater (Dwg. No. C6-1736)						0.82
V-01A FWKO (Dwg. No. C6-1736)	120	480	3,141.59	261.80	3,403.39	606.17

FIGURE 22.2 (Cont'd)

Platform Elly Estimated Hydrocarbon Volumes – Tanks/Vessels (Cont'd)						
Description	**Diameter (inches)**	**Length S/S (inches)**	**Shell Volume (cu. ft.)**	**Head Volume (cu. ft.)**	**Total Volume (cu. ft.)**	**Total Volume (bbls)**
X-03A produced water emulsion exchanger (Dwg. No. C6-1737)						19.06
X-04A emulsion heater (Dwg. No. C6-1737)						8.78
V-02A heater treater (Dwg. No. C6-1737)	144	540	5,089.38	452.39	5,541.76	987.03
X-01B crude/dry oil exchanger (Dwg. No. C6-1738)	42	240	192.42	5.61	198.03	35.27
X-02B crude heater (Dwg. No. C6-1738)						0.82
V-01B FWKO (Dwg. No. C6-1738)	120	480	3,141.59	261.80	3,403.39	606.17
X-03B produced water emulsion exchanger (Dwg. No. C6-1738)						19.06
X-04B emulsion heater (Dwg. No. C6-1739)						8.78
V-02B heater treater (Dwg. No. C6-1739)	144	540	5,089.38	452.39	5,541.76	987.03
S-02A wet oil tank (Dwg. No. C6-1742)						500.00
S-02B dry oil tank (Dwg. No. C6-1742)						2,500.00
M-5 Edith oil pig receiver (Dwg. No. C6-1743 Supp 1)	8	36	1.05	0.08	1.12	0.20
U-10 sphere launcher for 16" dry oil line to shore (Dwg. No. C6-1743 Supp 1)	20	138	25.09	5.09	30.18	5.37
V-1004B 35# gas scrubber	60	144	235.62	32.72	268.34	47.79
VZ-04X vapor recovery compressor suction scrubber (Dwg. No. C6-1744)	42	96	76.97	11.22	88.19	15.71
V-18 slug catcher (Dwg. No. C6-1744)	30	96	39.27	4.09	43.36	7.72
VZ-05AX "A" fuel gas compressor suction scrubber (Dwg. No. C6-1745)	30	96	39.27	4.09	43.36	7.72
VZ-06AX "A" fuel gas compressor interstage scrubber (Dwg. No. C6-1745)	30	96	39.27	4.09	43.36	7.72
VZ-05BX "B" fuel gas compressor suction scrubber (Dwg. No. C6-1746)	30	96	39.27	4.09	43.36	7.72
VZ-06BX "B" fuel gas compressor interstage scrubber (Dwg. No. C6-1746)	30	96	39.27	4.09	43.36	7.72
MAK-9003 fuel gas separator filter (Dwg. No. 4000-F-001)	22	133	29.26	0.81	30.06	5.35
MAK-9004 fuel gas separator filter (Dwg. No. 4000-F-001)	22	133	29.26	0.81	30.06	5.35
V-15A fuel gas scrubber (Dwg. No. C6-1747)	35	116	64.59	6.50	71.08	12.66
V-15B fuel gas scrubber (Dwg. No. C6-1747)	35	116	64.59	6.50	71.08	12.66
F-14A injection pump turbine fuel gas filter (Dwg. No. C6-1788)	10.75	82	4.31	0.09	4.40	0.78
F-14B injection pump turbine fuel gas filter (Dwg. No. C6-1788)	10.75	82	4.31	0.09	4.40	0.78
F-13A generator turbine fuel gas filter (Dwg. No. C6-1788)	12.75	83	6.13	0.16	6.29	1.12
F-13B generator turbine fuel gas filter (Dwg. No. C6-1788)	12.75	83	6.13	0.16	6.29	1.12
TK1000 temporary dry oil tank (Dwg. No. C6-1749) Brine Storage, not crude oil						600.00
TK1001 temporary dry oil tank (Dwg. No. C6-1749) Brine Storage, not crude oil						600.00
TOTAL						**9,518.16**

FIGURE 22.3

Platform Eureka Estimated Hydrocarbon Volumes – Pipelines							
Nominal Diameter (inches)	**Description**	**Schedule**	**Inside Diameter (inches)**	**Cross-Sectional Area (sq. inches)**	**Length (ft.)**	**Volume (cu. ft.)**	**Volume (bbls)**
3	PL-701 flowlines from West Well Bay (typical of 19) (Dwg. No. 3900-F-403)	80	2.900	6.61	2,850	130.72	23.2
3	PL-731 flowlines from East Well Bay (typical of 19) (Dwg. No. 3900-F-404)	80	2.900	6.61	2,850	130.72	23.2
6	PL-813-H "B" well test manifold in West Well Bay (Dwg. No. 3900-F-403)	80	5.761	26.07	50	9.05	1.6
6	PL-103-H "B" well test header from West Well Bay to MAM-1102B (Dwg. No. 3900-F-403/404/409)	80	5.761	26.07	150	27.16	4.8
6	PL-817-H "B" well test manifold in East Well Bay (Dwg. No. 3900-F-404)	80	5.761	26.07	50	9.05	1.6
6	PL-103-H tie-in from East Well Bay "B" test manifold to 6" PL-103 well test header (Dwg. No. 3900-F-404)	80	5.761	26.07	150	27.16	4.8
6	PL-812-H "A" well test manifold in West Well Bay (Dwg. No. 3900-F-403)	80	5.761	26.07	50	9.05	1.6
6	PL-102-H "A" well test header from West Well Bay to MAM-1102A (Dwg. No. 3900-F-403/404/408)	80	5.761	26.07	150	27.16	4.8
6	PL-818-H "A" well test manifold in East Well Bay (Dwg. No. 3900-F-404)	80	5.761	26.07	50	9.05	1.6
6	PL-102-H tie-in from East Well Bay "B" test manifold to 6" PL-102 well test header (Dwg. No. 3900-F-404)	80	5.761	26.07	150	27.16	4.8
6	PL-811-H production manifold in West Well Bay (Dwg. No. 3900-F-403)	80	5.761	26.07	50	9.05	1.6
10	PL-101-H production header from West Well Bay to 10" x 12" reducer (Dwg. No. 3900-F-403/404/405/406)	80	9.750	74.66	100	51.85	9.2
6	PL-815-H production manifold in East Well Bay (Dwg. No. 3900-F-404)	80	5.761	26.07	50	9.05	1.6
10	PL-101-H tie-in from East Well Bay production manifold to 12" PL-101 production header (Dwg. No. 3900-F-404)	80	9.750	74.66	100	51.85	9.2
12	PL-101-H production header from 10" x 12" reducer to MAY-1101 (Dwg. No. 3900-F-404/405/406)	80	11.374	101.64	200	141.17	25.1
6	PL-814-H well cleanup manifold in West Well Bay (Dwg. No. 3900-F-403)	80	5.761	26.07	50	905	1.6
6	PL-1040-H well cleanup header in West Well Bay to MAY-1116 (Dwg. No. 3900-F-403/404/405)	80	5.761	26.07	150	27.16	4.8
6	PL-818-H well cleanup manifold in East Well Bay (Dwg. No. 3900-F-404)	80	5.761	26.07	50	9.05	1.6
6	PL-1040-H tie-in from well cleanup manifold in East Well Bay well cleanup header (Dwg. No. 3900-F-404)	80	5.761	26.07	150	27.16	4.8
6	Crossover from PL-103 "B" well test header to 12" PL-101 production header (Dwg. No. 3900-F-404)	80	5.761	26.07	25	4.53	0.8
6	Crossover from PL-102 "A" well test header to 12" PL-101 production header (Dwg. No. 3900-F-404)	80	5.761	26.07	25	4.53	0.8
6	Crossover from PL-1040 well cleanup header to 12" PL-101 production header (Dwg. No. 3900-F-404)	80	5.761	26.07	25	4.53	0.8
10	PL-118-E S.V. bypass from East Well Bay production manifold to downstream of shipping pumps (No. 3900-F-404/407)	80	9.750	74.66	300	155.54	27.7
6	PL-1043-A liquid outlet from MAY-1116 to ABJ-1105 well cleanup tank (Dwg. No. 3900-F-405/406)	80	5.761	26.07	150	27.16	4.8
6	PL-040-A liquid outlet from ABJ-1105 to suction of PBA-1308 solids transfer pump (Dwg. No. 3900-F-406)	80	5.761	26.07	25	4.53	0.8
4	PL-040-A liquid outlet from discharge of PBA-1308 to 6" PL-110-A (Dwg. No. 3900-F-406)	80	3.826	11.50	100	7.99	1.4
6	PL-108-A liquid outlet from ABJ-1105 to suction of PBA-1303 liquid transfer pump (Dwg. No. 3900-F-406)	80	5.761	26.07	25	4.53	0.8
6	Crossover between suction of PBA-1303 and PBA-1304 (Dwg. No. 3900-F-406)	80	5.761	26.07	25	4.53	0.8

FIGURE 22.3 (Cont'd)

Platform Eureka Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	Cross-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
6	PL-110-A liquid discharge from PBA-1303 to junction of PL-110-A/PL-111-A (Dwg. No. 3900-F-406)	80	5.761	26.07	50	9.05	1.6
6	PL-110-A from intersection with PBA-1303 discharge/6" PL-111-A to MAY-1101 inlet piping (Dwg. No. 3900-F-406)	80	5.761	26.07	100	18.10	3.2
16	PL-105-A wet oil out of MAY-1101 to inlet PAX-1301-A/B shipping pumps (Dwg. No. 3900-F-406/407)	80	16.124	204.24	150	212.75	37.8
10	PL-106-A wet oil from 16" PL-105 to ABJ-1105 (Dwg. No. 3900-F-406)	80	9.750	74.66	200	103.69	18.4
6	PL-111-A liquid from intersection with 6" PL-110-A to HBG-1103 A/B inlet piping (Dwg. No. 3900-F-406/408/409)	80	5.761	26.07	200	36.21	6.4
4	PL-139-A liquid from ABJ-1105 to utility pump suction header (Dwg. No. 3900-F-406/413)	80	3.826	11.50	150	11.98	2.1
4	Liquid from ABJ-1105 to high pressure mud pump suction header (Dwg. No. 3900-F-406/452)	80	3.826	11.50	150	11.98	2.1
8	Emulsion discharge line from PAX-1301 A/B to discharge header (Dwg. No. 3900-F-407)	80	3.826	11.50	20	1.60	0.3
6	Emulsion recycle line from discharge to suction of PAX-1301 A/B (Dwg. No. 3900-F-407)	80	5.761	26.07	20	3.62	0.6
12	PL-118-A discharge header from PAX-1301 A/B to inlet to 12" wet oil line to Elly (Dwg. No. 3900-F-407)	80	11.374	101.64	150	105.88	18.8
4	Emulsion charge line from 12" PL-118 to KAH-1603 crude oil sphere launcher (Dwg. No. 3900-F-407)	80	3.826	11.50	25	2.00	0.4
12	PL-104 emulsion bypass line around PAX-1301 A/B to PAX-1302 A/B/C suction header (Dwg. No. 3900-F-407)	80	11.374	101.64	100	70.58	12.6
6	PL-118-A suction lines to P-1302 A/B/C (Dwg. No. 3900-F-407)	80	5.761	26.07	30	5.43	1.0
6	Emulsion in discharge lines from P-1302 A/B/C to 12" discharge header	80	5.761	26.07	30	5.43	1.0
4	Emulsion recycle line from discharge to suction of PAX-1302 A/B/C (Dwg. No. 3900-F-407)	80	3.826	11.50	25	2.00	0.4
12	PAX-1302 A/B/C discharge header to tie-in with PAX-1301 A/B discharge header (Dwg. No. 3900-F-407)	80	11.374	101.64	50	35.29	6.3
8	PL-101-A production liquid return line from PAX-1302 A/B/C discharge header to MAY-1101 inlet piping (3900-F-407)	80	7.625	45.66	200	63.42	11.3
12	Wet oil pipeline to Elly from KAH-1603 to +12 level (Dwg. No. 3900-F-407)	80	11.374	101.64	75	52.94	9.4
2	Level control bridle for MAY-1101 (Dwg. No. 3900-F-407)	80	1.939	2.95	75	1.54	0.3
4	PL-115 wet oil from MAM-1102A to MBD-1104A (Dwg. No. 3900-F-408)	80	3.826	11.50	25	2.00	0.4
2	Level gage bridle for MAM-1102A (Dwg. No. 3900-F-408)	80	1.939	2.95	25	0.51	0.1
4	MAM-1102A bypass from 6" PL-2102-A to HBG-1103A inlet (Dwg. No. 3900-F-408)	80	3.826	11.50	50	3.99	0.7
4	PL-128-A bypass from 6" PL-102-A around MAM-1102A and HBG-1103A (Dwg. No. 3900-F-408)	80	3.826	11.50	50	3.99	0.7
2	PL-1018-A from MAM-1102A to suction of PBA-1102A (Dwg. No. 3900-F-408)	80	1.939	2.95	25	0.51	0.1
2	PL-103-A from PBA-1102A discharge to MAM-1102A inlet piping (Dwg. No. 3900-F-408)	80	1.939	2.95	25	0.51	0.1
2	PL-117 wet oil out of MAM-1102A to 4" PL-113-A (Dwg. No. 3900-F-408)	80	1.939	2.95	50	1.02	0.2
2	Level gage bridle for MBD-1104A (Dwg. No. 3900-F-408)	80	1.939	2.95	25	0.51	0.1
2	PL-113-A emulsion out of MDB-1104A to 4" PL-113-A (Dwg. No. 3900-F-408)	80	1.939	2.95	50	1.03	0.2

FIGURE 22.3 (Cont'd)

Platform Eureka Estimated Hydrocarbon Volumes – Pipelines (Cont'd)							
Nominal Diameter (inches)	**Description**	**Schedule**	**Inside Diameter (inches)**	**Cross-Sectional Area (sq. inches)**	**Length (ft.)**	**Volume (cu. ft.)**	**Volume (bbls)**
2	PL-124-A wet oil out of MBD-1104A to 4" PL-113-A (Dwg. No. 3900-F-408)	80	1.939	2.95	50	1.03	0.2
4	PL-113-A wet oil to 12" PL-101-A (Dwg. No. 3900-F-408/405)	80	3.826	11.50	100	7.99	1.4
4	PL-120 wet oil from MAM-1102B to MBD-1104B (Dwg. No. 3900-F-409)	80	3.826	11.50	25	2.00	0.4
2	Level gage bridle for MAM-1102B (Dwg. No. 3900-F-409)	80	1.939	2.95	25	0.51	0.1
4	MAM-1102B bypass from 6" PL-103-A to HBG-1103B inlet (Dwg. No. 3900-F-409)	80	3.826	11.50	50	3.99	0.7
4	PL-129-A bypass from 6" PL-103-A around MAM-1102B and HBG-1103B (Dwg. No. 3900-F-409)	80	3.826	11.50	50	3.99	0.7
2	PL-1014-A from MAM-1102B to suction of PBA-1102B (Dwg. No. 3900-F-409)	80	1.939	2.95	25	0.51	0.1
2	PL-102-A from PBA-1102B discharge to MAM-1102B inlet piping (Dwg. No. 3900-F-409)	80	1.939	2.95	25	0.51	0.1
2	PL-122 wet oil out of MAM-1102B to 4" PL-114-A (Dwg. No. 3900-F-409)	80	1.939	2.95	50	1.02	0.2
2	Level gage bridle for MBD-1104B (Dwg. No. 3900-F-409)	80	1.939	2.95	25	0.51	0.1
2	PL-114-A emulsion out of MDB-1104B to 4" PL-114-A (Dwg. No. 3900-F-409)	80	1.939	2.95	50	1.03	0.2
2	PL-125-A wet oil out of MBD-1104B to 2" PL-122-A (Dwg. No. 3900-F-409)	80	1.939	2.95	50	1.03	0.2
4	PL-114-A wet oil to 12" PL-101-A (Dwg. No. 3900-F-409/405)	80	3.826	11.50	100	7.99	1.4
4	CD-1003-A liquid from MBF-1106 relief scrubber to ABH-1109 oil sump (Dwg. No. 3900-F-412/414)	80	3.826	11.50	100	7.99	1.4
6	PL-131-A wet oil from ABH-1108 oil sump to suction of PBA-1304 oil sump pump (Dwg. No. 3900-F-414)	80	5.761	26.07	25	4.53	0.8
4	PL-123-A wet oil from discharge of PBA-1304 to 12" PL-101 (Dwg. No. 3900-F-414/405)	80	3.826	11.50	100	7.99	1.4
4	DF-101-A diesel fuel loading header (Dwg. No. 3900-F-427)	80	3.826	11.50	500	39.93	7.1
4	DF-100-A diesel fuel loading header to inlet of MAJ-2583/2584 (Dwg. No. 3900-F-427)	80	3.826	11.50	500	39.93	7.1
4	DF-127-A diesel fuel loading header from outlet of MAJ-2583/2584 12" pump casing (Dwg. No. 3900-F-427)	80	3.826	11.50	500	39.93	7.1
4	MAJ-2583/2584 bypass from 4" DF-100-A to 4" DF-127-A (Dwg. No. 3900-F-427)	80	3.826	11.50	50	3.99	0.7
4	DF-126-A diesel fuel from 4" DF-127-A to ABJ-2580 (Dwg. No. 3900-F-427)	80	3.826	11.50	200	15.97	2.8
2	DF-129-A diesel fuel from ABJ-2580 to 12" casing (Dwg. No. 3900-F-427)	80	1.939	2.95	200	4.10	0.7
4	DF-162-A diesel fuel from ABJ-2580 to utility pump suction header (Dwg. No. 3900-F-427-413)	80	3.826	11.50	200	15.97	2.8
2	DF-151-A diesel fuel from ABJ-2580 to PZZ-2581 diesel transfer pump suction (Dwg. No. 3900-F-427)	80	1.939	2.95	50	1.03	0.2
2	DF-153-A diesel fuel from PZZ-2581 discharge to inlet of MAJ-2585/2586 transfer filters (Dwg. No. 3900-F-427)	80	1.939	2.95	50	1.03	0.2
2	DF-154-A diesel fuel from outlet of MAJ-2585/2586 to 4" DF-200 diesel fuel header (Dwg. No. 3900-F-427)	80	1.939	2.95	50	1.03	0.2
2	DF-153-A diesel fuel bypass of MAJ-2585/2586 transfer filters (Dwg. No. 3900-F-427)	80	1.939	2.95	50	1.03	0.2
2	DF-200-A diesel fuel transport line (Dwg. No. 3900-F-427)	80	1.939	2.95	200	4.10	0.7
2	DF-201-A diesel fuel from 2" DF-200-A to V-010-E2/V-020-E2 (Dwg. No. 3900-F-427/2900-F-448)	80	1.939	2.95	200	4.10	0.7

FIGURE 22.3 (Cont'd)

Platform Eureka Estimated Hydrocarbon Volumes – Pipelines (Cont'd)

Nominal Diameter (inches)	Description	Schedule	Inside Diameter (inches)	Cross-Sectional Area (sq. inches)	Length (ft.)	Volume (cu. ft.)	Volume (bbls)
3	DF-204-A diesel fuel from V-020-A to ABJ-2580 (Dwg. No. 2900-F-448/3900-F-427)	80	2.900	6.61	200	9.17	1.6
1	Diesel fuel transfer line from V-020-E2 to V-420-E2 standby diesel supply tank (Dwg. No. 2900-F-448)	80	0.957	0.72	100	0.50	0.1
2	Diesel fuel transfer line from V-010-E2 to V-410-E2 diesel supply tank (Dwg. No. 2900-F-448)	80	1.939	2.95	100	2.05	0.4
2	246E-H diesel fuel from V-410-E2 to EN-010/020/030-E2 (Dwg. No. 2900-F-448)	80	1.939	2.95	100	2.05	0.4
2	246E-H diesel fuel from EN-010/020/030-E2 to V-410-E2 (Dwg. No. 2900-F-448)	80	1.939	2.95	100	2.05	0.4
1.5	DF-207-A diesel fuel to standby generator (Dwg. No. 3900-F-427/435)	80	1.500	1.77	200	2.45	0.4
1	DF-1082-A diesel fuel from 2" DF-200-A to rig truss (Dwg. No. 3900-F-427/2900-F-448)	80	0.957	0.72	200	1.00	0.2
1	DF-160-A diesel fuel to utility pump engine (Dwg. No. 3900-F-327/413)	80	0.957	0.72	200	1.00	0.2
1	DF-161-A diesel fuel return from utility pump engine to ABJ-2580 (Dwg. No. 3900-F-413/427)	80	0.957	0.72	200	1.00	0.2
6	Suction header to utility pump (Dwg. No. 3900-F-413)	80	5.761	26.07	50	9.05	1.6
4	Discharge line from utility pump to 3" branch to disposal wells (Dwg. No. 3900-F-413)	80	3.826	11.50	100	7.99	1.4
3	Piping to disposal well 48 from 4" discharge line from utility pump (Dwg. No. 3900-F-413)	80	2.900	6.61	150	6.88	1.2
3	Piping from disposal well 48 inlet piping to disposal well 46 (Dwg. No. 3900-F-413)	80	2.900	6.61	150	6.88	1.2
2	DF-202-A diesel fuel from 2" DF-200-A to pipe rack PR-2 (Dwg. No. 3900-F-427/2900-F-448)	80	1.939	2.95	200	4.10	0.7
1	263R-H diesel fuel to crane SP-3790-PR-2 (Dwg. No. 2900-F-448)	80	0.957	0.72	200	1.00	0.2
1	262R-H diesel fuel to logging unit (Dwg. No. 2900-F-448)	80	0.957	0.72	200	1.00	0.2
2	DF-303-A diesel fuel from 4" DF-200 to pump package P-2 (Dwg. No. 3900-F-427/2900-F-448)	80	1.939	2.95	200	4.10	0.7
1	Diesel fuel line from DF-303-A to crane SP-980-P2 (Dwg. No. 2900-F-448)	80	0.957	0.72	200	1.00	0.2
1	Diesel fuel line from DF-303-A to logging unit (Dwg. No. 2900-F-448)	80	0.957	0.72	200	1.00	0.2
1	Diesel fuel line from DF-303-A to crane SP-985-P2 (Dwg. No. 2900-F-448)	80	0.957	0.72	200	1.00	0.2
2	LAN-2530 facilities standby generator skid diesel fuel piping (Dwg. No. 3900-F-435)	80	1.939	2.95	50	1.03	0.2
1	Lube oil fill piping from lube oil tank to facilities standby generator (Dwg. No. 3900-F-435)	80	0.957	0.72	100	0.50	0.1
1	Lube oil fill piping from lube oil tank to engine package E-2 (Dwg. No. 3900-F-435)	80	0.957	0.72	200	1.00	0.2
2	279P-A wet oil header to H.P. mud pumps P-020-P2/P-010-P2 (Dwg. No. 2900-F-452)	80	1.939	2.95	100	2.05	0.4
TOTAL							**358.6**

FIGURE 22.3 (Cont'd)

Platform Eureka Estimated Hydrocarbon Volumes – Tanks/Vessels

Description	Diameter (inches)	Length S/S (inches)	Shell Volume (cu. ft.)	Head Volume (cu. ft.)	Total Volume (cu. ft.)	Total Volume (bbls)
MAY-1116 well cleanup surge vessel (Dwg. No. 3900-F-405)	48	108	113.10	16.76	129.85	23.13
ABJ-1105 well cleanup tank (Dwg. No. 3900-F-406)					6,525.00	1,162.15
MAY-1101 production surge vessel (Dwg. No. 3900-F-406)	144	30	282.74	452.39	735.13	130.93
KAH-1603 crude oil sphere launcher (Dwg. No. 3900-F-407)	16	106	12.33	0.62	12.95	2.31
MBF-1106 relief scrubber (Dwg. No. 3900-F-412)	60	120	196.35	32.72	229.07	40.80
ABH-1108 oil sump (Dwg. No. 3900-F-414)	48	192	201.06	8.38	209.44	37.30
12" diesel fuel pump casing (Dwg. No. 3900-F-427)	12	3,720	243.47	0.13	243.60	43.39
Diesel fuel storage leg A-1 (Dwg. No. 3900-F-427)						1,000.00
ABJ-2580 diesel reservoir (Dwg. No. 3900-F-427)						100.00
MAJ-2583 diesel fuel fill filter (Dwg. No. 3900-F-427)	20	4.5	0.82	1.21	2.03	0.36
MAJ-2584 diesel fuel standby fill filter (Dwg. No. 3900-F-427)	20	4.5	0.82	1.21	2.03	0.36
MAJ-2585 diesel fuel transfer filter (Dwg. No. 3900-F-427)	20	4.5	0.82	1.21	2.03	0.36
MAJ-2586 diesel fuel standby transfer filter (Dwg. No. 3900-F-427)	20	4.5	0.82	1.21	2.03	0.36
V-010-E2 diesel day tank (Dwg. No. 2900-F-448)						57.71
V-020-E2 standby generator day tank (Dwg. No. 2900-F-448)						11.40
V-420-E2 standby diesel supply tank (Dwg. No. 2900-F-448)						3.06
V-410-E2 diesel supply tank (Dwg. No. 2900-F-448)						6.23
ABJ-2530 diesel fuel day tank (Dwg. No. 3900-F-435)						17.00
Lube oil tank for facilities standby generator (Dwg. No. 3900-F-435)						7.14
Reserve storage tank (Dwg. No. 2900-F-455)						278.50
Active Tank No. 1 (Dwg. No. 2900-F-455)						246.00
Active Tank No. 2 (Dwg. No. 2900-F-455)						131.13
Active Tank No. 3 (Dwg. No. 2900-F-455)						130.00
Slugging Tank (Dwg. No. 2900-F-455)						23.00
TOTAL						**3,452.62**

FIGURE 22.4

Beta Pump Station Estimated Hydrocarbon Volumes						
Tank No.	**Source**	**Commodity**	**Major Type of Failure**	**Capacity (bbls)**	**Direction of Flow**	**Secondary Containment Volume (bbls)**
100-S-19	Crude Oil Tank (45' dia x 40')	Crude Oil	Overfill, Leak, Rupture	10,000	Primary drainage is to the containment area – Drainage outside of, or escaping containment, will flow toward the Northeast corner of the property. Drainage escaping the property would flow into storm drains.	Concrete Containment Walls/ Earthen Floor Capacity is approximately 13,900 bbl.
P/L	Station Pumps, pipe manifolds, meter facilities.	Crude Oil	P/L leak, rupture	-----	Minimal berms around pumps and piping would contain minor volumes. Product escaping berms would flow to the Northeast corner of the property. Drainage escaping the property would flow into storm drains.	-----
Misc.	Station Lines, Drums, and other Temporary Containers	Crude Oil and Misc. Products	Overfill, Leak, Rupture	-----		-----

Secondary Containment/Drainage

In accordance with BSEE regulations, all applicable equipment is equipped with drip pans to prevent any oil from reaching the ocean. Drain and sump systems are provided on all platforms to collect deck and equipment drainage fluids. The lower deck is interconnected with solid steel plating to form a drain system covering the entire deck. Liquids collected in the drain system gravity-flow to the sumps and are then pumped back to the liquid handling system.

INTRA-FIELD PIPELINES AND CABLES

Three pipelines and two power cables link Platform Eureka with Platform Elly located approximately one and one-half miles away. Produced gas from Platform Eureka is transported to Platform Elly via a 6-inch pipeline for use as fuel. A 10-inch pipeline delivers production fluids from Platform Eureka to Platform Elly and another 10-inch pipeline delivers injection water from Platform Elly to Platform Eureka. Specifications for these pipelines are provided in the table below. The Beta intra-field pipelines are designed, operated, and inspected in compliance with BSEE regulations.

Intra-Field Pipeline and Cable Specifications					
Product	**Outside Diameter (inches)**	**Wall Thickness (inches)**	**Length (feet)**	**Maximum Design Working Pressure (PSI)**	**Throughput**
Produced Oil and Water	10.75*	.594 .719	9,449.0	1,440 (MAOP)	10,200 bpd
Injection Water	10.75*	.594 .719	8,994.8	2,250 (MAOP)	12,000 bpd
Wet Natural Gas	6.625**	.375 .432	8,439.0	720 (MAWP)	200 – 350 mcfd @25 – 65 psi
Out of Service/Shut-in	10.75***	.594	8,156.0	400 (MAWP)	N/A
Out of Service/Shut-in	12.75****	.625	8,220.0	1,440 (MAWP)	N/A
Grade and Weight: *API5LX-grade X-52 SMLS, 64.49 pounds/foot **API5LX-grade X-42 SMLS, 25.03 pounds/foot ***API5LX-grade X-42 SMLS, 64.43 pounds/foot ****API5LX-grade X-42 SMLS, 80.93 pounds/foot					
Protective Coating: *One (1) inch 5IPPFoam Others 14 mils of thin-film thermosetting epoxy					
Corrosion Protection: *125# aluminum-indium anodes spaced at 550 ft **75# aluminum anodes spaced at 500 ft ***125# aluminum anodes spaced at 350 ft ****150# aluminum anodes spaced at 350 ft					
Elly to Edith Electric Cable Specifications: Description: 35 kV, 3 Conductor 1/0 AWG, EPR or TR-XLPE insulated, armored submarine power cable with two (2) fiber-optic cables inside. Length of Circuits (J-tube to J-tube): 8,500 feet					

External Pressure

The pipelines are designed to withstand external loads, including hydrostatic pressures with the pipeline void and with its absolute internal pressure equal to one atmosphere.

Other Stresses

The pipelines were designed under applicable codes and regulations to withstand stresses that result from installation, thermal and fluid expansion effects, earthquakes and other dynamic effects, dead loads, and surges.

Leak Detection System

Intra-field pipelines have SCADA leak detection. There is a high/low pressure shutdown valve at the header. A new leak detection system was installed in early 2008 on the bulk fluids intra-field pipeline between Platforms Eureka and Elly. Its function is based on comparison of fluid flow into versus out of the pipeline. Alarms are initiated if volume balance discrepancies vary beyond specific short term and long term limits.

SAN PEDRO BAY PIPELINE AND PUMP STATION

San Pedro Bay Pipeline Company's Department of Transportation (DOT) - regulated 16" crude oil pipeline, transports oil from the Company's Platform Elly (OCS Lease P-300) to the onshore Beta Pump Station (which includes a 10,000 bbl breakout tank) located at 170 N. Pico Street in Long Beach. At the Beta Pump Station, the oil is pumped through one of two sales Automatic Custody Transfer (ACT) Units, and then through one of two approximately 1000 feet long 10" diameter delivery pipelines to the off-site THUMS manifold. The 10" pipelines are also owned by San Pedro Bay Pipeline Company and operated by Beta Offshore. San Pedro Bay Pipeline is a 16-inch, 17.3-mile-long common carrier pipeline installed in 1980.

Pipeline Design and Construction

Approximately 15.29 miles of the 16" crude oil pipeline is situated offshore (6.37 miles in federal waters and 8.91 miles in State waters). The landfall is at Pier H adjacent to the Queen Mary. Beginning at Platform Elly, the first 10.9 miles of the pipeline lie on the ocean floor. The remainder of the offshore pipeline is buried 10-to-15 feet below the ocean floor. The onshore portion of the pipeline is buried 10-to-15 feet below grade. The pipeline is designed in accordance with 49 CFR Part 195 and applicable State regulations. The riser is a 16-inch O.D. seamless steel pipe with 0.844-inch thickness. The remainder of the offshore portion is constructed of 16-inch O.D. seamless steel pipe with a 0.500 wall thickness, 82.77 lb/ft, with welded pipe joints. A concrete weight coating consisting of a 1-inch thickness of 190 lb/cu ft concrete is installed. The protective coating is a "double enamel coat system" of coal tar enamel, reinforcing glass wrap, and outer felt wrap. In addition to the enamel coating, the line is protected with sacrificial zinc anodes. Each anode weighs approximately 315 lb and is installed at intervals of 1000 feet.

Pipeline Throughput

The pipeline currently transports approximately 6,000 BOPD of 14.5 API crude oil from Platform Elly to the onshore Beta Pump Station. The crude is currently shipped using non-pulsating positive displacement screw pumps at pressures that vary from 250 psi to 720 psi.

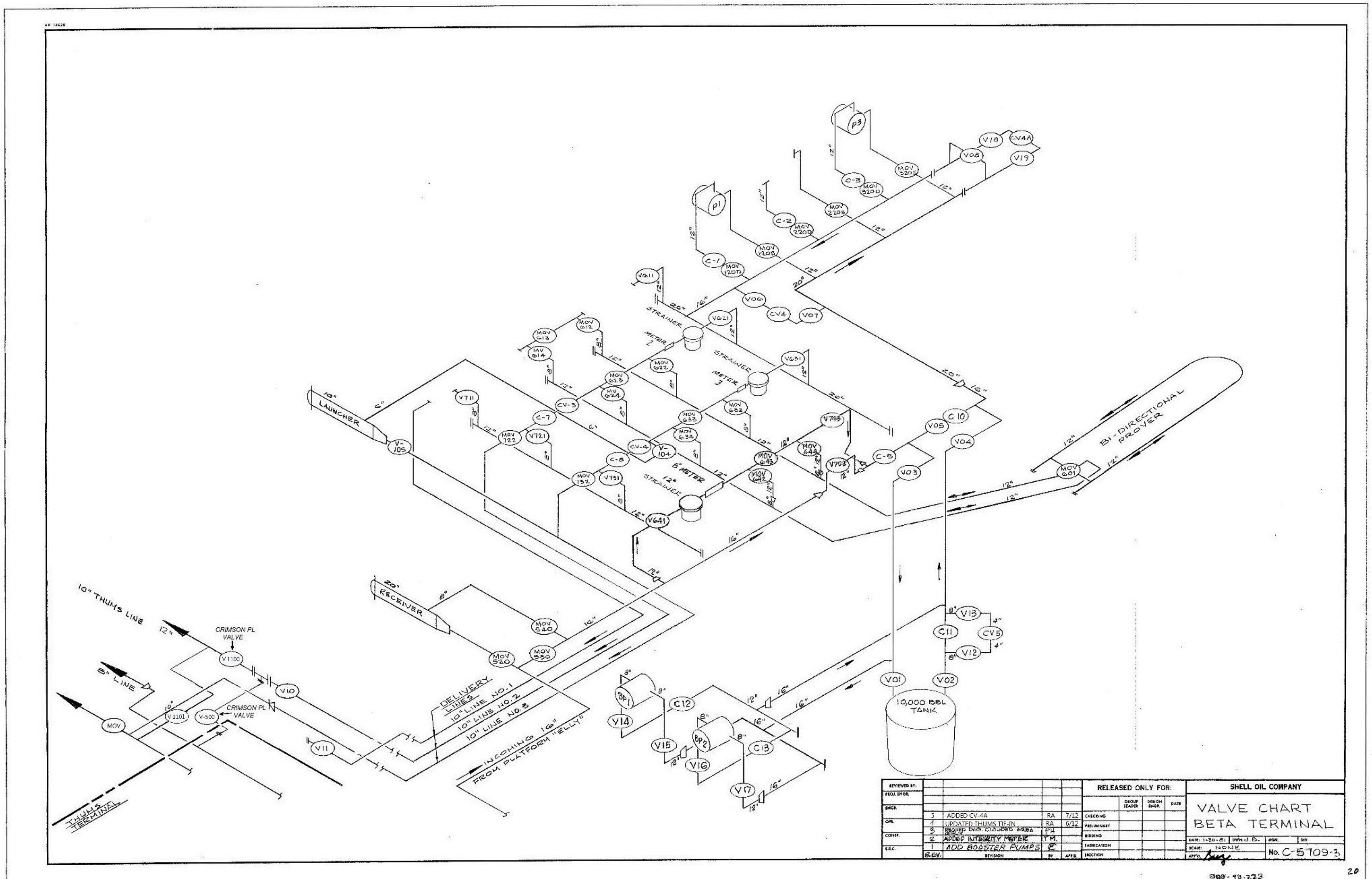
Beta Pump Station

The facility was installed in 1980 on one acre of land between Pico Avenue and the Long Beach Freeway. It consists of a scraper trap, custody transfer meters, a floating roof surge tank, pumps, and manifolds. The current average daily throughput is 6,000 BOPD; the maximum throughput capacity is 9,600 BOPD.

The 10,000–bbl surge tank is a welded steel tank protected by a containment wall, and provides surge control for the San Pedro Bay Pipeline shipping system. The primary function of the tank is to store or provide the oil volume necessary to account for the differential flow rate between the Platform Elly shipping pumps and the onshore pump station shipping pumps.

The surface areas under aboveground piping are contained by a 6–inch curb and covered with gravel. Rainwater in these areas percolates into the soil. The catch basins installed during construction of the pump station have been permanently deactivated. The balance of the pump station surface is covered with a rock and asphalt paving or landscaped. These areas drain off-site to the city storm water system.

Figure A-11


10,000 BBL TANK
BI-DIRECTIONAL PROVER
LAUNCHER
RECEIVER
10" THUMS LINE
CRIMSON PL VALVE
DELIVERY LINES
10" LINE NO. 1
10" LINE NO. 2
10" LINE NO. 3
INCOMING 16" FROM PLATFORM "ELLY"
THUMS TERMINAL
STRAINER
METER
8" METER
5 ADDED CV-4A RA 7/12
4 UPDATED THUMS TIE-IN RA 6/12
2 ADDED INTEGRITY METER T.M.
1 ADD BOOSTER PUMPS
REVISION
RELEASED ONLY FOR:
CHECKING
PRELIMINARY
BIDDING
FABRICATION
ERECTION
SHELL OIL COMPANY
VALVE CHART
BETA TERMINAL
DATE: 1-20-81
SCALE: NONE
No. C-5709-3

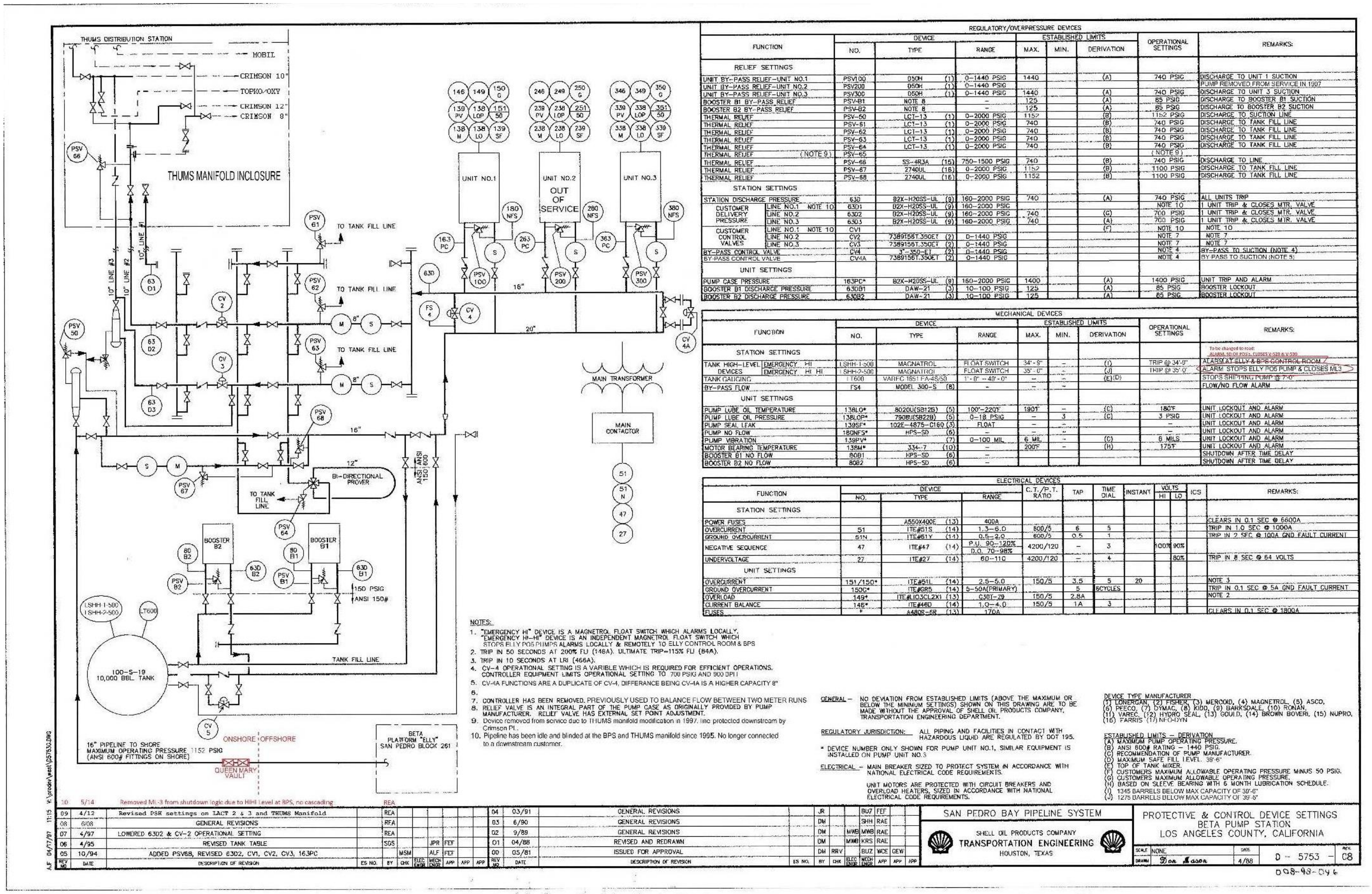


Figure A-12 Beta Pump Station Protective & Control Device Settings

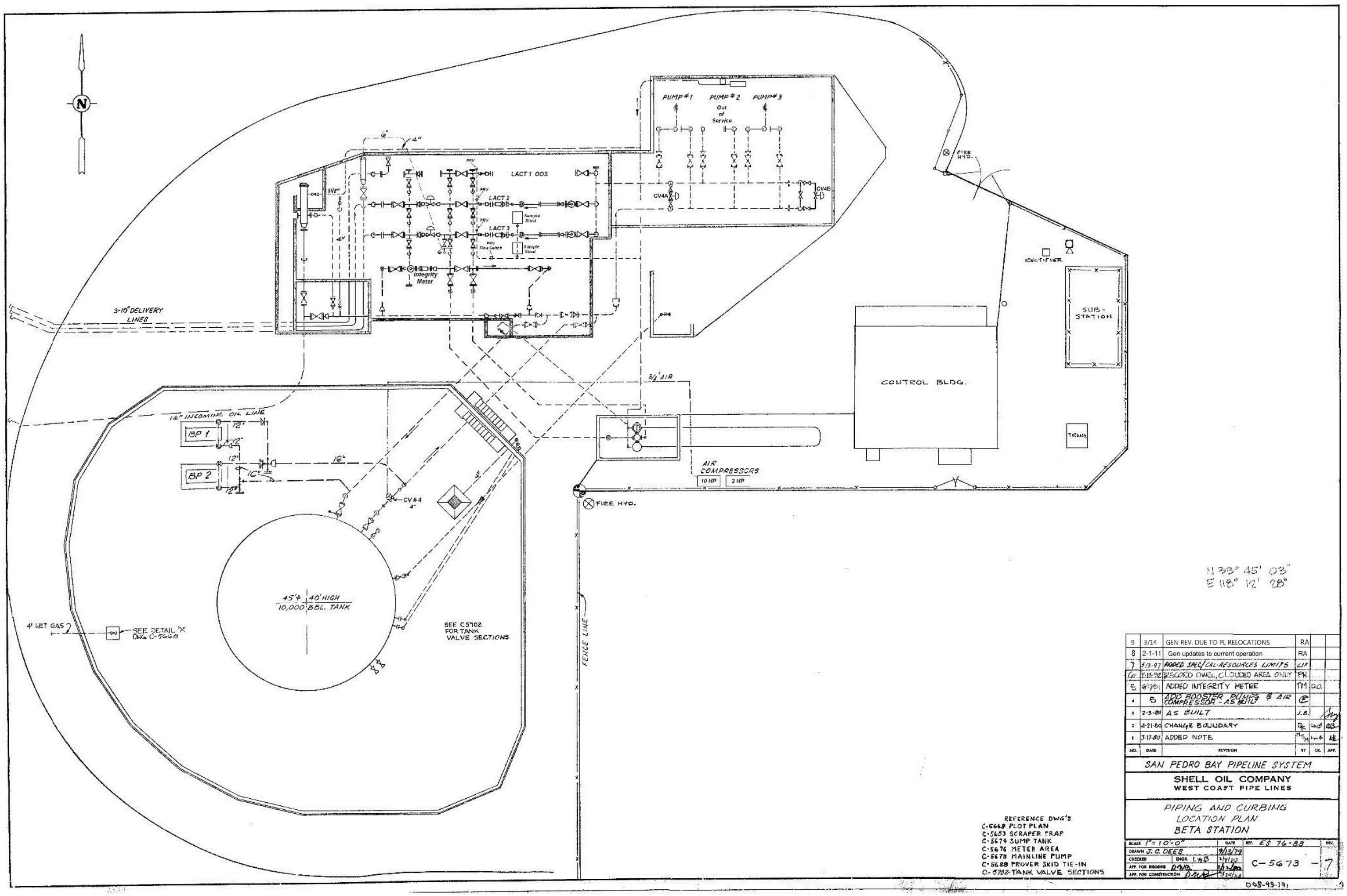
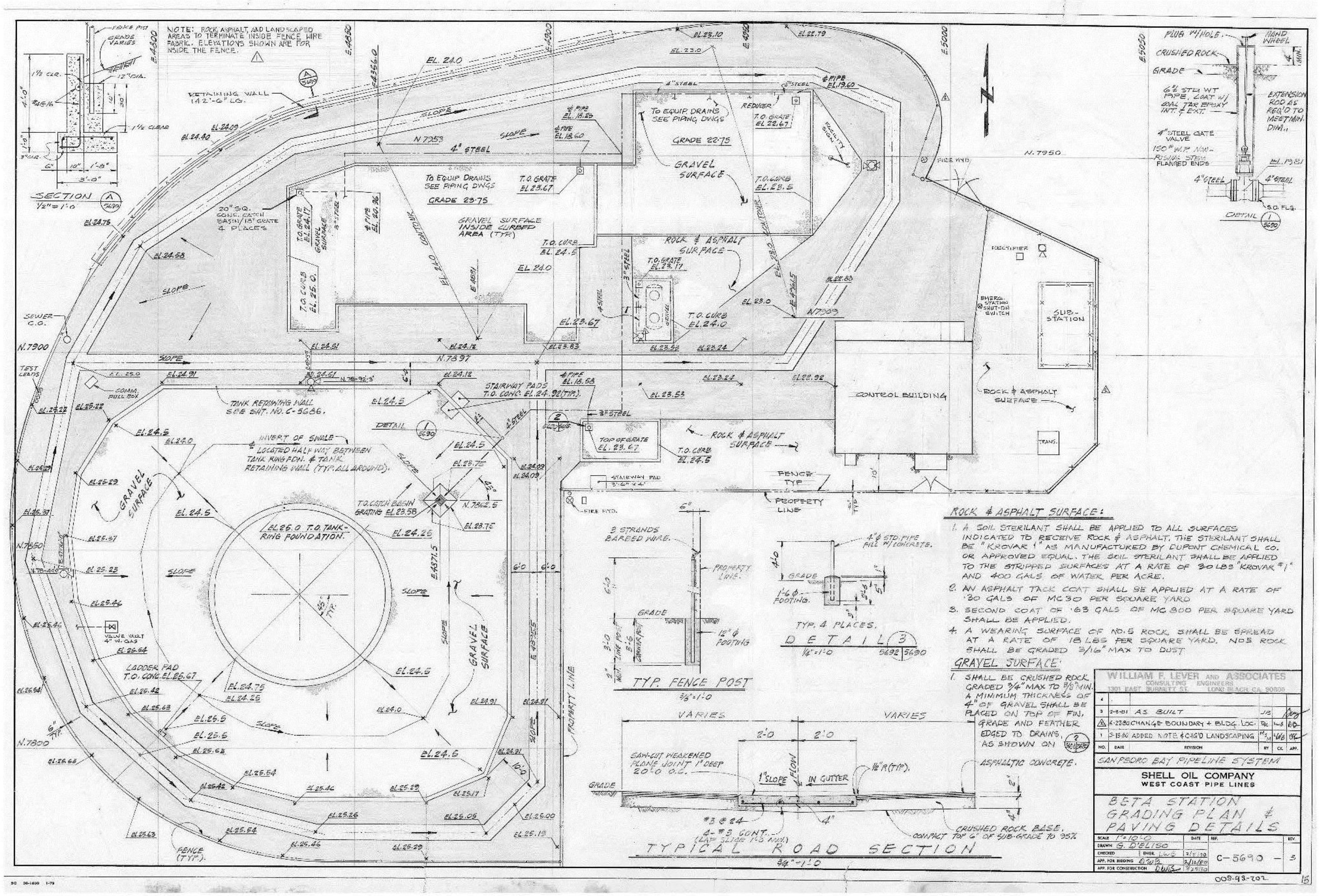


Figure A-13 Beta Pump Station Piping and Curbing Location Plan

Figure A-14


NOTE: ROCK, ASPHALT, AND LANDSCAPED AREAS TO TERMINATE INSIDE FENCE. WIRE FABRIC. ELEVATIONS SHOWN ARE FOR INSIDE THE FENCE.
SECTION A
RETAINING WALL
CONTROL BUILDING
SUB-STATION
ROCK & ASPHALT SURFACE
GRAVEL SURFACE
EL 26.0 T.O. TANK-RING FOUNDATION
TANK RETAINING WALL SEE SHT. NO. C-5686
STAIRWAY PADS
PROPERTY LINE
FENCE TYP
TYP. FENCE POST
DETAIL 3
TYPICAL ROAD SECTION
ROCK & ASPHALT SURFACE:
1. A SOIL STERILANT SHALL BE APPLIED TO ALL SURFACES INDICATED TO RECEIVE ROCK & ASPHALT. THE STERILANT SHALL BE "KROVAR 1" AS MANUFACTURED BY DUPONT CHEMICAL CO. OR APPROVED EQUAL. THE SOIL STERILANT SHALL BE APPLIED TO THE STRIPPED SURFACES AT A RATE OF 30 LBS "KROVAR 1" AND 400 GALS OF WATER PER ACRE.
2. AN ASPHALT TACK COAT SHALL BE APPLIED AT A RATE OF .30 GALS OF MC30 PER SQUARE YARD
3. SECOND COAT OF .83 GALS OF MC 800 PER SQUARE YARD SHALL BE APPLIED.
4. A WEARING SURFACE OF NO. 5 ROCK SHALL BE SPREAD AT A RATE OF 18 LBS PER SQUARE YARD. NO5 ROCK SHALL BE GRADED 3/16" MAX TO DUST
GRAVEL SURFACE:
1. SHALL BE CRUSHED ROCK GRADED 3/4" MAX TO 3/8" MIN. A MINIMUM THICKNESS OF 4" OF GRAVEL SHALL BE PLACED ON TOP OF FIN. GRADE AND FEATHER EDGED TO DRAINS, AS SHOWN ON
WILLIAM F. LEVER AND ASSOCIATES
CONSULTING ENGINEERS
SAN PEDRO BAY PIPELINE SYSTEM
SHELL OIL COMPANY
WEST COAST PIPE LINES
BETA STATION GRADING PLAN & PAVING DETAILS
C-5690

SPILL DETECTION AND SPILL MITIGATION PROCEDURES

Leak Detection System

An automated leak detection system continuously monitors the 16" San Pedro Bay Pipeline and the onshore Beta Pump Station. This includes:

- Automated monitoring and direct reporting of any anomalies to the control room at Platform Elly (staffed 24 hours/day).
- Beta Pump Station for surveillance and operations.
- Leak detection surveillance of the line.
- Annual regulatory surveillance of the line.

The pipeline leak detection system accumulates statistical information concerning the flow difference between inlet and outlet, and will consider generating a leak alarm when the test statistic reaches a certain limit (the alarm threshold). A pattern recognition technique is used to determine whether a leak alarm should be generated when the limit is exceeded.

Detection Time and Accuracy of Leak Rate Estimate

Assuming the following conditions:
Steady state operations (changes less than approximately 5% from present operating conditions)
Repeatability for the instrumentation = 0.5%
Flow meter accuracy = 1%
The following leak size and detection time should be achievable by ATMOS PIPE

Leak Size (% of nominal flow)	Detection Time
1%	50 min
1.67%	25 min
3.33%	10 min
≥ 10%	4 min

The leak size (% of nominal flow) is based on the observed flow rate of 250 bbls/h from data collected. Leak size estimates are expected to have an accuracy of ±10% of real leak size or better. It should be pointed out that the above performance figures may change depending on the actual instrument performance.

SPILL DETECTION AND SPILL MITIGATION PROCEDURES (Cont'd)

Leak Location Accuracy

As a general rule, the location error decreases exponentially as the leak size increases. Leak location estimation depends on the quality of the measurements. For large leaks (greater than 20% of flow), an accuracy of ±5% of the distance from nearest two pressure meters is achievable. Surveillance of the line with this leak detection system is conducted at Platform Elly's control room, manned 24 hours per day. The control room operators recognize the alarms generated and respond to each alarm. The specific procedures used by the control room operators are contained in the Basic Operations Maintenance, and Procedures Manual. This manual lists the normal and abnormal operating procedures for the pipeline. Should the leak detection system become inoperative, routine surveillance of the pipeline is conducted until the system is repaired. In the event of a leak, the control room operators have the ability to close the platform discharge shutdown valve (ML3). Closure of this valve automatically shuts down the shipping pumps.

Automatic Controls

The San Pedro Bay Pipeline and the Beta Pump Station have a variety of automatic controls which are monitored by Beta control room operators at Platform Elly and field personnel. In addition to these remote protection devices, the Elly control room has the ability to remotely start and stop pumps and to open and close shutdown valves.

The status of each remotely operated device is monitored in the Elly control room. The control room has a CRT display screen that identifies the location of these devices within the process flow.

AUTOMATIC CONTROLS	
PLATFORM ELLY	
Shipping Pump High Pressure Shutdown Switch	
Set Pressure:	1,045 psig
Function:	Shuts down shipping pumps if discharge pressure reaches 1,045 psig
Shipping Pump Pressure Relief Valve	
Set Pressure:	1,100 psig
Function:	Relieves discharge fluid flow back to shipping tank if pressure reaches 1,325 psig
BETA STATION	
10,000 Barrel Surge Tank High-High Alarm	
Set Point:	35 feet – 0 inches
Function:	Shut down P05 pump(s) then close main block valve at inlet to Beta Onshore Pump Station and alarms at Platform Elly
Booster Pumps – High Pressure Shutdown	
Set Point:	85 psig
Function:	Shuts down booster pumps on high pressure exceeding 85 psig
Shipping Pump Discharge Bypass to Suction	
Set Point:	695 psig
Function:	Bypasses discharge fluid to pump suction when pressure exceeds 1,350 psig
Delivery Line Shutdown	
Set Point:	700 psig
Function:	Shuts in line if pressure exceeds 1370 psig
Station Shutdown	
Set Point:	700 psig
Function:	Shuts down all pumps if shipping pump discharge pressure exceeds 1,370 psig

INSPECTION AND MAINTENANCE

Corrosion Protection

All buried piping (both onshore and offshore) is externally coated and subject to an impressed current cathodic protection system. All aboveground piping is maintained with an adequate protective coating to prevent corrosion.

The dry oil in the pipeline is non-corrosive. As the oil contains less than three (3) percent water, the water remains suspended as small droplets in the continuous oil phase during shipping. As such, water should not come in contact with the pipe wall. As a precaution, however, a corrosion inhibitor is injected into the dry oil stream. Inhibitor residuals are checked every six (6) months along with fluid pH to assure that the pipe wall continues to be exposed to a non-corrosive environment.

Pipeline Surveys

Surveys of the offshore portion of the pipeline are conducted annually to assure that cathodic protection potentials are adequate (more negative than -800 MV with respect to a silver/silver chloride half cell) to prevent corrosion. A survey of each end of the line is made each year, while a survey of the entire line is done every two years. A visual inspection of the line is made every two (2) years with a remotely operated vehicle (ROV) in conjunction with the cathodic protection survey to inspect for mechanical damage to the line, the coating, and the anode bracelets. In addition, an internal caliper inspection of the line is made every two (2) years to detect any significant changes in internal diameter.

Hazard Prevention Program

The Company has an established, comprehensive Hazard Prevention Measures program in place for the pipeline. The program is summarized in the table below.

HAZARD PREVENTION PROGRAM
Preventive Maintenance
All Equipment associated with the pipeline systems are maintained/inspected with appropriate operative guidance and in accordance with agency regulations and industry standards.
Field Inspections
Internal self-auditing which enables the Company to: • Assess the status of and need for corrective actions in the preventive maintenance programs. • Train and gather input from field staff. • Assess the effectiveness of operation and maintenance procedures.
Pipeline Rights-of-Way (ROW) Inspection
Performed in accordance with the Department of Transportation (DOT) Code of Federal Regulations Parts 192 and 195. (All inspections are documented.)
1-Call Systems
The Company actively participated in 1-Call systems in states where the Company has facilities by: • Using and helping promote the system. • Requiring contractors to use the system.
Compliance
The Company is in compliance with all applicable Department of Transportation Pipeline Safety Regulations and the California Pipeline Safety Act regarding: • Leak detection systems, devices, equipment, and procedures. • Release prevention systems, devices, equipment, and procedures. • Testing and maintenance practices for pipelines and appurtenances. • Testing and maintenance practices for storage tanks.
Test Frequency
• Valves (manual and motor-operated) – twice per year, not to exceed 7½ months. • Overpressure devices – annually, not to exceed 15 months. • Tank alarms – semiannually, not to exceed 7½ months. • CP system survey - annually

APPENDIX A

FACILITY INFORMATION

Table 1 .... A-2

Table 2 .... A-3

Table 3 .... A-4

Area Map A-5

TABLE 1

FACILITY INFORMATION
PRODUCTION PLATFORMS AND SATELLITE STRUCTURES IN OCS WATERS

AREA	BLOCK	LEASE	FAC. NAME	FAC. ID	WATER DEPTH	LATITUDE/ LONGITUDE	DIST. SHORE	API GRAV.	RATING *	HIGH WELL	ALL STOR	THRU VOLUME
6C	3337	P-300	Platform Elly		265’	33°35.025'N 118°07.76'W	8.56	13°-16°	E	N/A	9,562.5	6,000
6C	3337	P-300	Platform Ellen		265’	33°34.956'N 118°07.746'W	8.73	9°-19°	B		1,715.7	1,800-4,000
		P-301	Platform Eureka		700’	33°33.833'N 118°07.0'W	9.05	9°-19°	C		3,452.7	4,000-9,000

***** Worst Case Discharge Rating
(Volume Barrels)

A -	0 - 1,000
B-	1,001-3,000
C-	3,001-10,000
D-	10,001-20,000
E-	20,001 +

1. Provide the 2-letter BSEE area designation of the facility (e.g., MP, PS, WC).
2. Provide the OCS Block No. of the facility (e.g., 25, 251, A-375).
3. Provide the OCS Lease No. of the facility (e.g., 091, 0425, G 10112).
4. Provide the facility designation (e.g., No. 2, A, JA).
5. Provide the 5-digit BSEE complex identification number for the facility.
6. Provide the water depth at the site of the facility in feet.
7. Provide the latitude and longitude of the facility in degrees and decimal minutes (e.g., 28 25.35'N, 90 09.08'W).
8. Provide the distance from the facility to the nearest shoreline in miles.
9. Provide the API Gravity of the densest oil being produced or stored at the facility.
10. Enter the appropriate worst-case discharge volume rating (e.g., A, B, C, D, or E).
11. If “Rating” in column 10 is “E” or if high rate well has a daily flow rate greater than 2,500 barrels, provide the rate that oil is being produced in barrels per day from an uncontrolled flow of the highest capacity well at the facility.
12. If “Rating” in column 10 is “E” or if high rate well has a daily flow rate greater than 2,500 barrels, provide the total volume in barrels of all tanks on the facility used for the storage of oil including production (e.g., fuel oil including diesel fuel, corrosion inhibitors).

    If “Rating” in column 10 is “E” or if high rate well has a daily flow rate greater than 2,500 barrels, provide the throughput volume in barrels of oil per day of the lease term pipelines that depart the facility.

TABLE 2

FACILITY INFORMATION
PRODUCTION PLATFORMS AND SATELLITE STRUCTURES IN OCS WATERS (Cont'd)

FROM	LATITUDE/ LONGITUDE	TO	LATITUDE/ LONGITUDE	F/S BOUND.	SEG. NO.	ROW NO.	LENGTH (ft.)	SIZE (in.)	API GRAV.	LEAK DETECT SYSTEM	THRU VOLUME (Bbls)	DIST. SHORE (miles)	APPURT PLATFORM
Platform Elly	33 35.025'N 118 07.76'W	F/S	33 40.153'N 118 06.104'W	Y			33,521	16	15.0	Y	6,000	8.5 - 3.0	Y
Platform Eureka	33 33.833'N 118 07.0'W	Platform Elly	33 35.025'N 118 07.76'W	N			9,449	10	9-19	Y	10,200	8.5 - 9.2	Y
Platform Elly Water Injection Pipeline	33 35.025'N 118 07.76'W	Platform Eureka	33 33.833'N 118 07.0'W	N			8,994.8	10	N/A	N	12,000	8.5 - 9.2	Y
Platform Eureka Natural Gas Pipeline	33 33.833'N 118 07.0'W	Platform Elly	33 35.025'N 118 07.76'W	N			8,439.0	6	N/A	N	350 mcfd	8.5 - 9.2	Y

1. Provide the 2-letter BSEE area designation and the OCS Block No. of the originating point of the ROW pipeline (e.g., WC 425, HI A-375).
2. Provide the latitude and longitude of the originating point of the ROW pipeline in degrees and decimal minutes (e.g., 28 25.35'N, 90 09.08'W).
3. Provide the 2-letter BSEE area designation and the OCS Block No. of the terminus of the ROW pipeline (e.g., WC 425, HI A-375).
4. Provide the latitude and longitude of the terminus of the ROW pipeline in degrees and decimal minutes (e.g., 28 25.35'N, s90 09.08'W).
5. Indicate whether the ROW pipeline either terminates or originates at the Federal/State boundary (i.e., yes, no).
6. Provide the 5-digit BSEE Segment No. of the ROW pipeline (e.g., 00006, 01234, 11456).
7. Provide the OCS ROW No. of the ROW pipeline (e.g., 092, 0436, G 10992).
8. Provide the length of the ROW pipeline in feet.
9. Provide the internal diameter of the ROW pipeline in inches.
10. Provide the API Gravity of the oil being transported by the ROW pipeline.
11. Indicate whether the ROW pipeline is monitored by a leak detection system (i.e., yes, no).
12. Provide the throughput volume in barrels of oil per day of the ROW pipeline.
13. Provide the distance to shore of the point of the ROW pipeline that is nearest to the shoreline in miles.
14. Indicate whether the ROW pipeline has an associated appurtenance platform(s) (i.e., yes, no).

TABLE 3

FACILITY INFORMATION
ROW PIPELINES IN STATE WATERS SEAWARD OF THE COASTLINE

FROM	LATITUDE/ LONGITUDE	TO	LATITUDE/ LONGITUDE	F/S BOUND.	ID. NO.	ROW NO.	LENGTH (ft.)	SIZE (in.)	API GRAV.	LEAK DETECT SYSTEM	THRU VOLUME (Bbls)	DIST. SHORE (miles)	APPURT PLATFORM (yes/no)
F/S	33 40.153'N 118 06.104'W	Shore	33 45.208'N 118 11.552'W	Yes			41,448	16	16	Yes	6,000	0 (Shoreline)	No

1. Provide the 2-letter BSEE area designation and the Block No. of the originating point of the State ROW pipeline (e.g., SP 2, EI 21).
2. Provide the latitude and longitude of the originating point of the State ROW pipeline in degrees and decimal minutes (e.g., 28 25.35'N, 90 09.08'W).
3. Provide the 2-letter BSEE area designation and the Block No. of the terminus of the State ROW pipeline or the point at which the ROW pipeline crosses the coastline (e.g., HI 96, SS 10).
4. Provide the latitude and longitude of the terminus of the State ROW pipeline (if in State waters) or the point at which the ROW crosses the coastline in degrees and decimal minutes (e.g., 28 25.35'N, 90 09.08'W).
5. Indicate whether the ROW pipeline either terminates or originates at the Federal/State boundary (i.e., yes, no).
6. Provide the State-assigned identification number of the State ROW pipeline, if assigned.
7. Provide the State-assigned ROW No. of the State ROW pipeline.
8. Provide the length of the State ROW pipeline in feet.
9. Provide the internal diameter of the State ROW pipeline in inches.
10. Provide the API Gravity of the oil being transported by the State ROW pipeline.
11. Indicate whether the State ROW pipeline is monitored by a leak detection system (i.e., yes, no).
12. Provide the throughput volume in barrels of oil per day of the State ROW pipeline.
13. Provide the distance to shore of the point of the ROW pipeline that is nearest to the shoreline in miles.
14. Indicate whether the ROW pipeline has an associated appurtenance platform(s) (i.e., yes, no).

AREA MAP

WITT | O'BRIEN'S

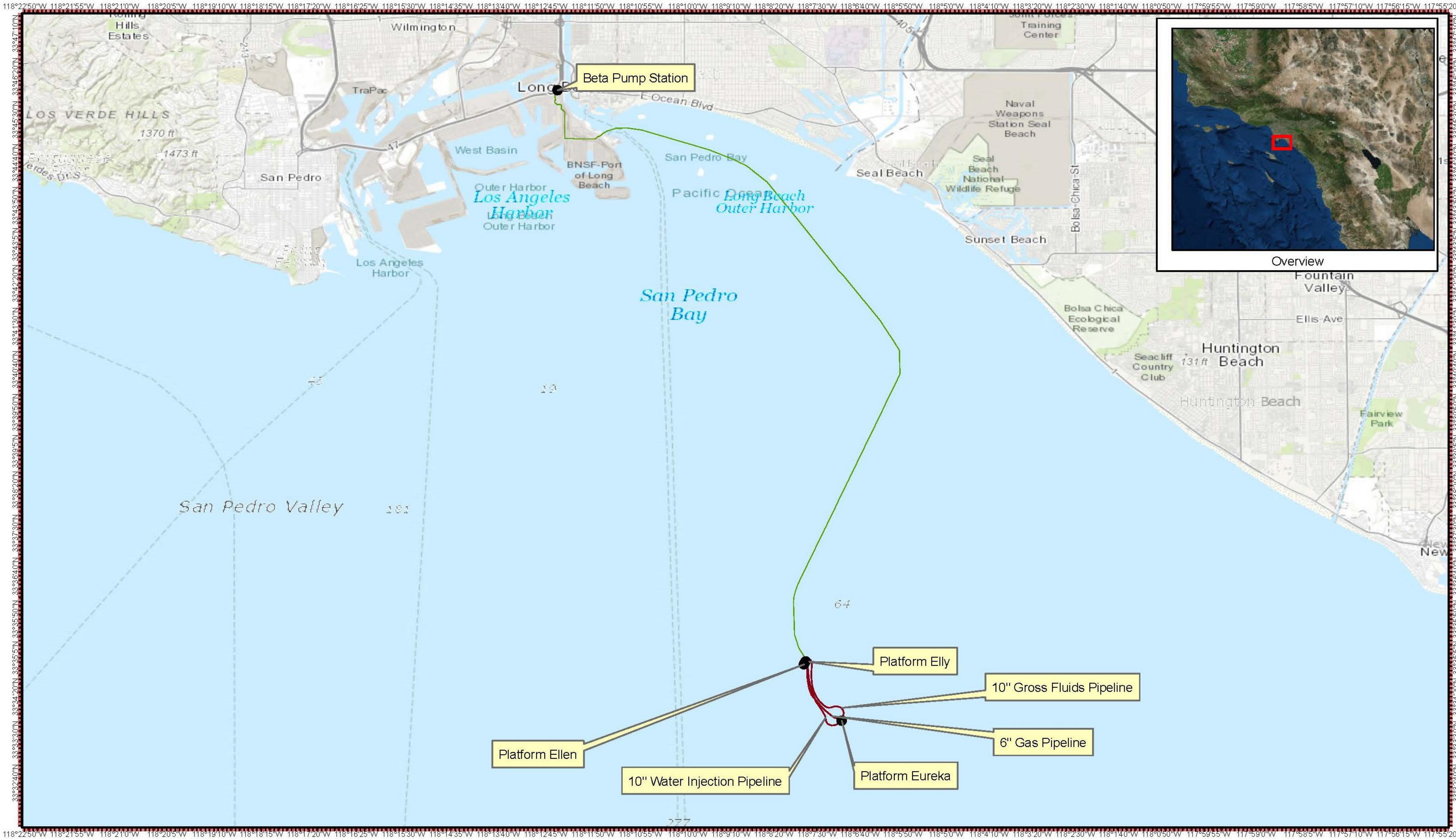
Map Prepared By; Witt O'Brien's
818 Town & Country Blvd., Houston, Texas 77024
(281)320-9796

Beta Offshore Corporate Office
111 West Ocean Boulevard, Suite 1240
Long Beach, California 90802
Office: (562)628-1526
Fax: (562)-628-4536 / Main: (562)628-9595

Area Map

N

0 5,600 11,200 16,800 22,400 28,000
Feet



APPENDIX B

TRAINING INFORMATION

B. Training Program B-2

B.a OSRC/IC and QI B-2

B.b Other SMT B-2

B.c SROT Members B-3

B.d Location of Records B-3

B. TRAINING PROGRAM

The Company's training program ensures that all personnel receive appropriate training so that:

<u>All personnel will be trained on:</u>

- Their responsibilities under the plan.
- Procedures for contacting the operator on a 24 Hr. basis.
- Name of, and procedures for contacting the Qualified Individual on a 24 Hr. basis.

<u>Reporting personnel will be trained on:</u>

- The content of the Information Summary in Section 3.j.
- The telephone number of the National Response Center **(800-424-8802)**.
- The notification process.

<u>Personnel engaged in response activities will be trained on:</u>

- The characteristics and hazards of the oil discharged.
- Conditions that could worsen emergencies, including the consequences of facility malfunctions or failures, and the appropriate corrective actions.
- The steps necessary to control any accidental discharge of oil and to minimize the potential for fire, explosion, toxicity, environmental damage.
- The proper firefighting procedures and use of equipment, fire suits, and breathing apparatus.

B.a. OSRC/IC and QI

Qualified Individual (QI), Oil Spill Response Coordinator (ORSC)/Incident Commander (IC) and Spill Management Team (SMT) training occurs yearly and includes, at a minimum, instruction on locations, use, deployment, and logistical requirements of the response equipment. In addition, the training includes spill reporting procedures and spill trajectory analysis

B.b. OTHER SMT

Other SMT personnel have received training on the types of equipment available for in-situ burn and dispersant operations from the various OSROs and spill response contractors. This training includes their locations, response times, capabilities, shortcomings, and general operational parameters. It also includes the integration of those resources into the ICS structure within the Operations Section.

In-situ burn and dispersant training follows the recommendations by the equipment manufacturer in regards to operation and maintenance of the equipment. The use of these techniques requires prior agency approval. Further details for the use of dispersants, including the conditions for use and approval procedures, can be found in Section 18 (Dispersant Use Plan) of this OSRP. Details for the use of in situ burning, including conditions for use, decision processes, and approval procedures, can be found in Section 19 (In Situ Burning Plan) of this OSRP.

B.c. SROT MEMBERS

Spill Response Operating Team members of Marine Spill Response Corporation (MSRC), Patriot Environmental and Clean Harbors Environmental Services who are responsible for operating response equipment are trained in hands-on classes at least annually. The training includes the deployment and operation of the response equipment. Trainers are also trained annually in order to properly supervise and direct the deployment of the equipment. The training records are kept by MSRC, Patriot and Clean Harbors.

B.d LOCATION of RECORDS

The course completion certificates or attendance records are kept at the company office or at the following locations:

- Witt O'Brien's — 818 Town & Country Blvd., Suite 200
Houston, TX 77024

Personnel training records are maintained for as long as personnel have responsibilities under the Plan.

ANNUAL TRAINING SUMMARY				
BETA OFFSHORE				
NAME	**POSITION**	**TYPE**	**DATE**	**LOCATION**
Dan Steward	Qualified Individual, Incident Commander, Safety Officer, Liaison Officer, Information Officer	QI/SMT	9/10/2019	Long Beach, CA
Diana Lang	Qualified Individual, Incident Commander, Safety Officer, Liaison Officer, Planning Section Chief	QI/SMT	9/10/2019	Long Beach, CA
Rick Armstrong	Qualified Individual, Source Control Section Chief, Operations Section Chief	QI/SMT	9/10/2019	Long Beach, CA
Lorraine Lopez	Logistics Section Chief, Finance Section Chief, Procurement Unit Leader, Cost Unit Leader	SMT	9/10/2019	Long Beach, CA
Veronica Banuelos	Finance Section Chief, Procurement Unit Leader, Cost Unit Leader	SMT	9/10/2019	Long Beach, CA
Christian Zumaran	Operations Section Chief, Planning Section Chief, Liaison Officer	SMT	9/10/2019	Long Beach, CA
Kate Conrad	Public Information Officer	SMT	9/10/2019	Long Beach, CA
Marielle Lomax	Operations Section Chief, Planning Section Chief, Resources Unit Leader, Situation Unit Leader	SMT	9/10/2019	Long Beach, CA
Terry Mullin	Safety Officer	SMT	8/1/17	Long Beach, CA
Jazmin Tostado	Planning Section Chief, Environmental Unit Leader,	SMT	9/10/2019	Long Beach, CA
Lidia Carbajal	Logistics Support, Documentation support	SMT	9/10/2019	Long Beach, CA
Drew White	Logistics Section Chief, Logistics Support	SMT	9/10/2019	Long Beach, CA

B.d LOCATION of RECORDS (Cont'd)

ANNUAL TRAINING SUMMARY				
BETA OFFSHORE				
NAME	POSITION	TYPE	DATE	LOCATION
Leo Renteria	Logistics Support	SMT	8/29/17	Long Beach, CA
Mike Smith	Operations Support	SMT	9/12/17	Long Beach, CA
Sam Sacco (Contractor)	Information Officer, Liaison Officer	SMT	10/16/17	Canada
Rob Hurley, CSP (Contractor)	Safety Officer	SMT	9/10/2019	Long Beach, CA

O'BRIEN'S RESPONSE MANAGEMENT				
NAME	POSITION	TYPE	DATE	LOCATION
Dan Sobieski	Incident Commander, Liaison Officer, Planning Section Chief	QI/SMT	1/9-13/2017	Slidell, LA
Ed Turner	Operations Section Chief, Logistics Section Chief	QI/SMT	1/11/2018	Houston, TX
Tom Haug	Incident Commander, Operations Section Chief, Planning Section Chief	QI/SMT	1/11/2018	Houston, TX
Keith Towler	Logistics Section Chief, Finance Section Chief	QI/SMT	1/11/2018	Houston, TX
Tim O'Leary	Information Officer, Liaison Officer	SMT	1/11/2018	Houston, TX

APPENDIX C

DRILL INFORMATION

Drill Information C-1

Figure C-1 Exercise Notification DFW 1964 .... C-9
Figure C-2 Exercise Credit Form DFW 1967 .... C-10

RESPONSE TEAM EXERCISES

Local/Spill Management Team members, government agencies, contractors, and other resources must participate in response exercises required by Federal, state, or local regulations and as detailed in the "National Preparedness for Response Exercise Program (PREP) Guidelines." The Company will conduct announced and unannounced drills to maintain compliance, and each plan-holder must participate in at least one exercise annually. The following table lists the triennial exercise cycle for facilities (see PREP Guidelines for full details).

TRIENNIAL CYCLE		
Total Number	**Frequency**	**Exercise Type/Description**
12	Quarterly	QI Notification Exercise
6	Semi-Annual	Equipment Deployment Exercise *(OSRO or Owner/Operator Equipment staged offshore)*
3	Annual	Equipment Deployment Exercise *(OSRO or Owner/Operator Equipment staged onshore)*
3	Annual	Spill Management Team Tabletop Exercise
1	Triennial	Government Initiated Unannounced Exercise.
NOTE: All response plan components must be exercised at least once in the Cycle. At least one (1) SMT Tabletop Exercise in a triennial cycle must involve simulation of the Worst Case Discharge/Reasonable Worst Case Spill Scenario. Annually, plan holders (excluding plan holders regulated by BSEE) should ensure that one (1) Spill Management Team Table Top Exercise or Equipment Deployment Exercise is conducted as an internally-initiated unannounced exercise. An unannounced exercise is one in which the exercise participants do not have prior knowledge of the exercise, as would be the situation in an actual spill. A response to an actual spill may be considered for plan holder-initiated unannounced exercise requirement credit, if the response was self-evaluated and required exercise objectives were met and documented by the plan holder.		

RESPONSE TEAM EXERCISES (Cont'd)

Quarterly QI Notification Exercise

- **Scope:** Exercise and test communication between facility personnel on each facility manned on a 24-hour basis and the QI(s) and/or designated alternate(s) *information to be provided in the event of a spill must be simulated during this exercise. *In accordance with 14 CCR § 820.01(a)(1)(B) contact must also be made with the Oil Spill Response Organization (OSRO) and Spill Management Team (SMT).

- **Objective:** *Voice contact must be made with the QI. (In accordance with 14 CCR § 820.01(a)(1)(B) contact must also be made with the OSRO and SMT.) All pertinent information must be communicated in a timely manner as outlined within the approved response plan and include:

  A. Incident location:
  Indicate county, State, and latitude and longitude of release.

  B. Released material:
  Indicate name of material released, quantity released, and quantity in the water.

  C. Brief description of incident

  D. Incident details:
  Include platform rig name or platform letter, location area ID, block number, OCS lease number or State lease number.

  E. Sheen information:
  Include color, direction traveling, size, leading edge.

  F. Impact:
  Indicate if fire is involved and, if so, whether it is extinguished; document injuries or fatalities and if evacuation(s) occurred.

  G. Remedial action:
  Indicate if source is secure and whether steps have been taken for source control or spill response.

  H. Weather:
  Describe weather conditions, wind speed, wave conditions, speed and direction of currents.

  I. Agency notifications:
  Indicate any local/State/Federal agencies that have been notified.

  J. Additional Information:
  Describe threats to personnel, biological resources, or the environment and any other pertinent information not previously covered.

RESPONSE TEAM EXERCISES (Cont'd)

- **General:** Corrections must be identified and incorporated into your oil spill response plan to address any problems encountered while conducting the notification exercise. At least once per year, the QI notification exercise should be conducted during non-business hours.

- **Note:** The BSEE requires notification drills be conducted annually. PHMSA and OSPR require notification drills be conducted quarterly.

Semi-Annual Equipment Deployment Exercise (equipment staged offshore, OSRO or Company owned)

- **Applicability:** BSEE - OSRO or owner or operator response equipment required to be or voluntarily staged offshore.

- **Scope:** Deploy and operate response equipment that is staged offshore and identified in the response plan. Each type of this equipment is to be deployed annually. Each type need not be deployed at each exercise.

- **Objectives:** Demonstrate ability of spill response personnel to conduct timely and proper deployment and operation of equipment in a safe manner.

  Demonstrate the ability of spill response personnel to employ response techniques and methodologies that would enhance spill response capability and/or serve to protect environmentally sensitive or economic resources.

  Evaluate the effective operation of the deployed equipment; i.e., the operating condition and the ability to demonstrate and achieve the equipment's defined operating specifications during the exercise.

  Evaluate deployment strategies under various spill scenarios.

  Identify corrections needed to address any problems encountered while conducting the exercise and the incorporation of these corrections into the spill response plan.

- **General:** The Facility may take credit for actual equipment deployment to a spill or training sessions as long as the activities are properly documented.

- **Note:** BSEE requires that the first equipment deployment be conducted during the first six (6) months of the year and the second during the second six (6) months.

RESPONSE TEAM EXERCISES (Cont'd)

***Semi-Annual/Annual Equipment Deployment Exercise* (*equipment staged onshore, OSRO or Company owned*)**

- **Applicability:** BSEE - OSRO or owner or operator response equipment stored at an onshore location that is cited in a spill response plan submitted to BSEE for review and approval. OSPR - Company owned response equipment (Semi-Annual, see Note). DOT/PHMSA - Operator-owned equipment listed in the response plan (Annual).

- **Scope:** Deploy and operate response equipment that is stored onshore and identified in the response plan. Each type of equipment must be exercised during each triennial period. It is not necessary to deploy each piece of equipment.

- **Objective:** Demonstrate ability of spill response personnel to conduct timely and proper deployment and operation of equipment in a safe manner.

  Demonstrate the ability of spill response personnel to employ response techniques and methodologies that would enhance spill response capability and/or serve to protect environmentally sensitive or economic resources.

  Evaluate the effective operation of the deployed equipment; i.e., the operating condition and the ability to demonstrate and achieve the equipment's defined operating specifications during the exercise.

  Evaluate deployment strategies under various spill scenarios.

  Identify corrections needed to address any problems encountered while conducting the exercise and the incorporation of these corrections into the spill response plan.

- **Note:** In accordance with 14 CCR § 820.01(d) equipment deployment exercises must be scheduled with OSPR at least 30 days prior to the exercise using OSPR Exercise Notification Form DFW 1964 (Refer to Figure C-1). Following the exercise a request for credit must be submitted to OSPR within 60 days using OSPR Request for Drill/Exercise Credit DFW 1967 (Refer to Figure C-2) accompanied with appropriate documentation. The OSPR Exercise Calendar is located at: https://www.wildlife.ca.gov/OSPR/Drills-Exercises/Drills-Exercises-Calendars

  OSPR requires that the first equipment deployment be conducted during the first six (6) months of the year and the second during the second six (6) months. If the first equipment deployment drill is evaluated as successful the second is not required by OSPR. Note that for Company owned equipment BSEE still requires a second equipment deployment exercise.

RESPONSE TEAM EXERCISES (Cont'd)

Annual Spill Management Team Tabletop Exercise

- **Scope:** Exercise the Spill Management Team annually.

- **Objective:** Exercise the SMT's organization, communication, and decision-making in managing a spill response to an unannounced scenario.

  Exercise a select combination of the core components of a spill response plan as outlined within Appendix A of the PREP Guidelines. Design the exercise to test for the selected core components. For each triennial cycle (every 3 years), each of the applicable core components (outlined in Appendix A of the PREP Guidelines) needs to be exercised at least once.

  In addition, effective demonstration of any of the following components may be included in the scenario for the exercise:

  A. Ability to track and monitor the spill and to properly map the spill information necessary to respond to the unannounced spill scenario.

  B. Knowledge of response plan.

  C. Ability to access information in ACP for location of sensitive areas, resources available within the area, unique conditions of area, recommended protection strategies, etc.

  D. Ability, through the appropriate procurement of resources and planning, to utilize the best available measures, equipment, and techniques necessary to protect the onshore and offshore potentially impacted resources. This may include subsea well containment and control equipment if applicable.

  E. Identification of corrections to address any problems encountered while conducting the exercise and the incorporation of these corrections into the spill response plan.

- **General:** A minimum of one Spill Management Team Tabletop Exercise in a triennial cycle will involve simulation of the Worst Case Discharge scenario.

  In accordance with 14 CCR § 820.01(d) Spill Management Team Tabletop Exercises must be scheduled with OSPR at least 30 days prior to the exercise using OSPR Exercise Notification Form DFW 1964 (Refer to Figure C-1). Following the exercise a request for credit must be submitted to OSPR within 60 days using OSPR Request for Drill/Exercise Credit DFW 1967 (Refer to Figure C-2) accompanied with appropriate documentation. The OSPR Exercise Calendar is located at: https://www.wildlife.ca.gov/OSPR/Drills-Exercises/Drills-Exercises-Calendars

RESPONSE TEAM EXERCISES (Cont'd)

Government Initiated Unannounced Exercise

- **<u>Applicability/ Frequency</u>:** Offshore Facilities. An offshore facility will not undergo a BSEE-initiated unannounced exercise more than once every 36 months, unless the BSEE Chief, OSPD, determines that the results of an exercise or response to real time incidents warrant a more frequent evaluation, or an emerging concern arises necessitating that BSEE test the preparedness and viability of the contents of a newly submitted or existing OSRP.

  Plan Holder: DOT/PHMSA has and reserves the authority to conduct and require an operator to participate in a GIUE. (Plan holders who have successfully completed a GIUE will not be required to participate in another one for at least 36 months from the date of the exercise.)

- **<u>Scope:</u>** BSEE - Exercise will require that the owner or operator respond to a spill scenario posed by the BSEE Chief, OSPD, or designee. These unannounced exercises may consist of either (1) an IMT exercise, (2) a deployment exercise/drill using equipment staged onshore, or (3) an IMT exercise combined with the deployment of equipment staged onshore and/or offshore.

  PHMSA - A. Demonstrate the ability to respond to a WCD spill event. B. Unannounced exercise to discuss strategic issues. C. On the day of the exercise, the pipeline owner or operator will be provided the scenario and post-spill events. This information will be used to explore and discuss strategic issues that will help operators evaluate their response plans.

- **<u>Objective:</u>** BSEE -

  A. IMT Exercise

  The owner or operator will be requested by BSEE to demonstrate a select combination of the Core Components outlined within Appendix A of the PREP Guidelines. Each drill will use an unannounced scenario that will be designed to test these selected Core Components.

  In addition, effective demonstration of any of the following components may be included in the unannounced scenario for the exercise:

  1. Demonstrate the ability to detect, track and monitor the spill, and determine the size or flow rate of a discharge;
  2. Demonstrate knowledge of the OSRP and any referenced OSRO inventories, tactics manuals, and well containment plans;
  3. Demonstrate the ability to access information in the appropriate RCPs and ACPs for the location of sensitive areas, protective best management practices, response resources available within the area, unique conditions of area, recommended response strategies, etc.;
  4. Demonstrate the ability, through the appropriate procurement of resources and planning, to use the equipment and techniques necessary to secure and mitigate the threat of a discharge of oil and protect potentially impacted resources; and

RESPONSE TEAM EXERCISES (Cont'd)

Government Initiated Unannounced Exercise

5. Demonstrate the effective and coordinated integration of source control and subsea containment operations with other incident management activities, including oil spill response operations.

B. Deployment exercise/drill using equipment staged onshore and/or offshore

The deployment exercise is intended to:

1. Demonstrate ability of response personnel to conduct timely and proper mobilization, deployment and operation of selected spill response and source control equipment in a safe manner, including any and all supporting logistical platforms, systems, and services;
2. Demonstrate the ability of spill response personnel to employ response techniques and methodologies that would enhance spill response capability and/or serve to protect environmentally sensitive or economic resources;
3. Evaluate the operating condition and the ability to achieve the deployed equipment's defined operating specifications during the exercise;
4. Evaluate deployment strategies under the unannounced spill scenario; and
5. Effectively direct oil removal, protection, or mitigation operations using oil spill surveillance and tracking resources.

C. IMT exercise combined with deployment of equipment staged onshore and/or offshore

1. The objectives as outlined in numbers 1 and 2 above.

PHMSA - Designated emergency response team members should demonstrate adequate knowledge and understanding of their FRP and the ability to organize, communicate, coordinate, and respond in accordance with that plan. Initiate and demonstrate use of a UC, consistent with NIMS.

- **General:** Plan holder may receive credit for other required exercises (a QI notification, equipment deployment exercise, and unannounced exercise) if the GIUE is successfully completed, objectives of the other exercise(s) are met, and a proper record is generated.

Exercise Documentation

- All exercises should be documented and records maintained at the Company office; documentation should specify:
  - The type of exercise;
  - Date and time of the exercise;
  - A description of the exercise;
  - The objectives met in the exercise;
  - The components of the response plan exercised; and
  - Lessons learned.
- Exercise documentation should be kept on file for a minimum of three (3) years.

FIGURE C-1

EXERCISE NOTIFICATION DFW 1964

State of California – Department of Fish and Wildlife

EXERCISE NOTIFICATION

DFW 1964 (Rev. 04/01/14) Page 1

SAVE PRINT

Company Name:

Company Address:

Facility/Vessel Name:

OSPR Contingency Plan #:

Point of Contact: Phone:

Cell:

Email: Fax:

Exercise Date : Exercise Time:

Exercise Location:

Type of Exercise: ☐ Table Top/Functional ☐ Equipment Deployment ☐ (1st 6 Months) ☐ (2nd 6 Months)

☐ Unannounced ☐ Other

Level of Participation (optional): ☐ Facility/vessel personnel ☐ National Team

☐ Regional Response Team ☐ International Team

Level of OSPR ICS Participation (optional):

☐ IC ☐ Planning ☐ Operations ☐ Other

☐ ICS software to be used Type: ____________________ ☐ None

OSPR Design Team Participation (optional): ☐ Yes ☐ No

Sensitive Site Location, if any (Site Number/Site Name):

Objectives – Use numbers described in the California Code of Regulations, Title 14, Section 820.01 (e-g):

Other Participants (Agencies, OSRO's, etc.):

Email to osprdrills@wildlife.ca.gov Please call (916) 445-9338 or email if not on the calendar within 5 days. Thank you.

EXERCISE NOTIFICATION INSTRUCTIONS

This form is to be submitted to OSPR pursuant to CCR Title 14, Division 1 Subdivision 4, Chapter 3, Subchapter 3, Section 820.01 (d). It shall be filled in and sent to OSPR. The CCR states, the "Administrator shall be given advance notice of a minimum of 30 days for in-state semi-annual equipment deployment drills and discussion-based tabletop exercises (which is a discussion only of response to an oil spill scenario and involves no role playing); 60 day for all other in-state drills and exercises." One drill/exercise for each form. Include the following information.

Company Name: Name of company plan holder conducting the exercise.

Company Address: Street address of the facility in this exercise.

Facility/Vessel Name: The official name of the facility or vessel. (Example : Facility Plan number E1-11-1111, Vessel Plan number 08-01-1111).

Point of Contact: Person who will be the primary contact for the exercise.

Exercise Date and Time: Date and time exercise will be conducted.

Exercise Location: Name and street address where the exercise will be held.

Type of Exercise: Is the exercise a Tabletop/Functional, Equipment Deployment, Unannounced or Other. Other; includes discussion based exercises, seminars or workshops which are starting points in exercise complexity. If it's an Equipment Deployment, is it for the first 6 months of the year or the second 6 months?

Level of Participation (optional): Who will be players during the exercise? Is it the local facility personnel or will other team members participate?

Level of OSPR ICS Participation: Do you want OSPR to fill specific positions within the Incident Command System? What is the name of the response software used during the exercise?

OSPR Design Team Participation: OSPR has drill coordinators and subject matter experts to help with the design of the drill.

Sensitive Sites Location, if any: California has 630 sensitive sites, will the exercise involve deploying boom near a sensitive site?

Exercise Scenario Description: Brief description of the incident that will be used during the exercise.

Scenario: Latitude/Longitude, coordinates of the spill site in the scenario.

Objectives: Listing of the objective numbers in CCR Title 14, Section 820.01 (e-g)

Other Participants: List of other agencies who are invited to participate in the exercise.

FIGURE C-2

EXERCISE CREDIT FORM DFW 1967

State of California – Department of Fish and Wildlife
REQUEST FOR DRILL/EXERCISE CREDIT
DFW 1967 (Rev. 04/01/14) Page 1

SAVE PRINT

Name of Facility or Vessel Plan:

Plan Number(s):	OSPR Representative(s):

Date of Drill/Exercise:	Location of Drill/Exercise: Address:	Scenario Coordinate:	Latitude: Longitude:

Name of Submitter:	Address:	Phone: E-mail:

Type of Drill or Exercise

Tabletop/Functional	Equipment Deployment	Unannounced	Actual Spill	Other
☐	☐ 1st 6 Mos. of yr. ☐ 2nd 6 Mos. of yr.	☐	☐	☐ ________

Tank Vessels, Nontank Vessels, Marine Facilities – Check the Objectives exercised during tabletop exercises or spills.

☐	1.	Notifications	☐	8.3	Vessel Emergency Services**	☐	9.3.1	Waste Management
☐	2.	Staff Mobilization	☐	8.4	Lightering**	☐	9.3.2	Applied Response Technology (ART)
☐	3.	Incident Command System (ICS)	☐	8.5	Firefighting	☐	9.4	Documentation
☐	4.	Unified Command (UC)	☐	8.6	Shoreline Protection	☐	9.5	Volunteer Management
☐	5.	Public Information Officer (PIO)	☐	8.7	Wildlife Recovery & Rehabilitation	☐	10.	Logistics
☐	6.	Liaison Officer (LNO)	☐	8.8	Safety of Responders and Public	☐	10.1	Communications
☐	7.	Safety Officer (SOFR)	☐	9.	Planning	☐	10.2	Personnel Support
☐	8.	Operations (OPS)	☐	9.1	Situation Unit	☐	10.3	*ICP Equipment and Support
☐	8.1	Source Control	☐	9.2	Resource Unit	☐	11.	Finance
☐	8.2	Assessment	☐	9.3	Environmental Unit			

*ICP-INCIDENT COMMAND POST ** VESSEL APPROPRIATE

Small Marine Fueling Facilities, Mobile Transfer Units, Vessels Carrying Oil as Secondary Cargo – Check the objectives exercised during tabletop exercises or spills.

☐	1.	Notifications	☐	8.	Operations	☐	9.2	Resource Unit
☐	2.	Staff Mobilization	☐	8.1	Source Control & Assessment	☐	9.3	Environmental Unit
☐	3.	Incident Command System (ICS)	☐	8.2	Firefighting	☐	9.4	Waste Management and Disposal
☐	4.	Unified Command (UC)	☐	8.3	Containment	☐	9.5	Documentation
☐	5.	Public Information	☐	8.4	Wildlife Recovery & Rehabilitation	☐	10.	Logistics
☐	6.	Liaison	☐	9.	Planning	☐	10.1	Personnel & Facility Support
☐	7.	Safety	☐	9.1	Situation Unit	☐	11.	Finance

Equipment Deployment

☐	1.	Notifications ☐ OSRO ☐ NRC ☐ Cal OES	☐	3.	Safety	☐	5.	Communication
☐	2.	Staff Mobilization	☐	4.	Equipment Deployment			

Authorized Representatives Name:	Date:

NOTE: ONE FORM FOR EACH DRILL CONDUCTED IS REQUIRED.

Please send request via FAX to (916) 327-0907 or email to OSPRDRILLS@WILDLIFE.CA.GOV

This form needs to be submitted to OSPR pursuant to CCR Title 14, Division 1 Subdivision 4, Chapter 3, Subchapter 3, Section 820.01 (h). It shall be filled in and sent to OSPR when requesting credit for a drill/exercise or actual spill. The CCR states, the "OSPR's Request for Drill/Exercise Credit Form (DFW 1967 (04/2014) located at www.dfg.ca.gov/ospr) shall be used to provide this documentation and shall include documentation supporting the objectives tested, such as Site Safety Plan, Incident Action Plan, Waste Management Plan, Communications Plan, etc., as appropriate. The documentation shall be submitted to the Drills and Exercises Program within 60 days after the completion of the drill/exercise. If the information submitted is insufficient, the Plan Holder will be notified and shall have 15 calendar days to send in the completed documentation or the request for credit will be denied."

The Request for Credit Form is divided into 4 sections. The top (yellow section) is filled out by all Plan Holders requesting Drill/Exercise credit. The violet section contains the exercise objectives to be used by the Tank Vessels, Nontank Vessels and Marine Facilities. The green section contains the exercise objectives to be used by the Small Marine Fueling Facilities, Mobile Transfer Units and Vessels Carrying Oil as Secondary Cargo. The blue section contains the objectives that may be met during an Equipment Deployment.

Include the following information.

Name of Facility or Vessel Plan: Name of plan holder conducting the exercise.

Plan Number(s): The Contingency Plan number assigned by OSPR example; Facility Plan number E1-11-1111, Vessel Plan number 08-01-1111.

OSPR Representative(s): Name or names of OSPR personnel who attended the drill or exercise.

Date of Drill/Exercise: Date exercise was conducted.

Location of Drill/Exercise: Address where the exercise was held.

Scenario Coordinate: If the exercise includes a specific scenario location, what is the latitude/longitude of the spill site?

Name of Submitter: Name of individual submitting the Request for Drill/Exercise Credit.

Address: Address of the individual submitting the Request for Drill/Exercise Credit

Phone: Phone number of submitter.

E-mail: E-mail address of the submitter.

Type of Drill or Exercise: Tabletop/Functional (an exercise as realistic as possible without deploying resources); **Equipment Deployment** (actual physical deployment of boom and response vessels); **Unannounced** (the drill or exercise was not on the calendar); **Actual Spill;** (see 820.01 (i)5 "Actions taken in response to an actual spill in California may be considered for exercise credit."); **Other** (discussion-based exercises, seminars or workshops which are starting points in exercise complexity. Full-scale exercises, such as PREP exercises are also classified as "other".)

Tank Vessels, Nontank Vessels, Marine Facilities – Check the Objectives exercised during tabletop exercises or spills.

The listed Objectives are in the California Code of Regulations, Title 14, Division 1 Subdivision 4, Chapter 3, Subchapter 3, Section 820.01. (e).

Small Marine Fueling Facilities, Mobile Transfer Units, Vessels Carrying Oil as Secondary Cargo – Check the objectives exercised during tabletop exercises or spills.

The listed Objectives are in California Code of Regulations, Title 14, Division 1 Subdivision 4, Chapter 3, Subchapter 3, Section 820.01 (f).

Equipment Deployment – Check the Objectives exercised during this drill or spill. The listed Objectives are in California Code of Regulations, Title 14, Division 1 Subdivision 4, Chapter 3, Subchapter 3, Sections 820.01 (g).

(Note that all five objectives must be met to receive credit).

Authorized Representatives Name: The name of the individual filling out this form. **Date:** The date this form was filled out.

APPENDIX D

CONTRACTUAL AGREEMENTS

Contractual Agreements D-2

MARINE SPILL RESPONSE CORPORATION (MSRC)

A list of MSRC's response equipment and locations nationwide is available on MSRC's Internet web-site: https://www.msrc.org . MSRC's available resources in Los Angeles, Orange County, Ventura, and the Santa Barbara areas are also summarized on the web-site.

MARINE SPILL RESPONSE CORPORATION
SERVICE AGREEMENT

EXECUTION INSTRUMENT

The MSRC SERVICE AGREEEMENT attached hereto (together with this execution instrument, the "Agreement"), a standard form of agreement amended and restated as of September 27, 1996, is hereby entered into by and between

Beta Operating Company, LLC d/b/a Beta Offshore
[Name of COMPANY]

a Delaware Limited Liability Company
[Type of entity and place of organization]

with its principal offices located at 111 W. Ocean Blvd. Ste 1240 Long Beach, CA 90802 (the "COMPANY"), and MARINE SPILL RESPONSE CORPORATION, a nonprofit corporation organized under the laws of Tennessee ("MSRC"), and shall be identified as

SERVICE AGREEMENT No. 6MPA 291 [This is to be provided by MSRC.]

IN WITNESS WHEREOF, the parties hereto each have caused this Agreement to be duly executed and effective as of ~~MAY 8~~ 19th, 20 10

Beta Offshore [COMPANY]

By: [signature] [signature]

Steve Liles [print name]

Title: Executive Vice President
& Chief Operating Officer

Address: 111 W. Ocean Blvd., Ste 1240
Long Beach, CA 90802

Telephone: (562) 628-1526 Fax: (562) 628-1536

MARINE SPILL RESPONSE CORPORATION:

By: [signature]
Judith ~~R. Norell~~ A. Roos
Vice President
Marketing, Customer Services & Corporate Relations
220 Spring Street, Suite 500
Herndon, VA 20170
(703) 326-5617; Fax: (703) 326-5660

Beta OFFSHORE

List of Facilities to be covered under the MSRC Agreement

1. Platform Ellen and all attached equipment
2. Platform Elly and all attached equipment
3. Platform Eureka and all attached equipment
4. Bridge connecting Platform Ellen & Elly
5. 16" San Pedro Bay Pipeline (oil line) running between Platform Elly and Long Beach
6. 10" water line running between Platform Elly & Platform Eureka (current gas line)
7. 6" gas line running between Platform Elly & Platform Eureka (current gross fluids)
8. 10" oil line running between Platform Elly & Platform Eureka (idle)

FINANCIAL RESPONSIBILITY CERTIFICATION

In accordance with Section 2.01(a) of Schedule 2 to the MSRC Service Agreement, the undersigned, being a duly authorized officer of Beta Offshore [*insert name of the "COMPANY" that is the party to the Service Agreement*] ("COMPANY"), does hereby certify to the best knowledge and belief of the undersigned, that the COMPANY meets the requirements of Schedule 2 and:

(i) the method relied on by the COMPANY to establish financial responsibility for each Vessel and Facility owned or operated within the Operational Area by the COMPANY or its affiliates is as follows (*see Section 2.02 (a) through (c) of Schedule 2 for the available methods*):

The company carries a liability insurance to a maximum amount of $101 Million

[Attach additional sheets if necessary]

(ii) the applicable Financial Responsibility Amount for each Vessel and Facility owned or operated within the Operational Area by the COMPANY or its affiliates is as follows (*see the definitions in Section 2.03 of Schedule 2 for the proper calculation of Financial Responsibility Amount*):

Required Insurance: MMS Oil spill Financial Responsibility
$35 Million OPA

Estimated Pipeline Responsibility
$12,500 x 1000 BBL = $12.5 Million Onshore

[Attach additional sheets if necessary]

Capitalized terms used in this Certificate and not defined have the meaning ascribed to such terms under the Service Agreement.

IN WITNESS WHEREOF, the undersigned has executed this Certificate in the name and on behalf of the COMPANY as of MAY 5, 20 10.

Beta Offshore
[*COMPANY NAME*]

BY: ____________________
[*signature of duly authorized officer*]

Name: Steve Liles
[*print name of officer signing*]

Title: Executive VP & Chief Operating Officer
[*print title of officer signing*]

PATRIOT ENVIRONMENTAL SERVICES

Patriot Environmental Services is a rated OSRO and an MSRC *STARs* Contractor. Patriot can be used for nearshore protection and shoreline cleanup, and for oil and hazardous waste cleanup and disposal. Patriot's available resources in the Los Angeles, Orange County, Ventura and Santa Barbara areas are also summarized on the web-site: https://www.patriotenvironmental.com/oil-spill-removal-organization.html

This Master Service Agreement ("agreement") is entered into on May 31, 2011, between:

Operator: Beta Offshore
Address: 111 W. Ocean Blvd., Suite 1240
Long Beach, CA 90802-4645

Contractor: Patriot Environmental Services
Address: PO Box 1091
Long Beach, CA 90801

The parties agree as follows:

1. Background

A. Operator regularly and customarily enters into contracts with independent contractors for the performance of service relating to the Operator's business.

B. Contractor represents that it has adequate equipment in good working order and fully trained personnel capable of efficiently and safely operating such equipment and performing services for Operator.

2 **Hazards:** The equipment and work areas involved in the work under this agreement are in and part of a producing oilfield offshore California and may contain hazards, including without limitation, flammable, corrosive and/or toxic liquids or gases. Contractor acknowledges that it must take extreme care in performing its work hereunder and accepts the entire risks of such hazards to the employees, tools, equipment and materials of Contractor and its subcontractors.

3. **Safety:** While performing work under this agreement, Contractor shall provide and maintain a safe working environment for, and shall adequately protect the health and safety of, the employees and representatives of Operator, Contractor, Contractor's subcontractors, and all third parties. Contractor acknowledges receiving a copy of Operator's Contractor Environmental Health and Safety Requirements, and Contractor agrees to comply with these minimum requirements, but such minimum requirements shall in no way limit Contractor's obligations to prescribe and enforce appropriate environmental, safety and health standards for the work which shall comply with all applicable federal, state and local safety and health laws and regulations. Contractor shall be solely responsible for notifying its employees, and those of its subcontractors, of all health and safety hazards to which they may be exposed, and Contractor hereby assumes the responsibility to train them in accordance with federal and state OSHA requirements and to provide all necessary protective clothes and equipment for them.

4. **Acceptance and Period of Performance:** Execution of this agreement by Contractor, the shipment of any articles hereunder by Contractor, or the commencement of any work hereunder by Contractor shall constitute Contractor's acknowledgement that it is a party to this agreement, and Contractor's agreement to be bound by its terms. No contrary or additional terms or conditions shall apply notwithstanding any oral or written statement made by Contractor. This agreement applies to all work and/or services performed by or on behalf of Contractor for Operator. Unless otherwise provided in writing by the Contractor and Operator, this agreement shall remain in full force and effect continuously until either party cancels the agreement with a minimum of 30 days advance notice in writing to the other party.

Initial: 5/11/11 Date: MQS

5. **Title and Quality:** Contractor warrants the title to all articles sold and materials supplied hereunder and warrants that all articles sold and materials and work supplied hereunder are of good quality, free of any defects and in full accord with all Operator specifications. All manufacturers' warranties or guarantees shall specifically extend to Operator and shall be furnished to Operator, but such extension and furnishing shall in no way relieve Contractor of any of its obligations hereunder. Should Contractor's title to any article or material fail, or should any article, material or work, in Operator's sole opinion, not be of good quality, not be free of defects, or not conform to Operator's specifications, Contractor shall promptly replace same at Contractor's sole expense and subject to the provisions hereof. Payment or acceptance by Operator shall not constitute a waiver of the foregoing. Nothing herein contained shall be construed to exclude or limit any warranties implied by law.

6. **Taxes:** Unless otherwise provided, Contractor assumes exclusive liability for, and shall pay before delinquency, all sales, use, excise and other taxes, charges or contributions of any kind now or hereafter imposed on, with respect to, or measured by, the articles sold or materials or work furnished hereunder or the wages, salaries, or other remunerations paid to persons employed in connection with the performance of the work hereunder, and Contractor shall indemnify and hold Operator harmless from any liability and expense by reason of the Contractor's failure to pay such taxes, charges, or contributions. Goods purchased under the agreement may be for delivery and use on Operator's Beta Unit platforms located offshore in Federal waters. Because the State of California requires strict compliance with certain tax provisions allowing exemptions for these items, invoices and delivery documents must show a delivery address reflecting the final offshore destination to ensure compliance with state law.

7. **Compliance with Laws, Permits:** In activity connected with performance under this Agreement, Contractor shall comply fully with all applicable laws, regulations, ordinances, rules, and permits. When requested, Contractor shall furnish evidence satisfactory to Operator of such compliance, including, but not limited to laws relating to equal employment opportunity, including: Executive Order 11246 and the regulations, orders and rules issued thereunder; the Rehabilitation Act of 1973 and regulations, orders and rules issued thereunder; the Vietnams Era's Veterans' Readjustment Assistance Act of 1974, as amended, and the regulations, orders and rules issued thereunder; the Equal Opportunity Clause (41 C.F.R. 60-1.4) the Affirmative Action and Non Discrimination Clause for Individuals with Disabilities (41 C.F.R. 60-741.5); the Affirmative Action and Non-Discrimination Clause for Special Disabled and Vietnam Era Veterans (41 C.F.R. 60-250.4); Utilization of Small, Small Disadvantaged and Women Owned Small Business Subcontracting Plan (FAR 52.219.9); and other applicable sections contained in 41 C.F.R. Chapter 60.

8. **Patent Infringements:** Contractor shall defend, indemnify and hold Operator, its affiliates and subsidiaries, and their respective officers, directors, shareholders, members, managers, employees, subcontractors, consultants and agents, harmless from and against any and all loss, liability or expense by reason of any claim or suit for alleged infringement of any copyright, trademark, or patent, resulting from or arising in connection with the manufacture, sale, use or other disposition of any article or material furnished hereunder, or the performance of any work hereunder, and shall defend any such claim or suit and pay all costs and expenses incidental thereto; provided, however, that Operator shall have the right, at its option, to participate in the defense of any such claim or suit, without relieving Contractor of any obligations hereunder.

9. **Assignments and Subcontracts:** Any assignment, whether by operation of law or otherwise, of this agreement or of any claim against Operator arising directly or indirectly out of or in connection with this agreement and any subcontract of any obligation hereunder, whether by operation of law or otherwise, shall be void without the prior written consent of Operator.

10. Default: Notwithstanding the provisions for Condition for Excuses of Non-performance hereof, if Contractor shall fail, neglect, refuse or be unable at any time to provide ample equipment or labor to perform the work at a rate of progress deemed reasonably sufficient by Operator or, if Contractor or any subcontractor shall breach any provision hereof, shall become insolvent, enter voluntary or involuntary bankruptcy or receivership proceedings, or make an assignment for the benefit of creditors, Operator shall have the right (without limiting any other rights or remedies which it may have hereunder or by operation of law) to terminate this agreement by written notice to Contractor, whereupon Operator shall be relieved of all further obligation hereunder except only the obligation to pay the reasonable value of Contractor's prior performance. Time is of the essence hereof.

11. Withholding of Payments: Operator shall have the right (but no duty) to withhold any monies payable by it to Contractor hereunder and apply same to the payment of any obligations of Contractor to Operator or any other parties.

12. Prices: Unless otherwise specified in any applicable supplement hereto, Operator shall pay Contractor, for the complete performance of Contractor's obligations, the prices quoted by Contractor, of if there are no such prices quoted then in accordance with applicable posted or published price lists or schedules, or if there are no such lists or schedules then in accordance with the prices of Contractor in effect on the date of shipment of any article covered hereby or the date of any work performed hereunder, less applicable discounts. If this agreement is based upon a bid of Contractor as awarded by Operator, any attached schedules or rates may be changed only pursuant to any provisions for such change set forth in Operator's request for bid. Any other schedules of rates may be changed from time to time by Contractor filing revised and dated schedules of rates, in duplicate, with Operator, which revised schedules of rates, shall become effective only after written approval thereafter by Operator. Provided Operator's authorized representative has given prior approval for Contractor to furnish any item through a third party or on a subcontracted basis, Operator shall pay Contractor for same at Contractor's net cost (after applicable discounts) plus a handling charge as set forth in any applicable supplement hereto. Contractor's billings for such items shall be supported by copies of third party subcontractor invoices.

13. Excuses for Non-performance: Except as provided in Condition for Default hereof, either party shall be absolved from its obligations under the agreement when and to the extent that performance is delayed or prevented (and in Operator's case when and to the extent that its need for the articles, materials or work to be supplied hereunder is reduced or eliminated) by reason of acts of God, fire, explosion, war, riots, strikes, or governmental laws, order or regulations.

14. Audit: If any payment provided for hereunder is to be made on the basis of Contractors cost, rates or other flexible billing basis, Operator shall have the right to audit Contractors books and records pertinent thereto. Contractor agrees to maintain such books and records for a period of two (2) years from the date of invoice to Operator and to make such books and records available to Operator at any reasonable time or times within the two-year period for Operator's use in making such audits.

15. Conflict: Should any conflict exist between this agreement and any document attached to or incorporated in this agreement, the provisions of this agreement shall control.

16. Applicable Law: This agreement shall be governed by and interpreted in accordance with the laws of the State of California including all matters of construction, validity, performance and enforcement, without giving effect to principles of conflict of law.

17. Performance: Contractor shall diligently and carefully perform all work in a good and workmanlike manner and shall be fully responsible for all work and services performed by any subcontractors. Contractor shall conduct all operations in Contractor's own name as an independent Contractor and not in the name of, or as agent for, Operator. Operator shall have no voice in the control of Contractor's employees, representatives or subcontractors, nor shall it have any right to direct or control Contractor in the method of performance or the means of accomplishing the desired result. Contractor shall be responsible for the results

18. Liability and Indemnity: Contractor shall defend, indemnify and hold harmless Operator, its affiliates and subsidiaries, and their respective officers, directors, shareholders, members, managers, employees, subcontractors, consultants and agents from and against any and all claims, demands, causes of action, damages, awards, settlements, penalties, fines, liabilities, losses, costs and expenses (including, without limitation, court costs and reasonable attorneys' fees) ("Losses") arising from or in connection with the actions or omissions of Contractor, or Contractor's employees, agents or subcontractors (without regard to the negligence of any party or parties), including without limitation, property damage, personal injury or death. Contractor's indemnity under this agreement shall be without regard to and without any right to contribution from any insurance maintained by Contractor. In the event any action or proceeding is brought against Operator by reason of any such claim, Contractor, upon notice from Operator, shall defend it at Contractor's expense by counsel satisfactory to Operator. If it is judicially determined that the monetary limits of contractually required insurance or of the indemnities assumed under this agreement (which Contractor and Operator hereby agree with, will be supported either by available liability insurance, or voluntarily self-insured, in part or in whole) exceed the maximum limits permitted under applicable law, it is agreed that such insurance requirements or indemnities shall automatically be amended to conform to the maximum monetary limits permitted under such law. Operator shall defend, indemnify and hold harmless Contractor, its affiliates and subsidiaries, and their respective officers, directors, shareholders, members, managers, employees, subcontractors, consultants and agents from and against any and all Losses arising from or in connection with the actions or omissions of Operator, or Operator's employees, agents or subcontractors (without regard to the negligence of any party or parties), including without limitation, property damage, personal injury or death. Operator's indemnity under this agreement shall be without regard to and without any right to contribution from any insurance maintained by Operator. In the event any action or proceeding is brought against Contractor by reason of any such claim, Operator, upon notice from Contractor, shall defend it at Operator's expense by counsel satisfactory to Contractor. If it is judicially determined that the monetary limits of contractually required insurance or of the indemnities assumed under this agreement (which Contractor and Operator hereby agree with, will be supported either by available liability insurance, or voluntarily self-insured, in part or in whole) exceed the maximum limits permitted under applicable law, it is agreed that such insurance requirements or indemnities shall automatically be amended to conform to the maximum monetary limits permitted under such law. Notwithstanding any other provision in this agreement, gross negligence or willful misconduct shall not be included in any indemnity obligation. It is expressly understood and agreed that each party's gross negligence or willful misconduct shall be the sole and exclusive responsibility of the actor and his employer. It is further understood that any monetary and or property damages incurred as a result of such party's gross negligence or willful misconduct shall be the sole and exclusive responsibility of the actor and his employer.

19. Use of Premises: Contractor shall perform all work in such manner as to cause a minimum of interference with Operator's operations and the operations of other contractors on the premises, shall take all necessary precautions to protect the premises and all persons and property thereon from damage or injury, and shall assume responsibility for the taking of such precautions by Contractor's and any subcontractor's employees, agents, licenses, permittees and subcontractors. Upon completion of the work, Contractor shall leave the premises clean and free of all tools, equipment, waste materials and rubbish.

Initial: MQS Date: 5/11/11

20. **Payments of Bills and Liens:** Contractor shall pay promptly all indebtedness for labor, materials, tools and equipment furnished by Contractor and any subcontractors in the performance of this agreement. Before Contractor shall be entitled to receive payment, Contractor shall, when requested by Operator, furnish evidence satisfactory to Operator of the full payment of such indebtedness. Contractor shall not permit any lien or charge to attach to the work or the premises upon which the work is being performed. Should any lien attach, Contractor shall promptly procure its release and shall indemnify Operator for all loss, cost, damage, fees, or expense incidental thereto.

21. **Changes in Work:** Changes in the work may be required from time to time by Operator. Should changes be so required, they shall not be commenced until Contractor is given written instruction from Operator which shall specify the changes, the sums (or the method of determining the sums) to be added to or subtracted from the agreed price as a result of such changes, and the effect, if any, of such changes on the completion or delivery dates. Should Contractor dispute any of the provisions of the instructions it shall notify Operator within forty-eight (48) hours and the parties shall settle their differences by negotiation.

22. **Insurance:** At all times during the term of this agreement, Contractor shall carry insurance in accordance with the attached Insurance Coverage Requirements. All such insurance shall be evidenced by the completion, execution and delivery to Operator of an Insurance Certificate.

23. **Invoicing and Payment:** Contractor shall promptly prepare and submit invoices according to the terms and conditions of the attached Invoicing and Payment Requirements.

24. **Recovery of Litigation Costs:** In any legal action, arbitration or alternate dispute resolution proceeding based upon or concerning this agreement, the successful or prevailing party shall be entitled to recover its actual attorney fees and costs incurred in that action or proceeding, in addition to all other relief to which it is entitled, regardless of whether the proceeding is concluded by settlement, award or judgment.

PATRIOT ENVIRONMENTAL SERVICES INC.

Printed Name of Contractor

Michael G Sall

Signature of Officer of the Contractor

05/11/2011

Date

Beta Offshore

Printed Name of Operator

Signature of Officer of the Operator

5-31-11

Date

CLEAN HARBORS

Clean Harbors is a response contractor for onshore cleanup. The company has a contract with Clean Harbors and will use them as necessary. Clean Harbor's Emergency Response Resources are linked here: www.cleanharbors.com > Services > Emergency Response > Download Clean Harbors Emergency Response Resource Book

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FIELD SERVICE ADDENDUM

Amendment 1

This Amendment 1 to the Waste Transportation and Disposal Agreement between Clean Harbors Environmental Services, Inc. ("Clean Harbors or CHES") and Beta Offshore ("Customer") (the "Agreement"), executed on June 11, 2010 is intended to supplement and modify the Agreement as stated herein. . Clean Harbors is willing to provide On-Site Confined Space Rescue Services ("CSR"), Field Services ("FS") and Emergency Response Services ("ERS") under the following terms and conditions.

A. CSR

The Agreement shall be amended and modified to include the following terms and conditions in all instances where Clean Harbors performs CSR for Customer,

1. DUTIES OF BETA OFFSHORE

Customer will ensure that all persons involved in the entry or other services (non CHES) are compliant with all Cal OSHA and Federal OSHA requirements pertaining to applicable H&S requirements. This shall include customer's subcontractors and/or employees have the appropriate written procedures, training, medical clearance etc. To perform the type of work required by Customer.

All equipment necessary to perform the CSR or other shall be provided by Customer (or their sub-contractor). CHES will not be responsible for supplying any of the entry equipment other than specific equipment required for rescue services.

2. DUTIES OF CLEAN HARBORS

Clean Harbors shall provide all personnel and equipment as deemed necessary to provide hole watch and confined space rescue services as needed. This equipment may include but not be limited to the following:

Supplied air equipment (SCBA or Supplied Airline Systems with egress bottles)
Body Harnesses
Mechanical Retrieval equipment
Basic First-Aid Kit.

Each confined space entry is unique and prior to initiating entry into any vessel CHES personnel shall develop a rescue plan for that particular space. The plan shall be documented and discussed with all personnel prior to beginning the entry.

3. INDEMNIFICATION

Customer acknowledges that the services provided herein are specialized and rescue actions are only made necessary when an incident involving independent third Party(ies) has or have occurred. In light of the specialized circumstances, Customer shall indemnify, defend, release and hold harmless Clean Harbors, its parent and affiliated companies and their respective directors, officers, employees and agents from and against any and all costs, liabilities, claims, demands and causes of action including, without limitation, any bodily injury to or death of any person or destruction of or damage to property which Clean Harbors may suffer, incur, or pay out, that arise out of, or are in any way related to, the services provided herein; except to the extent such liabilities, claims, demands and causes of action result from Clean Harbors' willful misconduct or gross negligence.

The foregoing indemnity shall only apply to those claims, liabilities or causes of action arising, during, or as a result of the performance of CSR. The indemnity contained in the Agreement shall govern the rights and obligations of the parties with regard to the transportation or disposal of waste materials by contractor.

Except as specifically amended herein, all other terms and conditions contained in the Agreement shall remain in full force and effect.

B. FS

The Agreement shall be amended and modified to include the following terms and conditions in all instances where Clean Harbors performs FS for Customer;

1. SCOPE OF WORK

The scope of work may include, but is not necessarily limited to:
Remediation and Remedial Systems
Site Construction
Custom Fabrication/Welding
Mobile Treatment Services
Site Operations, Monitoring & Maintenance
Well Maintenance and Video Inspection Services

2. CHANGE ORDERS

It is understood that the price set forth in Clean Harbors's quotation letter or bid for the Scope of Work is Clean Harbors's best estimate based on information provided to it, or made available, by the Customer. If, during the performance of the work, changes are made in the scope or character of the work or the limits of the project are revised, a Customer designated individual shall be authorized to issue, and shall so issue, the appropriate change order(s). The cost or credit to the Customer resulting from such change order(s) shall be determined in one or more of the following ways:

2.1 by mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

2.2 by unit prices stated in Clean Harbors's quotation letter or bid or as subsequently agreed upon;

2.3 by cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee.

3. SUBSURFACE/LATENT CONDITIONS

If Clean Harbors encounters (a) subsurface or latent physical conditions at the site which differ materially from those indicated by a reasonably diligent inspection or (b) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character as provided for in this Agreement and/or applicable purchase or work order and/or Scope of Work, equitable adjustment to the price and/or schedule shall be mutually agreed to by the parties before Clean Harbors shall proceed with the work.

4. CUSTOMER DELAYS

If the performance of all or any part of the project work is delayed or interrupted

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4.1 by an act of the Customer in the administration of the Agreement or project that is not expressly or impliedly authorized by the Agreement and/or any purchase or work order and/or Scope of Work definition (hereafter, collectively, the "SOW"), or

4.2 by a failure of Customer to act within the time specified in the SOW, or within a reasonable time if not specified,

Then, an adjustment shall be made for any increase in the cost of performance of SOW caused by the delay or interruption and the SOW shall be modified in writing accordingly. Adjustment shall also be made in the delivery or performance dates and any other contractual term or condition affected by the delay or interruption. However, no adjustment shall be made under this section for any delay or interruption to the extent that performance would have been delayed or interrupted by any other cause, including the fault or negligence of Clean Harbors, or for which an adjustment is provided or excluded under any other term or condition of this Agreement.

5. COMPLIANCE WITH LAWS AND REGULATIONS

Clean Harbors warrants that it has, or will secure by the time the project commences, all permits or approvals which are required for servicing the waste or for the services to be performed by Clean Harbors which are the subject of the SOW. Clean Harbors shall furnish to Customer, upon request, proof of all such permits and approvals. Customer warrants that Clean Harbors will be authorized by the appropriate agencies to utilize necessary permits or approvals previously secured by the Customer. Customer shall furnish to Clean Harbors, upon request, proof of such authority.

6. CLEAN HARBORS WARRANTIES

Clean Harbors warrants that:

6.1 All procedures, methods and work finished pursuant to the SOW to be free from defects in construction or workmanship for a period of one (1) year and in full compliance with all laws, rules and regulations of any government entity or agency applicable to the work to be performed hereunder; and

6.2 product, material, equipment or supplies used or installed pursuant to the SOW to be free from defects only to the extent of warranty provided by the respective manufacturer or supplier of such product, material, equipment or supplies. Copies of all applicable manufacturer's or supplier's warranties and limitations, if applicable, shall be provided to Customer.

This warranty is in lieu of all other warranties, express, implied or statutory, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, with respect to any product, material, equipment or supplies used or installed by clean harbors under the sow and all such warranties are expressly disclaimed. Representatives of Clean Harbors have no authority to make any additional warranties and any such warranties are expressly disclaimed.

7. TERMINATION

7.1 Termination. Clean Harbors may, by seven (7) days' written notice to the Customer, terminate a remedial work/purchase order for any of the following reasons:

7.1.1 the failure of the Customer to make timely payments pursuant to Section 3 of the Agreement;

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7.1.2 if the work to be performed is stopped for a period of fifteen (15) days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable;

7.1.3 If the work to be performed is stopped, delayed or rendered impracticable for a period of five (5) days or more because of action by the Customer and the parties are unable to agree on adequate and fair compensation occasioned by the cessation or delay.

7.1.4 The Customer shall pay Clean Harbors the allowable costs incurred prior to termination and any other costs reasonably incurred by Clean Harbors to implement the termination.

7.2 Termination by Customer. The Customer may, by seven (7) days written notice to Clean Harbors, terminate a remedial work/purchase order for the following reason:

Field (

7.2.1 the persistent or repeated refusal or failure to pursue the work set forth in the SOW or to comply with laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction over Clean Harbors which are material to the performance of this Agreement

Except as specifically amended herein, all other terms and conditions contained in the Agreement shall remain in full force and effect.

C. ERS

The Agreement shall be amended and modified to include the following terms and conditions in all instances where Clean Harbors performs ERS for Customer,

1. SCOPE OF EMERGENCY RESPONSE SERVICES

1.1 Upon execution of this Emergency Response Services Rider ("Rider"), Clean Harbors agrees to provide Emergency Response Services ("Services") for the Customer's accidental discharges of oil or other hazardous substances. Services may include, but are not limited to the following: Containment, recovery, repackaging and removal of materials; Site evaluation, decontamination and restoration; Transportation, storage, treatment or disposal of wastes; Technical services, including sampling, laboratory analysis, and other related services; Standby of personnel and equipment in anticipation of imminent activation; and Training and mock spill drill deployments.

2. COMPENSATION

2.1 The payment terms set forth herein are contingent upon the approval of Contractor's Credit Department. In the event of a change in Customer's financial condition, Clean Harbors reserves the right to alter, change, or modify payment terms, and to immediately stop work. The failure of Clean Harbors to exercise its rights under this article at any time shall not constitute a waiver of Contractor's continuing right to do so.

2.2 Customer agrees to pay Clean Harbors for Services in accordance with Contractor's Rate Schedule for emergency response work ("Rates") in effect at the time Services are rendered. Customer hereby assigns to Clean Harbors all rights to any insurance payments that Customer may be entitled to receive to pay for the Services provided under this Agreement and hereby authorizes its insurance Customer or agent to pay Clean Harbors directly. Customer's obligation to pay amounts due pursuant to this Agreement shall not be conditioned upon or limited by the types, amounts or availability of insurance coverage.

2.3 Clean Harbors will present its first invoice to Customer as soon as possible following commencement of Services provided hereunder, and may issue subsequent invoices every five (5) days thereafter. Customer agrees to pay the full amount of each invoice amount within fifteen (15) business days of the date of receipt of said invoice by Customer's Representative.

2.4 Customer agrees that interest shall accrue and will be paid to Clean Harbors on any unpaid balance of any invoice after fifteen (15) business days of receipt of invoice by Customer at the rate of one and one half percent (1.5%) per month or the maximum amount allowed by law.

2.5 In the event that legal or other action is required to collect unpaid balances of invoices due Contractor, Customer agrees to pay all costs of collection, litigation or settlement incurred by Contractor, including reasonable attorneys fees. "Legal or other action" as used above shall include bankruptcy and insolvency proceedings.

2.6 In the event that work is suspended or terminated for any reason prior to the completion of the Services, Customer agrees to pay for labor, equipment, materials, disposal and other costs incurred by Clean Harbors at the Rates and for reasonable demobilization costs.

2.7 Customer agrees to pay Clean Harbors in accordance with the Rates for any litigation support or testimony provided by Clean Harbors in connection with, or arising out of, the work performed by Clean Harbors hereunder.

3. INDEMNIFICATION

3.1 Clean Harbors shall indemnify, defend and hold harmless Customer, its parent and affiliated companies and their respective directors, officers, employees and agents from and against any and all costs, liabilities, claims, demands and causes of action including, without limitation, bodily injury to or death of any person or destruction of or damage to any property, except natural resource and other damages as provided in Section 3.3, which Customer may suffer, incur, or pay out, to the extent such are caused by the negligence or willful misconduct of Clean Harbors, its agents or employees during the performance of the Agreement or Clean Harbors' failure to comply with any laws, regulations or lawful authority, or failure to comply with its obligations under this Agreement; except to the extent such liabilities, claims, demands and causes of action result from (i) Customer's failure to comply with any laws, regulations or other lawful authority; (ii) Customer's failure to comply with its obligations under the Agreement or (iii) the negligence or willful misconduct of Customer, its employees or agents.

3.2 Customer shall indemnify, defend and hold harmless Clean Harbors, its parent and affiliated companies and their respective directors, officers, employees and agents from and against any and all costs, liabilities, claims, demands and causes of action including, without limitation, any bodily injury to or death of any person or destruction of or damage to property which Clean Harbors may suffer, incur, or pay out, to the extent such are caused by the negligence or willful misconduct of Customer, its employees or agents or the failure of Customer to comply with any laws, regulations or other lawful authority or the failure of Customer to comply with its duties or obligations under the Agreement; except to the extent such liabilities, claims, demands and causes of action result from (i) Clean Harbors' failure to comply with any laws, regulations or lawful authority; (ii) Clean Harbors' failure to comply with its obligations under the Agreement; or (iii) the negligence or willful misconduct of Clean Harbors, its employees or agents.

3.3 Notwithstanding the foregoing, Customer shall indemnify, defend and hold harmless Clean Harbors, its parent and affiliated companies and their respective directors, officers, employees, agents and subcontractors from and against any and all costs, liabilities, claims, demands and causes of action for pollution damages; contamination or adverse effects on the environment; destruction of, damage to, or loss of, whether actual or alleged, any property or natural resources, including the cost of assessing the damage; injury to or economic losses resulting from destruction of real or personal property; damages for loss of subsistence use of natural resources; damages equal to the loss of profits or impairment of earning capacity due to the injury, destruction or loss of real property, personal property or natural resources; damages for net costs of providing increased or additional public services; removal costs; and any other costs assessable under the Oil Pollution Act of 1990, the Comprehensive Environmental Response, Compensation and Liability Act or other local, state or Federal law or lawful authority applicable to discharges or releases of oil or hazardous substances which Clean Harbors, individually or collectively, may suffer, incur, or pay out in connection with, or arising out of, the release of oil or hazardous substances by Customer.

The foregoing indemnity shall only apply to those claims, liabilities or causes of action arising, during, or as a result of, emergency response activities. The indemnity contained in the Agreement shall govern the rights and obligations of the parties with re gard to the transportation or disposal of waste materials by Clean Harbors.

4. TERMINATION

4.1 Work Orders issued for performance of services under this Rider may be terminated by either party upon forty-eight (48) hours prior notice to the other party.

Except as specifically amended herein, all other terms and conditions contained in the Agreement shall remain in full force and effect.

D. MISCELLANEOUS

To the extent there are any conflicts between the terms contained in this Amendment and those contained in the Agreement, the terms set forth in the specific subsection of this Amendment which modifies the Agreement as it pertains to the specific services performed, shall control. This Amendment shall become effective upon its execution by both parties. No modification of this Amendment or the Agreement shall be binding on Customer or Clean Harbors unless in writing and signed by both parties. This Amendment may be executed in several counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument representing the agreement of the parties hereto.

CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.	CUSTOMER:
By: William O'Connor	By: [signature]
Its: Senior Vice President	Its: Exec VP & COO
Date: 9/7/2010	Date: 8-13-10

CleanHarbors ENVIRONMENTAL SERVICES, INC.

WASTE TRANSPORTATION & DISPOSAL AGREEMENT*

Beta Offshore

This Agreement is between the Customer identified below ("Customer"), and Clean Harbors Environmental Services, Inc. ("Clean Harbors"). In consideration of the mutual covenants contained herein, the parties agree as follows:

Article 1. Term

This Agreement shall have an initial term of one (1) year from the date hereof and shall continue in effect from year to year thereafter provided. Either party may terminate this Agreement at any time upon thirty (30) days prior written notice.

Article 2. Services*

This Agreement shall govern all labpack, transportation and disposal services ("Services") provided by Clean Harbors to Customer. **This agreement does not apply to emergency response services.**

Article 3. Waste Materials

Waste materials to be handled pursuant to this Agreement shall be agreed upon in advance in writing by Clean Harbors and Customer. At the time Customer requests the Services of Clean Harbors, Customer shall provide a Waste Profile Sheet or similar document ("Waste Profile") to Clean Harbors completely and accurately describing the waste materials.

Article 4. Transfer of Waste and Title

Waste materials which are discovered to be non-conforming may be rejected by Clean Harbors. Title, risk of loss and all other incidents of ownership to non-conforming wastes shall remain at all times with Customer. Waste materials shall be considered non-conforming if the waste materials are not properly packaged or labeled; or if the waste materials contain constituents or have characteristics or properties not disclosed on the Waste Profile. Customer shall pay Clean Harbors for the handling, transporting, storing and caring for and, if applicable, disposing of such non-conforming waste materials.

Article 5. Payment Terms thirty (30) SL

Payment terms shall be net ~~fifteen (15)~~ days from the date of invoice. Interest will be charged at the rate of 1.5% per month, or the maximum amount allowed by law, on all amounts outstanding more than ~~fifteen (15)~~ thirty (30) days. Customer shall be responsible for all costs incurred by Clean Harbors to collect any payments due under this Agreement, **including reasonable attorneys' fees.** SL

Article 6. Customer Warranties

Customer warrants that it has legal title or authority to waste; that the description of the waste materials on the Waste Profile is accurate and complete; that waste materials will conform to such description; that containers of waste materials will be marked, labeled and otherwise conform with all applicable law; and that it has communicated to Clean Harbors those hazards known by the Customer to be associated with the handling, transportation, treatment, storage and disposal of the waste materials.

Article 7. Indemnification

Each Party ("Indemnifying Party") agrees to indemnify, save harmless and defend the other Party ("Indemnified Party") from and against any and all losses, liabilities, claims, penalties, forfeitures, suits, and the cost and expenses incident thereto (including cost of defense, settlement and reasonable attorneys, fees) which the Indemnified Party may hereafter incur, or pay out as a result of death or bodily injuries to any person, destruction or damage to any property, contamination of or adverse effects on the environment or any violation of applicable federal, state and local laws, regulations, by-laws or ordinances to the extent caused by: (1) the Indemnifying Party's breach of any term of this Agreement, or (2) the negligence or willful misconduct of Indemnifying Party, its employees or agents. Clean Harbors shall not be liable to Customer for indirect, incidental, consequential, or special damages, including loss of use or lost profits.

Article 8. Insurance

Clean Harbors shall maintain at its own expense during the term of this Agreement the following insurance coverages:

COVERAGE	LIMITS
a. Worker's Compensation	Statutory
b. Employer's Liability	$500,000
c. General Commercial Liability	$1 million per occurrence $3 million aggregate
d. Automobile	$1 million per occurrence $1 million per annual aggregate
e. Environmental Impairment for Clean Harbors' TSD Facilities	$3 million per occurrence $6 million annual aggregate

Article 9. Excuse of Performance

The performance of this Agreement, except for the payment of money for Services already rendered, may be suspended by either party in the event performance of this Agreement is prevented by a cause(s) beyond its reasonable control.

Article 10. Additional Provisions

Entire Agreement - This Agreement represent the entire understanding and agreement between the parties. Additional, conflicting or different terms on any Purchase Order or other preprinted document issued by Customer shall be void and are hereby expressly rejected by Clean Harbors. Any modifications to this Agreement shall be in writing and shall be signed by Customer and Clean Harbors.

Law to Apply - The validity, interpretation and performance of this Agreement shall be governed and construed in accordance with the Laws of the Commonwealth of Massachusetts and the parties agree to submit to the jurisdiction of the courts of the Commonwealth of Massachusetts for any disputes arising under this Agreement.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives.

CUSTOMER:	CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.
Beta Offshore	
Signature	Signature
Steve Liles	William F O'Conner
Print Name	Print Name
Executive VP & COO	SVP
Title	Title
Date: 6-10-10	Date: 6/11/2010

Customer to complete shaded area.

OGC/02/02

APPENDIX E

RESPONSE EQUIPMENT

E.a Equipment Inventory E-2
E.b Inspection and Maintenance Programs E-3
E.c Platform Ellen Boom Removal E-4

E.a EQUIPMENT INVENTORY

RESPONSE EQUIPMENT

PLATFORM	EQUIPMENT	
Eureka (in Dry Storage Bldg.)	15 bales sorbent pad 6 bales sorbent boom (4 per bale) 1 sorbent roll (36") 8 tracking buoys	1 or more handheld radios
Ellen (Dry Storage)	8 tracking buoys (Dry Storage)	1 or more handheld radios
Elly (in Spill Equipment Locker)	15 bales sorbent pad 6 bales sorbent boom (4 per bale) 1 sorbent roll (36") 8 tracking buoys	1 or more handheld radios to communicate with response team
Vessel Support – SoCal Ship Services	Crewboat *Nicholas L* (24/7) Supply Boat *Kenneth Carl* available on flexible schedule	*Timberwolf* support vessel (and/or other vessels) available as alternates (24/7)
OSRO EQUIPMENT - MSRC		
California Responder (Terminal Island)	Transrec 350 Skimmer Stress I Skimmer 2,640 feet 67" Curtain Pressure-Inflatable Boom; Fast Advancing Encounter System #4 Level C - X-Band Radar Oil Detection and Thermal Imaging Camera 32' Munson Support Boat	
Recovery 1 (Terminal Island)	104 feet 60" Fence Boom 2,000 feet 20" Curtain Internal Foam Boom 1,500 feet 43" Curtain Self-Inflatable Boom Two (2) Lori Brush Pack Skimmers, One (1) GT-185 Skimmer, One (1) Stress I Skimmer	
Ocean Guardian (Long Beach Berth 57)	2,000 feet 43" Curtain Self-Inflatable Boom 70 feet 54" Pressure Inflatable Boom; Two (2) Lamar Brush Skimmers	
FRV #2 (Ventura)	2,000 feet 43" Curtain Self-Inflatable Boom 70 feet 54" Pressure Inflatable Boom Two (2) Lamar Brush Skimmers	
Response 3 (Long Beach Berth 57)	One (1) Lamor 50 Skimmer	
Recon 3 (Long Beach Berth 57)	1,000 feet 43" Curtain Self-Inflatable Boom	
Recon 4 (Long Beach Berth 57)	1,000 feet 43" Curtain Self-Inflatable Boom	
MSRC 320 (Port Hueneme, CA)	Oil Spill Response Barge (OSRB), 660 feet 67" Curtain Pressure-Inflatable Boom, GT-185 Skimmer, Stress III Skimmer	
30' Kvichak Marco (Terminal Island)	Skimming Vessel	
800' Boom (Alamitos Bay)	24" Curtain Internal Foam Boom	

OSRO EQUIPMENT - PATRIOT ENVIRONMENTAL (Wilmington, CA)	
6,000 Boom	Kepner Seacurtain 6"/12" Boom
Magnum 100	Elastec Drum Skimmer
Magnum 100G	Elastec Drum Skimmer
Flexi-Tanks	Six (6) Flexi Tank Bladders 1,000 Bbls One (1) Flexi Tank Bladder 3,000 Bbls
Vacuum Trucks	Five (5) Vacuum Trucks 70 Bbls each Six (6) Vacuum Trucks 120 Bbls each
308 Colorado	21' Work Boat
307 Texas	28' Work Boat
OSRO EQUIPMENT - CLEAN HARBORS (Compton, CA)	
American Marine Boats	Four (4) 18' American Marine, on trailers; Containment Boom 4,500'
Flat Work Boats	One (1) 30' Custom Flat Work Boat One (1) 24' Custom Flat Work Boat
Gregor Work Boat	14' Gregor Work Boat
Jon Boats	Two (2) 12' Jon Boats

OSRO equipment list details are provided in Appendix H-15.

E.b. INSPECTION AND MAINTENANCE PROGRAMS

Company owned response equipment is inspected monthly and tested semiannually during equipment deployment exercises. The monthly visual inspection is conducted in accordance with 30 CFR 254.43. The objective is to determine if equipment is present, not depleted, in good working order, stored and protected, and readily accessible for deployment. The inspection and maintenance of the facility-owned response equipment scheduled and inspection records are kept in the Beta Compliance Office and/or corporate files. All maintenance records and inspection reports for the Beta Unit Complex will be kept for five years and will be made available to the Administrator and BSEE Regional Supervisor upon request.

As a registered OSRO participants, Marine Spill Response Corporation, Patriot Environmental and Clean Harbors Environmental Services equipment is inspected regularly by the United States Coast Guard (USCG) and California OSPR, who perform routine and unannounced Preparedness Assessment Visit (PAV) inspections, as well as the Bureau of Safety and Environmental Enforcement (BSEE). These inspections can be both static assessments of equipment availability and dynamic assessment of equipment operational readiness.

On prolonged operations, OSRO equipment may need to be serviced while in the field. Items such as oil changes and daily greasing are required to be carried out by the Technicians who operate the equipment. This type of PM is referred to as “active equipment maintenance”. The OSROs require active equipment maintenance to be performed and recorded while any equipment is in field use.

Wildlife rehabilitation and source control companies maintain their own response equipment.

E.c. PLATFORM ELLEN BOOM REMOVAL

In the September 2019 plan update, Beta Offshore requested BSEE approve the permanent removal of the Expandi Roto Pack boom from Platform Ellen’s equipment inventory. The aging boom was prone to failure and response to an oil spill was determined to be more efficiently handled by the OSRO MSRC. The boom was formerly referenced in the table in Section 1 and in this section Appendix E. The following report summarizes the case for action to remove the Ellen boom.

Proposal for Expandi-Roto Pak Boom Removal from Platform Ellen

Beta Offshore

111 West Ocean Boulevard, Suite 1240

Long Beach, CA 90802

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SECTION A. SUMMARY

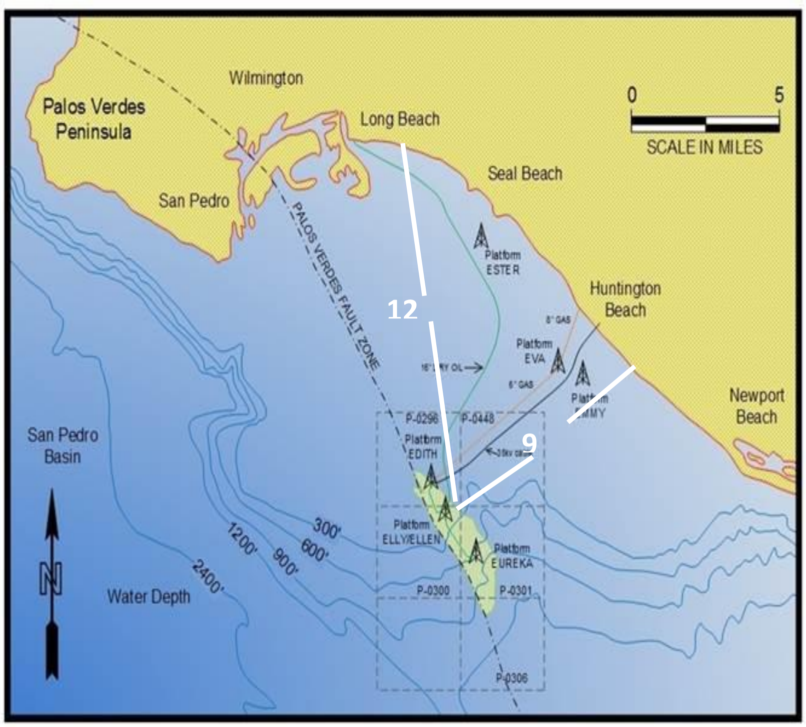
Beta Offshore respectfully requests the Bureau of Safety and Environmental Enforcements' approval to permanently remove aging boom from Platform Ellen. Response to an ocean oil spill can be more efficiently handled by Beta's Oil Spill Response Organization contractor, Marine Spill Response Corporation.

SECTION B. BETA OFFSHORE BACKGROUND

Beta Operating Company, LLC (d.b.a. "Beta Offshore" or "Beta") is a local oil and gas production company (upstream) with its office located in Long Beach, CA and operational assets located on three offshore fixed platforms in the federal Outer Continental Shelf (OCS) approximately 12 miles south of Long Beach and 9 miles west of Huntington Beach. The Beta oil field has been in operation since it was originally developed by Shell Oil in the 1980s, and was operated by various Shell entities (SCPI, SWEPI, Cal Resources, Aera Energy) until 2007, when the business was acquired by Pacific Energy Resources, Ltd. In 2010, Beta Offshore took over the business and employees of its predecessors and has continued the operations, investing close to $100 million in upgrades to the facilities and pipelines. In 2012, the controlling interest in Beta Offshore was acquired by Memorial Production Partners, who in 2017 changed its name to Amplify Energy Corporation. Beta is now a wholly-owned subsidiary of publicly-traded Amplify Energy Corporation based in Houston, Texas.

Beta's oil is pumped from wells located on Platforms Ellen and Eureka where two drilling rigs, one on each platform, have been in operation since the 1980s. Oil, water, and associated natural gas are pumped through the wells from the subsurface petroleum reservoirs and transferred to Platform Elly via pipeline where the fluids are separated. The oil is shipped to shore via a subsea pipeline, the water is clarified and then reinjected into the petroleum reservoirs, and the gas is used for fuel for power generation.

Figure 1 – Beta Offshore in Pacific OCS

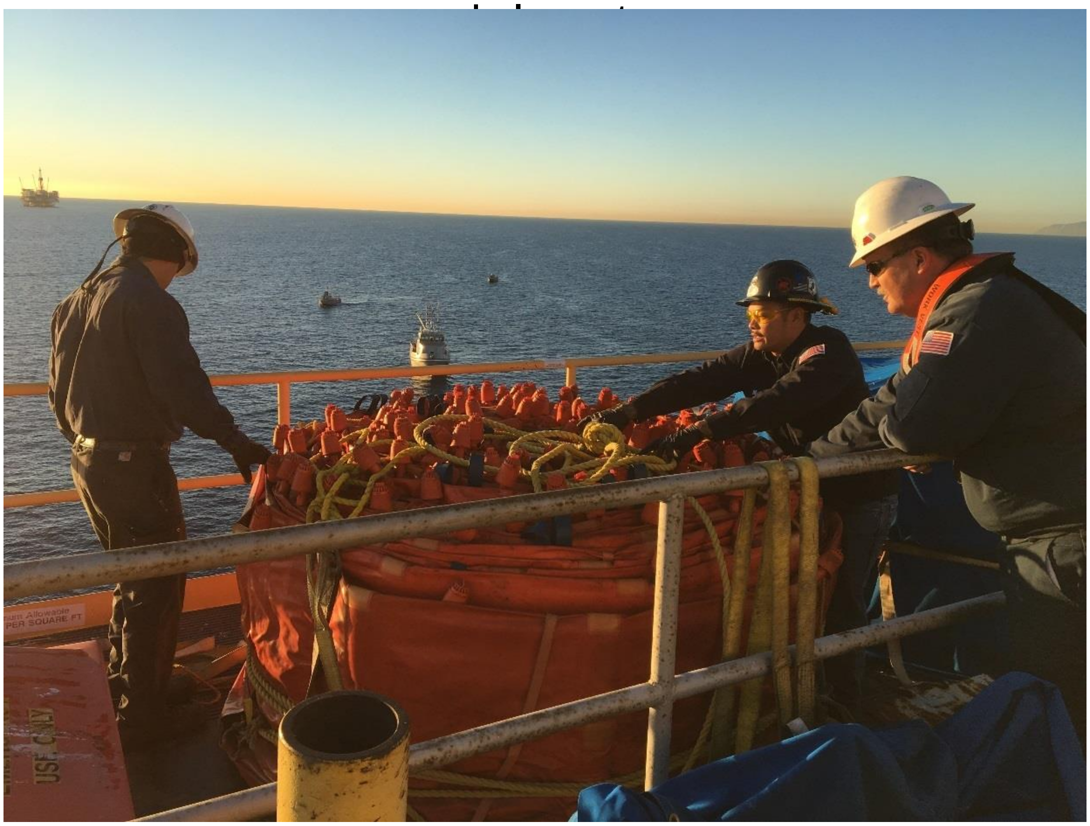


SECTION C. BOOM HISTORY AND OPERATION

For the last 24 years, Platform Ellen has maintained two 750-foot sections of Expandi- Boom on board to deploy in the event of an oil spill to the ocean. The booms consist of fifteen (15) fifty-foot sections of boom that are coiled in a 750-foot “Roto Pak”. If one of the sections fails, the entire boom can sink due to the floatation chamber being continuous with nothing in place to stop the floatation chamber from completely filling with water if a valve is leaking or fabric tears.

The boom has valves that must be in the open position to let air in for proper boom expansion in the water. Each of the valves must be manually checked prior to deployment to assure correct orientation. If a series of valves are seized closed or cannot be fully opened, that section of boom is susceptible to sinking if deployed. In addition, if the seas and/or wind chop are high enough (2 feet or greater), water can be sucked in through the valves when the Roto Pak is initially set in the water by the crane and the floatation chamber is expanding as it is pulled out by the boom boat.

Figure 2 – Valves being opened on a 750-foot Expandi Boom Roto Pak prior to deployment



The boom on Platform Ellen requires a minimum of three platform personnel (one crane operator and two roustabouts) and one on-water response vessel such as the crew boat or work boat to pull out the boom. The crew boat makes four scheduled trips to the platforms each day. Their schedule is as follows:

Table 1 Ship Services Crew Boat: Time Spent at Platform Ellen

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
06:00-06:15	06:00-06:15	06:00-06:15	06:00-07:00	06:00-06:15	06:00-06:15	06:00-06:15
08:30-08:45	08:30-08:45	08:30-08:45	09:30-09:45	08:30-08:45	08:30-08:45	08:30-08:45
13:15-13:30	13:15-13:30	13:15-13:30	13:30-14:00	13:15-13:30	13:15-13:30	13:15-13:30
17:45-18:00	17:45-18:00	17:45-18:00	17:45-18:00	17:45-18:00	17:45-18:00	17:45-18:00

The crew boat is at Platform Ellen for approximately 15 minutes, four times per day for a total of one hour in a 24-hour period. The work boat is at Platform Ellen for approximately three hours two times each week. The work boat delivers fuel, water, groceries and equipment on Mondays and Fridays to Platform Ellen. While the workboat is onsite, if it is making a fuel or water transfer, it is not immediately available for boom deployment.

The Platform Ellen Roto Pak Boom is vulnerable to sinking under a variety of sea states and weather conditions that are common in the San Pedro Bay area. According to MSRC's Response Supervisor and expert, Jeff Gray, a wave height of two to three feet in short interval sets or calmer seas with two feet wind chop create conditions that can cause the boom to submerge. If the boom were to be deployed during compromising sea conditions, not only would the equipment risk sinking but it could be difficult or impossible to recover and would become unwanted trash in the ocean.

SECTION D. CASE FOR ACTION TO REMOVE PLATFORM ELLEN BOOM

In the event of an oil spill, Beta Offshore will call MSRC for their emergency response services. MSRC can respond immediately and dispatch a Fast Response Vessel (FRV Ocean Guardian) to arrive to the Beta Platforms in under one hour. The FRV Ocean Guardian carries 2,000 ft. of boom and can skim and recover the oil.

Table 2 MSRC Boat vs Ship Services Crew Boat response time

MPA Member	Platform	**MSRC Asset**	Platform Distance from Terminal Island (n.m.)	Mobilization Time (from Terminal Island)	Transit Time	Total time to get on-scene at **22 knots** (mobilization + transit time)
Beta Offshore	Ellen / Elly	Ocean Guardian	11.7	15 min.	32 min.	**47 min.**
Beta Offshore	Eureka	Ocean Guardian	13.1	15 min.	36 min.	**51 min.**

MPA Member	Platform	**Ship Services Crew Boat**	Platform Distance from Terminal Island (n.m.)	Mobilization Time (from Terminal Island)	Transit Time	Total time to get on-scene at **18 knots** (mobilization + transit time)
Beta Offshore	Ellen / Elly	Nicholas L or Patrick	11.7	15 min.	50 min.	65 min.
Beta Offshore	Eureka	Nicholas L or Patrick	13.1	15 min.	55 min.	70 min.

n.m. Nautical Miles

Ship Services crew boats are at least 4 knots slower than the FRV Ocean Guardian operated by MSRC. The Ocean Guardian carries 2,000 feet of Kepner Reel-Pak Boom 9 (two 750 ft. sections and one 500 ft. section), a state-of-the-art oil spill containment boom that is self-inflating during deployment from the vessels boom reel. There are no check valves to close or other ancillary equipment needed for deployment. Kepner boom has inflatable tow ends and the boom is in 200 ft. sections, so the floatation chamber is not continuous. There is little or no chance of the boom sinking. The Kepner Reel-Pak boom is newer, easier and faster to deploy, can handle higher sea states and is more reliable than the two Expandi Boom-Roto Pak's on Platform Ellen. The additional 500 feet of boom on the Ocean Guardian also allows for 3 boom tows for containment vs. two when using the Expandi Boom on the platform.

Figure 3 – Ocean Guardian with Kepner Boom

As mentioned, Beta Offshore operates three platforms. With boom located only on Platform Ellen, response time to Platform Elly or Platform Eureka will be delayed significantly due to the time it takes to tow the Expandi Boom from Ellen to the other platforms. Utilizing the Ocean Guardian allows the boom to be deployed where ever the slick is located, it does not need to be towed from Platform Ellen to the slick.

MSRC sold two of the three OSRV's capable of recovering Platform Ellen's Expandi Boom-Roto Pak type boom, both of which had low freeboards and had the roto pak recovery equipment permanently mounted on the vessels. Only the California Responder, another MSRC OSRV but with a higher freeboard on the stern, is left locally to recover the Ellen boom once deployed. The recovery effort for the Beta boom takes MSRC's eleven (11) crew members ~~and~~ one full day when you include setting up the OSRV back deck with the machinery used to recover and "roto pak" the boom, transiting to and from the platform and recovering the boom. Then the boom needs to be offloaded at the Ship Services dock, loaded on a crew boat, taken back to the platform and craned back on board.

There are no longer any platforms in the Santa Barbara channel that have boom on board. They utilize MSRC and the same type FRV as the Ocean Guardian for their boom deployment requirements. Additionally, the three DCOR platforms in San Pedro Bay also removed their boom from the platforms and now cite the Ocean Guardian for their boom requirements. Beta is ready to join their peers in their reliance on MSRC for on water spill response capabilities and remove their antiquated company owned Expandi Boom. End.

The Platform Ellen Boom Removal Proposal was sent to BSEE on January 10, 2020 via email. BSEE approved the proposal to remove the boom from Ellen via email and letter.

From:	Zaragoza, Roberto (Robert)
To:	Diana Lang
Cc:	Victoria, Jon@Wildlife; Jonathan.Bishop@coastal.ca.gov; Gregory, Mark G CIV; Suckow, John LCDR; Ricketson, Paul B MSSR2
Subject:	RE: [EXTERNAL]RE: Platform Ellen Boom Removal Proposal
Date:	Tuesday, January 28, 2020 8:20:15 AM
Attachments:	2020_01_24_Ltr fm BSSE_DCOR revision approval_Final.pdf

Diana – Attached is an electronic copy of our approval letter to remove the boom from platform Ellen. Please add the changes to your plan and include them to your upcoming Biennial update. Thanks.

V/R
Robert Zaragoza
Senior Preparedness Analyst
Pacific OSP Section-Oil Spill Preparedness Division
Bureau of Safety and Environmental Enforcement
760 Paseo Camarillo, Suite 102
Camarillo, CA 93010

United States Department of the Interior
BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT
PACIFIC OCS REGION
760 Paseo Camarillo, Suite 102
Camarillo, CA 93010-6064

Mrs. Diana Lang
Beta Offshore
111 West Ocean Blvd, Suite 1240
Long Beach, CA 90802

JAN 2 7 2020

Dear Mrs. Lang:

On Jan 10, 2020 we received your email that contained your most recent revisions to the OSRP and request to remove boom from platform Ellen. You submitted these revisions per our letter dated Jan 10, 2020. We have reviewed these non-regulatory revisions and determined that they are acceptable, and no further action is necessary.

Be reminded, you must review your entire OSRP and submit any resulting modifications to this office no later than March 20, 2020, in accordance with 30 CFR 254.30(a). Please include the above changes to your upcoming biennial plan update.

If you have any questions or comments regarding this letter, please contact me at (805) 384-6326 or roberto.zaragoza@bsee.gov.

Sincerely,

Robert Zaragoza
Senior Preparedness Analyst
Oil Spill Preparedness Division

APPENDIX F

SUPPORT SERVICES AND SUPPLIES

Support Services and Supplies F-2

SUPPORT SERVICES AND SUPPLIES

WASTE MANAGEMENT SERVICES

COMPANY	LOCATION	OFFICE	ALTERNATE
Chemical Waster Management Disposal (Class I)	Kettleman Hills Facility 35251 Old Skyline Blvd. Kettleman City, CA 93727	(559) 386-9711	
McKittrick Waste Land Fill	56533 Hwy 58 West McKittrick, CA 93251	(661) 912-0080	
Clean Harbors Buttonwillow, LLC Disposal (Class II)	2500 W. Lokern Road Buttonwillow, CA 93206	(661) 762-6200	(800) 544-7199
Clean Harbors Environmental Services Disposal (Class II)	1715 East Denni Street Wilmington, CA 90744	(310) 835-9998	
Kinsburasky Bros. Inc. Recycling1 (batteries)	1314 N. Lemon Street Anaheim, CA 92801	(714) 738-8516	
Ecology Control Industries Storage/Transport	20846 Normandie Avenue Torrance, CA 90502	(310) 320-2555 (24 Hr)	
Patriot Environmental Services Storage/Transport	508 East E Street, Unit A Wilmington, CA 90744	(800) 624-9136 (24 Hr)	(562) 436-2614

[1] Hazardous wastes sent to a recycling facility must be accompanied by a hazardous waste manifest. In most cases, a waste sample must be sent to the recycler for analysis prior to shipment.

AIR TRANSPORT

COMPANY	LOCATION	OFFICE	ALTERNATE
Island Express Helicopter	1175 Queens Highway Long Beach, CA 90802	(310) 510-2525	(562) 436-2012 Dispatch
Mercy Air (Emergency)	P.O. Box 2532 Fontana, CA	(800) 222-3456	
Clay Lacey Aviation (Emergency)	7435 Valjean Van Nuys, CA 91406	(800) 423-2904	(818) 989-2900

AMBULANCE SERVICES

COMPANY	LOCATION	OFFICE	ALTERNATE
American Medical Response	Long Beach, CA	(562) 808-2100	

VESSEL CLEANING SERVICE

COMPANY	LOCATION	OFFICE	ALTERNATE
Clean Harbors LA Service Ctr.	2500 E. Victoria Street Compton, CA 90220	(800) 645-8265 (24 Hr) (310) 764-5851 (24 Hr)	(310) 764-5863 FAX

SUB SEA SERVICES

COMPANY	LOCATION	OFFICE	ALTERNATE
Aqueos Sub Sea	418 Chapala Street, Suites E & F Santa Barbara, CA 93101	(805) 364-0570	(805) 334-7210 FAX
Aqueos Sub Sea	2550 Eastman Ave., Suite 8 Venture, CA 93003	(805) 676-4330	(805) 676-4335 FAX

SUPPORT SERVICES AND SUPPLIES (Cont'd)

HOSPITALS & MEDICAL EMERGENCY SERVICES				
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**	**BURN UNIT**
UCI Medical Center	101 City South Long Beach, CA	(714) 456-5876		No
LA County General Hospital	1200 North State Los Angeles, CA	(323) 226-6361		No
St. Mary's Medical Center	1050 Linden Avenue Long Beach, CA 90813	(562) 491-9000		No
Long Beach Memorial Medical Center *(Major medical and trauma center, primary hospital for Mercy Air)*	2801 Atlantic Avenue Long Beach, CA 90806	(562) 933-2000	(562) 933-2133 ER (24 Hr)	No
Pacific Hospital of Long Beach	2776 Pacific Ave Long Beach, CA	(562) 997-2000		No
Long Beach Community Hospital	1720 Termino Ave Long Beach, CA	(562) 498-1000		No
U.S. Health Works	150 S. Pico Ave Long Beach, CA	(562) 432-2821		No
Long Beach Medical Clinic	1250 Pacific Ave Long Beach, CA	(562) 437-0831		No
USE Catalina Hyperbaric Chamber (Big Fisherman Cove – Avalon, CA)	Helipad Coordinates for use by Emergency Response and Transport Agencies: 33º 26' 41.171" N 118º 29' 00.841" W Coordinate System: WGC 84	(310) 510-1053 Emergency phone	(310) 510-4020	No

AUTO RENTAL			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Avis Rent A Car		(800) 331-1212	
Budget Rent A Car		(800) 527-0700	
Hertz Rent A Car		(800) 654-3131	
Enterprise rent A Car		(800) 736-8222	
National Car Rental		(800) 227-7368	

BUS CHARTER			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Operation Shuttle	1400 E. 29th Street Signal Hill, CA	(562) 988-2636	(562) 988-2631 FAX
California Charter	3333 E. 69th Long Beach, CA 90805	(562) 634-7969	

SUPPORT SERVICES AND SUPPLIES (Cont'd)

EQUIPMENT RENTAL			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
United Rentals	2020 W. Pacific Coast Hwy Long Beach, CA	(714) 843-2029	
United Rentals	5860 Paramount Blvd. Long Beach, CA	(562) 663-1500	

FOOD SERVICE			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Rock Bottom Restaurant & Brewery	1 Pine Ave Long Beach, CA 90802	(562) 308-2255	
Pier 76 Fish Grill	95 Pine Ave Long Beach, CA 90802	(562) 983-1776	
Java Junction	111 W Ocean Blvd # 103 Long Beach, CA 90802	(562) 436-9888	
Jersey Mike's Subs	One World Trade Center Suite 110 Long Beach, CA 90831	(562) 491-1800	
George's Greek Café	135 Pine Ave Long Beach, CA 90802	(562) 437-1184	
Subway	100 W Broadway #170 Long Beach, CA 90802	(562) 436-9977	
Roscoe's House of Chix & Waffles	730 E Broadway Long Beach, CA 90802	(562) 437-8355	
Super Mex	732 E First St Long Beach, CA 90802	(562) 436-0707	
Modica's Deli	455 E Ocean Blvd Long Beach, CA 90802	(562) 435-7011	
Santa Fe Importers	1401 Santa Fe Ave Long Beach, CA 90813	(562) 437-7775	
Berth 55 Fish Market & Deli	555 Pico Ave. Long Beach, CA 90813	(562) 435-8366	
Buono's Authentic Pizzeria	250 W Ocean Blvd A Long Beach, CA 90802	(562) 432-2211	

SUPPORT SERVICES AND SUPPLIES (Cont'd)

FOOD SERVICE (Cont'd)			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Mosher's Gourmet Cornbeef	300 W Ocean Blvd #B Long Beach, CA 90802	(562) 432-6267	
Jimmy John's	421 W Broadway Long Beach, CA 90802	(562) 901-4444	
Flame Broiler	421 W Broadway #840 Long Beach, CA 90802	(562) 436-3470	
Famous Dave's BBQ	300 South Pine Dr Long Beach, CA 90802	(562) 436-9260	
Chili's Grill & Bar	30 W Shoreline Dr Long Beach, CA 90802	(562) 590-5103	
Kentucky Fried Chicken	1601 E. 7th St. Long Beach CA 90813	(562) 498-0446	
Bambuco Colombian Grill	1478 Santa Fe Ave. Long Beach, CA 90813	(562) 435-8333	
China Road Chinese Fast Food	429 W Anaheim St Long Beach, CA 90813	(562) 256-1680	
Papa Johns Pizza	1957 E 4th Street Long Beach, CA 90814	(562) 495-7272	
Domino's Pizza	1158 E. 7th St. Long Beach, CA 90813	(562) 437-4868	

LODGING			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Sunrise Hotel San Pedro	525 S. Harbor Blvd. San Pedro, CA 90731	(310) 548-1080	
Crowne Plaza Los Angeles Harbor	601 S. Palos Verdes St. San Pedro, CA 90731	(310) 519-8200	
Best Western LA Worldport Hotel	1402 W. Pacific Coast Hwy Wilmington, CA 90744	(310) 834-3400	
Best Western of Long Beach	1725 Long Beach Blvd. Long Beach, CA 90813	(562) 599-5555	
Renaissance Long Beach Hotel	111 E. Ocean Blvd Long Beach, CA 90802	(562) 437-5900	
Hyatt Regency Long Beach	200 S. Pine Ave. Long Beach, CA 90802	(562) 491-1234	

SUPPORT SERVICES AND SUPPLIES (Cont'd)

LODGING (Cont'd)			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Hotel Maya	700 Queensway Dr. Long Beach, CA 90802	(562) 435-7676	
The Varden Hotel	335 Pacific Ave. Long Beach, CA 90802	(562) 432-8950	
The Queen Mary	1126 Queens Hwy. Long Beach, CA 90802	(562) 342-0738	
SeaPort Marina Hotel	6400 E. Pacific Coast Hwy Long Beach, CA 90803	(562) 434-8451	
Long Beach Inn	2900 E. Pacific Coast Hwy Long Beach, CA 90804	(562) 494-4393	
Super 8 Long Beach	4201 E. Pacific Coast Hwy Long Beach, CA 90804	(562) 597-7701	
Comfort Inn & Suites Near Long Beach	200 W. Willow St. Long Beach, CA 90806	(562) 426-7611	
Motel 6	1221 Pacific Coast Hwy Long Beach, CA 90806	(562) 591-3321	
Days Inn Long Beach City Center	1500 Pacific Coast Hwy Long Beach, CA 90806	(562) 591-0088	
Eagle Inn Motel	1800 W. Pacific Coast Hwy Long Beach, CA 90810	(562) 491-0538	
Travel Eagle Inn Motel	809 W. Pacific Coast Hwy Long Beach, CA 90810	(562) 599-7477	
Beacon Inn Motel	660 W. Pacific Coast Hwy Long Beach, CA 90810	(562) 432-3031	
Holiday Inn Long Beach Downtown	1133 Atlantic Ave. Long Beach, CA 90813	(562) 590-8858	
La Bonita Inn Motel Long Beach	1626 W. Esther St Long Beach, CA 90813	(562) 436-5729	
Kearney Motel	1641 W. Parade St Long Beach, CA 90813	(562) 491-1559	
Hilton Long Beach	701 W. Ocean Blvd Long Beach, CA 90831	(562) 983-3400	
Quality Inn near Long Beach Airport	3201 E. Pacific Coast Hwy Long Beach, CA 90855	(562) 597-3374	

TRAILER RENTAL			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
ModSpace	18010 S. Figueroa Gardena, CA 90248	(800) 523-7918	(310) 532-0053
Mobile Mini		(866) 308-7242	
Commercial Mobile Systems		(800) 788-2502	

SUPPORT SERVICES AND SUPPLIES (Cont'd)

TRUCK RENTAL SERVICES			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Penske Truck Rental		(800) 736-7531	
Penske Truck Rental	Neil's Rentals, Long Beach, CA	(562) 439-8873	
Ryder		(800) 297-9337	
Ryder	Long Beach, CA	(562) 989-0015	
U-Haul	319 Olive Avenue Long Beach, CA	(562) 432-0712	
U-Haul	3303 E7th Street Long Beach, CA	(562) 930-9148	

PORTABLE TOILETS			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
United Site Services	Orange County, CA	(800) 638-1233	
National Sanitation		(800) 647-6244	

UTILITIES			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
Southern California Edison Co.		(800) 990-7788	(800) 611-1911 Emergency
Southern California Gas Co.		(800) 427-2000	

OPERATIONS SUPPORT			
COMPANY	**LOCATION**	**OFFICE**	**ALTERNATE**
West Coast Environmental Sol. Bea Esparza	2650 Lime Avenue Signal Hill, CA 90755	(562) 448-9525	(562) 244-1211 (562) 490-9615
Barr Lumber	2541 Anaheim Long Beach, CA	(562) 438-1124	
California Conservation Corps	1719 24th Street Sacramento, CA 95816	(916) 341-3160 (24 Hr)	
Crowley Towing and Transportation	Oakland, CA	(510) 251-7500	

*24 Hours

APPENDIX G

NOTIFICATION AND REPORTING FORMS

G.a Internal Spill Reporting Forms G-2
G.b External Spill Reporting Forms G-3

G.a INTERNAL SPILL REPORTING FORMS

NOTIFICATION DATA SHEET

Date: ____________ *Time:* ____________

INCIDENT DESCRIPTION

Reporter's Full Name: ____________ *Position:* ____________
Day Phone Number: ____________ *Evening Phone Number:* ____________
Company: Beta Offshore *Organization Type:* ____________
Facility Address: OCS P-300/P-301 *Owner's Address:* 111 W. Ocean Boulevard
Suite 1240
Long Beach, CA 90802
Facility Latitude: ____________ *Facility Longitude:* ____________
Spill Location (if not at Facility): ____________
Responsible Party's Name: ____________ *Phone Number:* ____________
Responsible Party's Address: ____________
Source and/or cause of discharge (Description): ____________
Nearest City: ____________ *Distance from City:* ____________ *Unit of Measure:* ____________
County: ____________ *State:* ____________ *Zip code:* ____________
Section: ____________ *Township:* ____________ *Range:* ____________ *Borough:* ____________
Distance from City: ____________ *Direction from City:* ____________
Container Type: ____________ *Container Storage Capacity:* ____________
Facility Oil Storage Capacity: ____________ *Unit of Measure:* ____________
Were Materials Discharged? ____________ *(Y/N) Confidential?* ____________ *(Y/N) Material:* ____________

CHRIS Code	Total Quantity Released	Unit of Measure	Water Impact (*YES or NO*)	Quantity into Water	Unit of Measure

RESPONSE ACTION(S)

Action(s) taken to Correct, Control, or Mitigate Incident: ____________

Number of Injuries: ____________ *Number of Deaths:* ____________
Evacuation(s): ____________ *Number Evacuated:* ____________
Damage in Dollars (approximate): ____________
Medium Affected: ____________
Description: ____________
More Information about Medium: ____________

CALLER NOTIFICATIONS

National Response Center (NRC): 1-800-424-8802
Additional Notifications (Circle all applicable): *USCG* *EPA* *State* *Other*
Describe: ____________
NRC Incident Assigned No: ____________

ADDITIONAL INFORMATION

Any information about the incident not recorded elsewhere in this report: ____________

Meeting Federal Obligations to Report? ____________*(Y/N)* *Date Called:* ____________
Calling for Responsible Party? ____________*(Y/N)* *Time Called:* ____________

NOTE: DO NOT DELAY NOTIFICATION PENDING COLLECTION OF ALL INFORMATION.

G.b EXTERNAL SPILL REPORTING FORMS

The following are report forms for state and Federal agencies that may be used, as needed.

Bureau of Safety and Environmental Enforcement
Oil Discharge Follow-up Report

1. Lessee/operator	2.BSEE identification code of the lessee/operator

3. Lessee/operator point of contact (POC) name	4. POC telephone number	5. POC e-mail address

6. Discharge occurrence date and time	7. Discharge cause

8. Discovered date and time

9. OCS area and block	10. OCS lease number

11. Source coordinates Latitude	Longitude	12. Source (structure type, structure name, and complex identification number; or pipeline segment number, as appropriate)

13. Product(s) discharged (if drilling mud, identify base oil and whether it is petroleum or synthetic based)

14. Characteristics of spilled product			
API gravity	Initial viscosity	Pour point	Results of any chemical analysis

15. Rate of discharge at time of discovery	16. Date, time, and method discharge secured	17. Discharge duration from occurrence to fully secured (days and/or hours)

18. Slick/sheen				
Date	Time	Length x Width (miles and/or feet)	Direction from Facility	Color

19. Final estimate of discharge volume (barrels) including the method(s) used for making the determination. Include calculations, where appropriate. (If drilling mud, note the total mud volume and the base oil volume)

20. Sea state during response operations					
Air Temp	Wind Speed	Wind Direction	Wave Height	Surface Current Direction and Speed	Name of Storm (if applicable)

21.Weather conditions at initiation of response operations					
Air Temp	Wind Speed	Wind Direction	Wave Height	Surface Current Direction and Speed	Name of Storm (if applicable)

22. Estimated total amount of oil recovered	Estimated total amount of oil chemically dispersed

23. Notifications made to:				
Organization	Date	Time	Report Number	Person Contacted
National Response Center				
Spill Management Team				
Oil Spill Removal Organization				
BSEE Regional or District Office				
BSEE Pipeline Section				

24. Description of actions that were taken to contain and cleanup the discharge.

25. Date spill response concluded	Description of spill at the conclusion

26. Description of all environmental resources that were impacted by the released oil This description shall include the following information: identification of type of resource, endangered/threatened status, quantity impacted, mortality by type of resource, location of contact to resource, impact effect, and rehabilitation actions taken. Additionally, if shoreline impact occurs, include the date, time and location of shoreline contact; type of shoreline contacted (wetland, beach, other); length, depth, thickness, and percentage of oil coverage: and observed impacts to the contacted areas.

OMB Control No. 1625-0001

U.S. DEPARTMENT OF HOMELAND SECURITY
U.S. COAST GUARD
CG-2692 (Rev. 06-04)

REPORT OF MARINE ACCIDENT, INJURY OR DEATH

RCS No. G-MOA
MISLE NOTIFICATION NUMBER

SECTION I. GENERAL INFORMATION

1. Name of Vessel or Facility
2. Official No.
3. Nationality
4. Call Sign
5. USCG Certificate of Inspection issued at:
6. Type (*Towing, Freight, Fish, Drill, etc.*)
7. Length
8. Gross Tons
9. Year Built
10. Propulsion (*Steam, diesel, gas, turbine...*)
11. Hull Material (*Steel, Wood...*)
12. Draft (*Ft. - in.*) FWD AFT.
13. If Vessel Classed, By Whom: (*ABS, LLOYDS, DNV, BV, etc.*)
14. Date (*of occurrence*)
15. TIME (*Local*)
16. Location (*See Instruction No. 10A*)
17. Estimated Loss of Damage TO:
VESSEL ______
CARGO ______
OTHER ______
18. Name, Address & Telephone No. of Operating Co.
19. Name of Master or Person in Charge — USCG License ☐ YES ☐ NO
20. Name of Pilot — USCG License ☐ YES ☐ NO — State License ☐ YES ☐ NO
19a. Street Address (*City, State, Zip Code*)
19b. Telephone Number
20a. Street Address (*City, State, Zip Code*)
20b. Telephone Number

21. Casualty Elements (*Check as many as needed and explain in Block 44.*)

NO. OF PERSONS ON BOARD ______
☐ DEATH - HOW MANY? ______
☐ MISSING - HOW MANY? ______
☐ INJURED - HOW MANY? ______
☐ HAZARDOUS MATERIAL RELEASED OR INVOLVED
(*Identify Substance and amount in Block 44.*)
☐ OIL SPILL - ESTIMATE AMOUNT: ______
☐ CARGO CONTAINER LOST/DAMAGED
☐ COLLISION
(*Identify other vessel or object in Block 44.*)
☐ GROUNDING
☐ WAKE DAMAGE
☐ FLOODING; SWAMPING WITHOUT SINKING
☐ CAPSIZING (*with or without sinking*)
☐ FOUNDERING OR SINKING
☐ HEAVY WEATHER DAMAGE
☐ FIRE
☐ EXPLOSION
☐ COMMERCIAL DIVING CASUALTY
☐ ICE DAMAGE
☐ DAMAGE TO AIDS TO NAVIGATION
☐ STEERING FAILURE
☐ MACHINERY OR EQUIPMENT FAILURE
☐ ELECTRICAL FAILURE
☐ STRUCTURAL FAILURE
☐ FIREFIGHTING OR EMERGENCY EQUIPMENT FAILED OR INADEQUATE (*Describe in Block 44.*)
☐ LIFESAVING EQUIPMENT FAILED OR INADEQUATE (*Describe in Block 44.*)
☐ BLOW OUT (*Petroleum exporation/production*)
☐ ALCOHOL INVOLVEMENT (*Describe in Block 44.*)
☐ DRUG INVOLVEMENT (*Describe in Block 44.*)
☐ OTHER (*Specify*) ______

22. Conditions

A. Sea or River Conditions (*wave height, river stage, etc.*)
B. WEATHER: ☐ CLEAR ☐ RAIN ☐ SNOW ☐ FOG ☐ OTHER (*Specify*) ______
C. TIME: ☐ DAYLIGHT ☐ TWILIGHT ☐ NIGHT
D. VISIBILITY: ☐ GOOD ☐ FAIR ☐ POOR
E. DISTANCE (*miles of visibility*) ______
F. AIR TEMPERATURE (F) ______
G. WIND SPEED & DIRECTION ______ ______
H. CURRENT SPEED & DIRECTION ______ ______

23. Navigation Information
☐ MOORED, DOCKED OR FIXED
☐ ANCHORED ☐ UNDERWAY OR DRIFTING
SPEED AND COURSE ______ ______
24. Last Port Where Bound ______
24a. Time and Date of Departure

25.	25a.				25b.	25c.			25d. (*Describe in Block 44.*)
FOR TOWING ONLY	NUMBER OF VESSELS TOWED	Empty	Loaded	Total	TOTAL H.P. OF TOWING UNITS	MAXIMUM SIZE OF TOW WITH TOW-BOAT(S)	Length	Width	☐ PUSHING AHEAD ☐ TOWING ASTERN ☐ TOWING ALONGSIDE ☐ MORE THAN ONE TOW-BOAT ON TOW

SECTION II. BARGE INFORMATION

26. Name
26a. Official Number
26b. Type
26c. Length
26d. Gross Tons
26e. USCG Certificate of Inspection Issued at:
26f. Year Built
26g. ☐ SINGLE SKIN ☐ DOUBLE
26h. Draft FWD AFT
26i. Operating Company
26j. Damage Amount
BARGE ______
CARGO ______
OTHER ______
26k. Describe Damage to Barge

PREVIOUS EDITION IS OBSOLETE

Reset

PAGE 2 OF CG-2692 (REV. 06-04)

SECTION III. PERSONNEL ACCIDENT INFORMATION

27. Person Involved ☐ MALE or ☐ FEMALE ☐ DEAD ☐ INJURED ☐ MISSING	27a. Name *(Last, First, Middle Name)*		27c. Status ☐ Crew ☐ Passenger ☐ Other
	27b. Address *(City, State, Zip Code)*		
28. Birth Date	29. Telephone No.	30. Job Position	31. *(Check here if off duty)* ☐
32. Employer - *(if different from Block 18., fill in Name, Address, Telephone No.)*			

33. Person's Time

	YEAR(S)	MONTH(S)
A. IN THIS INDUSTRY -	______	______
B. WITH THIS COMPANY -	______	______
C. IN PRESENT JOB OR POSITION -	______	______
D. ON PRESENT VESSEL/FACILITY -	______	______
E. HOURS ON DUTY WHEN ACCIDENT OCCURRED -	______	

34. Industry of Employer *(Towing, Fishing, Shipping, Crew Supply, Drilling, etc.)*

35. Was the Injured Person Incapacitated 72 Hours or More?

36. Date of Death

37. Activity of Person at Time of Accident

38. Specific Location of Accident on Vessel/Facility

39. Type of Accident *(Fall, Caught between, etc.)*	40. Resulting Injury *(Cut, Bruise, Fracture, Burn, etc.)*
41. Part of Body Injured	42. Equipment Involved in Accident

43. Specific Object, Part of the Equipment in block 42., or Substance *(Chemical, Solvent, etc.)* that directly produced the Injury.

SECTION IV. DESCRIPTION OF CASUALTY

44. Describe how accident occured, damage, information on alcohol/drug involvement and recommendations for corrective safety measures. *(See instructions and attach additional sheets if necessary).*

45. Witness *(Name, Address, Telephone No.)*

46. Witness *(Name, Address, Telephone No.)*

SECTION V. PERSON MAKING THIS REPORT

47. Name (PRINT) *(Last, First, Middle)*	47b. Address *(City, State, Zip Code)*	47c. Title
47a. Signature		47d. Telephone No.
		47e. Date

FOR COAST GUARD USE ONLY | REPORTING OFFICE:

MISLE Incident Investigation Activity Data Entry: MISLE Incident Investigation Activity Number (if applicable)

☐ NONE ☐ PRELIMINARY ☐ DATA COLLECTION ☐ INFORMAL ☐ FORMAL

Serious Marine Incident ☐ Yes ☐ No Major Marine Casualty ☐ Yes ☐ No	INVESTIGATOR *(Name)*	DATE	APPROVED BY *(Name)*	DATE

Reset

INSTRUCTIONS

FOR COMPLETION OF FORM CG-2692

REPORT OF MARINE ACCIDENT, INJURY OR DEATH

AND FORM CG-2692A, BARGE ADDENDUM

WHEN TO USE THIS FORM

1. This form satisfies the requirements for written reports of accidents found in the Code of Federal Regulations for vessels, Outer Continental Shelf (OCS) facilities, mobile offshore drilling units (MODUs), and diving. The kinds of accidents that must be reported are described in the following instructions.

VESSELS

2. A vessel accident must be reported if it occurs upon the navigable waters of the U.S., its territories or possessions; or whenever an accident involves a U.S. vessel; wherever the accident may occur. (Public vessels and recreational vessels are excepted from these reporting requirements.) The accident must also involve one of the following (ref. 46 CFR 4.05-1):

A. All accidental groundings and any intentional grounding which also meets any of the other reporting criteria or creates a hazard to navigation, the environment, or the safety of the vessel;

B. Loss of main propulsion or primary steering, or an associated component or control system, the loss of which causes a reduction of the maneuvering capabilities of the vessel. Loss means that systems, component parts, subsystems, or control systems do not perform the specified or required function;

C. An occurrence materially and adversely affecting the vessel's seaworthiness or fitness for service or route including but not limited to fire, flooding, failure or damage to fixed fire extinguishing systems, lifesaving equipment or bilge pumping systems;

D. Loss of life;

E. An injury that requires professional medical treatment (beyond first aid) and, if a crewmember on a commercial vessel, that renders the individual unfit to perform routine duties.

F. An occurrence not meeting any of the above criteria but resulting in damage to property in excess of $25,000. Damage cost includes the cost of labor and material to restore the property to the condition which existed prior to the casualty, but it does not include the cost of salvage, cleaning, gas freeing, drydocking or demurrage.

MOBILE OFFSHORE DRILLING UNITS

3. MODUs are vessels and are required to report an accident that results in any of the events listed by Instruction 2-A through 2-F for vessels. (Ref. 46 CFR 4.05-1, 46 CFR 109.411)

OCS FACILITIES

4. All OCS facilities (except mobile offshore drilling units) engaged in mineral exploration, development or production activities on the Outer Continental Shelf of the U.S. are required by 33 CFR 146.30 to report accidents resulting in:

A. Death;

B. Injury to 5 or more persons in a single incident;

C. Injury causing any person to be incapacitated for more than 72 hours;

D. Damage affecting the usefullness of primary lifesaving or firefighting equipment;

E. Damage to the facility in excess of $25,000 resulting from a collision by a vessel;

F. Damage to a floating OCS facility in excess of $25,000.

5. Foreign vessels engaged in mineral exploration, development or production on the U. S. Outer Continental Shelf, other than vessels already required to report by Instructions 2 and 3 above, are required by 33 CFR 146.303 to report casualties that result in any of the following:

A. Death;

B. Injury to 5 or more persons in a single incident;

C. Injury causing any person to be incapacitated for more than 72 hours.

DIVING

6. Diving casualties include injury or death that occurs while using underwater breathing apparatus while diving from a vessel or OCS facility.

A. COMMERCIAL DIVING. A dive is considered commercial if it is for commercial purposes from a vessel required to have a Coast Guard certificate of inspection, from an OCS facility or in its related safety zone or in a related activity, at a deepwater port or in its safety zone. Casualties that occur during commercial dives are covered by 46 CFR 197.486 if they result in:

1. Loss of life;
2. Injury causing incapacitation over 72 hours;
3. Injury requiring hospitalization over 24 hours.

In addition to the information requested on this form, also provide the name of the diving supervisor and, if applicable, a detailed report on gas embolism or decompression sickness as required by 46 CFR 197.410(a)(9).

Exempt from the commercial category are dives for:

1. Marine science research by educational institutions;
2. Research in diving equipment and technology;
3. Search and Rescue controlled by a government agency.

B. ALL OTHER DIVING. Diving accidents not covered by Instruction (6-A) but involving vessels subject to Instruction (2), VESSELS, must be reported if they result in death or injury causing incapacitation over 72 hours. (Ref. 46 CFR 4.03-1(c)).

HAZARDOUS MATERIALS

7. When an accident involves hazardous materials, public and environmental health and safety require immediate action. As soon as any person in charge of a vessel or facility has knowledge of a release or discharge of oil or a hazardous substance, that person is required to immediately notify the U. S. Department of Homeland Security's National Response Center (telephone toll-free 800-424-8802 - in the Washington, D.C. area call 202-426-2675). Anyone else knowing of a pollution incident is encouraged to use the toll-free telephone number to report it. If etiologic (disease causing) agents are involved, call the U.S. Public Health Service's Center for Disease Control in Atlanta, GA. (telephone 404-633-5313). (Ref. 42 USC 9603; 33 CFR 153; 49 CFR 171.15)

COMPLETION OF THIS FORM

8. This form should be filled out as completely and accurately as possible. Please type or print clearly. Fill in all blanks that apply to the kind of accident that has occurred. If a question is not applicable, the abbreviation "NA" should be entered in that space. If an answer is unknown and cannot be obtained, the abbreviation "UNK" should be entered in that space. If "NONE" is the correct response, then enter it in that space.

9. Once completed, deliver or mail this form as soon as possible to the Coast Guard Marine Safety, Marine Inspection or Activities Office nearest the location of the casualty or, if at sea, nearest the arrival port.

10. Amplifying information for completing the form:

A. Block 16 - "LOCATION" - Latitude and longitude to the nearest tenth of a minute should always be entered except in those rivers and waterways where a mile marker system is commonly used. In these cases, the mile number to the nearest tenth of a mile should be entered. If the latitude and longitude, or mile number, are unknown, reference to a known landmark or object (buoy, light, etc.) with distance and bearing to the object is permissible. Always identify the body of water or waterway referred to.

B. Tug or towboat with tow - Tugs or towboats with tows under their control should complete all applicable portions of the CG-2692. SECTION II should be completed if a barge causes or sustains damage or meets any other reporting criteria. If additional barges require reporting, the "Barge Addendum," CG-2692A, may be used to provide the information for the additional barges.

C. Moored/Anchored Barge - If a barge suffers a casualty while moored or anchored, or breaks away from its moorage, and causes or sustains reportable damages or meets any other reporting criteria, enter the location of its moorage in Block (1) of the CG-2692 and complete the form except for Blocks (2) through (13). The details will be entered in SECTION II for one barge and on the "Barge Addendum" CG-2692A, for additional barges.

D. SECTION III - Personnel Accident Information - SECTION III must be completed for a death or injury. In addition, applicable portions of SECTIONS I, II and IV must be completed. If more than one death or injury occurs in a single incident, complete one CG-2692 for one of the persons injured or killed, and attach additional CG-2692's, filling out Blocks (1) and (2) and SECTION III for each additional person.

E. BLOCK 44 - Describe the sequence of events which led up to this casualty. Include your opinion of the primary cause and any contributing causes of the casualty. Briefly describe damage to your vessel, its cargo, and other vessels/property. Include any recommendations you may have for preventing similar casualties. *ALCOHOL AND DRUG INFORMATION.* Provide the following information with regard to each person determined to be directly involved in the casualty: name, position aboard the vessel, whether or not the person was under the influence of alcohol or drugs at the time of the casualty, and the method used to make this determination. If toxicological testing is conducted the results should be included; if results are not available in a timely manner, provide the results of the toxicological test as soon as practical and indicate that this is the case in block 44 of the casualty form.

NOTICE: The information collected on this form is routinely available for public inspection. It is needed by the Coast Guard to carry out its responsibility to investigate marine casualties, to identify hazardous conditions or situations and to conduct statistical analysis. The information is used to determine whether new or revised safety initiatives are necessary for the protection of life or property in the marine environment.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number.

The Coast Guard estimates that the average burden for this report is 1 hour. You may submit any comments concerning the accuracy of this burden estimate or any suggestions for reducing the burden to: Commandant (G-MOA), U.S. Coast Guard, Washington, DC 20593-0001 or Office of Management and Budget, Paperwork Reduction Project (1625-0001), Washington, DC 20503

NOTICE: This report is required by 49 CFR Part 195. Failure to report can result in a civil penalty not to exceed $100,000 for each violation for each day that such violation persists except that the maximum civil penalty shall not exceed $1,000,000 as provided in 49 USC 60122.

OMB NO: 2137-0047

EXPIRATION DATE: 01/31/2013

U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

ACCIDENT REPORT – HAZARDOUS LIQUID PIPELINE SYSTEMS

Report Date ______________

No. ____________________
(DOT Use Only)

INSTRUCTIONS

Important: *Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the PHMSA Pipeline Safety Community Web Page at http://www.phmsa.dot.gov/pipeline. Note: Certain low consequence accidents only require the information indicated in the shaded fields.*

PART A – KEY REPORT INFORMATION

*Report Type: *(select all that apply)* ☐ Original ☐ Supplemental ☐ Final

*1. Operator's OPS-issued Operator Identification Number (OPID): /__/__/__/__/__/

*2. Name of Operator: ____

*3. Address of Operator:

*3.a ____
(Street Address)

*3.b ______________________________________
(City)

*3.c State: /__/__/

*3.d Zip Code: /__/__/__/__/__/ - /__/__/__/__/

*4. Local time *(24-hr clock)* and date of the Accident:

/__/__/__/__/ Hour /__/__/ Month /__/__/ Day /__/__/ Year

*5. Location of Accident:

Latitude: /__/__/ . /__/__/__/__/__/

Longitude: - /__/__/__/ . /__/__/__/__/__/

6. National Response Center Report Number (if applicable):

/__/__/__/__/__/__/

7. Local time *(24-hr clock)* and date of initial telephonic report to the National Response Center (if applicable):

/__/__/__/__/ Hour /__/__/ Month /__/__/ Day /__/__/ Year

*8. Commodity released: *(select only one, based on predominant volume released)*

☐ Crude Oil

☐ Refined and/or Petroleum Product (non-HVL) which is a Liquid at Ambient Conditions

- O Gasoline (non-Ethanol) O Diesel, Fuel Oil, Kerosene, Jet Fuel
- O Mixture of Refined Products (transmix or other mixture)
- O Other ⇨ Name: ______________________

☐ HVL or Other Flammable or Toxic Fluid which is a Gas at Ambient Conditions

- O Anhydrous Ammonia
- O LPG (Liquefied Petroleum Gas) / NGL (Natural Gas Liquid)
- O Other HVL ⇨ Name: ______________________

☐ CO_2 (Carbon Dioxide)

☐ Biofuel / Alternative Fuel (including ethanol blends)

- O Fuel Grade Ethanol O Ethanol Blend ⇨ % Ethanol: /__/__/
- O Biodiesel ⇨ Blend (e.g. B2, B20, B100): B/__/__/__/ O Other ⇨ Name: ______________

*9. Estimated volume of commodity released unintentionally: /__/__/__/__/,/__/__/__/__/./__/__/ Barrels

10. Estimated volume of intentional and/or controlled release/blowdown: /__/__/__/__/,/__/__/__/__/./__/__/ Barrels

*11. Estimated volume of commodity recovered: /__/__/__/__/,/__/__/__/__/./__/__/ Barrels

*12. Were there fatalities? O Yes O No If Yes, specify the number in each category: *12.a Operator employees /__/__/__/__/__/ *12.b Contractor employees working for the Operator /__/__/__/__/__/ *12.c Non-Operator emergency responders /__/__/__/__/__/ *12.d Workers working on the right-of-way, but NOT associated with this Operator /__/__/__/__/__/ *12.e General public /__/__/__/__/__/ 12.f Total fatalities (sum of above) /__/__/__/__/__/	*13. Were there injuries requiring inpatient hospitalization? O Yes O No If Yes, specify the number in each category: *13.a Operator employees /__/__/__/__/__/ *13.b Contractor employees working for the Operator /__/__/__/__/__/ *13.c Non-Operator emergency responders /__/__/__/__/__/ *13.d Workers working on the right-of-way, but NOT associated with this Operator /__/__/__/__/__/ *13.e General public /__/__/__/__/__/ 13.f Total injuries (sum of above) /__/__/__/__/__/

14. Was the pipeline/facility shut down due to the Accident?
O Yes O No ⇨ Explain: ____________________

If Yes, complete Questions 14.a and 14.b: *(use local time, 24-hr clock)*

14.a Local time and date of shutdown /__/__/__/__/ Hour /__/__/ Month /__/__/ Day /__/__/ Year

14.b Local time pipeline/facility restarted /__/__/__/__/ Hour /__/__/ Month /__/__/ Day /__/__/ Year O Still shut down* *(*Supplemental Report required)*

*15. Did the commodity ignite? O Yes O No

*16. Did the commodity explode? O Yes O No

17. Number of general public evacuated: /__/__/__/,/__/__/__/

18. Time sequence: *(use local time, 24-hour clock)*

18.a Local time Operator identified Accident /__/__/__/__/ Hour /__/__/ Month /__/__/ Day /__/__/ Year

18.b Local time Operator resources arrived on site /__/__/__/__/ Hour /__/__/ Month /__/__/ Day /__/__/ Year

PART B – ADDITIONAL LOCATION INFORMATION

*1. Was the origin of the Accident onshore?
O Yes *(Complete Questions 2-12)* O No *(Complete Questions 13-15)*

If **Onshore**:

*2. State: /___/___/

*3. Zip Code: /___/___/___/___/___/ - /___/___/___/___/

4. ______________________ (City) 5 ______________________ (County or Parish)

6. Operator-designated location: *(select only one)*
- ☐ Milepost/Valve Station *(specify in shaded area below)*
- ☐ Survey Station No. *(specify in shaded area below)*

/___/___/___/___/___/___/___/___/___/___/___/___/___/

7. Pipeline/Facility name: ______________________________

8. Segment name/ID: ______________________________

*9. Was Accident on Federal land, other than the Outer Continental Shelf (OCS)? O Yes O No

*10. Location of Accident: *(select only one)*
- ☐ Totally contained on Operator-controlled property
- ☐ Originated on Operator-controlled property, but then flowed or migrated off the property
- ☐ Pipeline right-of-way

*11. Area of Accident (as found): *(select only one)*
- ☐ Tank, including attached appurtenances
- ☐ Underground ⇨ Specify: O Under soil
  - O Under a building O Under pavement
  - O Exposed due to excavation
  - O In underground enclosed space (e.g., vault)
  - O Other ______________________
  - Depth-of-Cover (in): /___/___/,/___/___/___/
- ☐ Aboveground ⇨ Specify:
  - O Typical aboveground facility piping or appurtenance
  - O Overhead crossing
  - O In or spanning an open ditch
  - O Inside a building O Inside other enclosed space
  - O Other ______________________
- ☐ Transition Area ⇨ Specify: O Soil/air interface O Wall sleeve O Pipe support or other close contact area
  - O Other ______________________

*12. Did Accident occur in a crossing?: O Yes O No
If Yes, specify type below:
- ☐ Bridge crossing ⇨ Specify: O Cased O Uncased
- ☐ Railroad crossing ⇨ *(select all that apply)*
  - O Cased O Uncased O Bored/drilled
- ☐ Road crossing ⇨ *(select all that apply)*
  - O Cased O Uncased O Bored/drilled
- ☐ Water crossing
  - ⇨ Specify: O Cased O Uncased
  - Name of body of water, if commonly known: ______________________________
  - Approx. water depth (ft) at the point of the Accident: /___/___/,/___/___/___/
  - *(select only one of the following)*
    - O Shoreline/Bank crossing
    - O Below water, pipe in bored/drilled crossing
    - O Below water, pipe buried below bottom (NOT in bored/drilled crossing)
    - O Below water, pipe on or above bottom

If **Offshore**:

*13. Approximate water depth (ft.) at the point of the Accident:
/___/___/,/___/___/___/

*14. Origin of Accident:
- ☐ In State waters
  - ⇨ Specify: State: /___/___/
  - Area: ________________
  - Block/Tract #: /___/___/___/___/___/
  - Nearest County/Parish: ______________
- ☐ On the Outer Continental Shelf (OCS)
  - ⇨ Specify: Area: ________________
  - Block #: /___/___/___/___/___/

*15. Area of Accident: *(select only one)*
- ☐ Shoreline/Bank crossing or shore approach
- ☐ Below water, pipe buried or jetted below seabed
- ☐ Below water, pipe on or above seabed
- ☐ Splash Zone of riser
- ☐ Portion of riser outside of Splash Zone, including riser bend
- ☐ Platform

PART C – ADDITIONAL FACILITY INFORMATION

*1. Is the pipeline or facility:

- ☐ Interstate
- ☐ Intrastate

*2. Part of system involved in Accident: *(select only one)*

- ☐ Onshore Breakout Tank or Storage Vessel, Including Attached Appurtenances ⇨ O Atmospheric or Low Pressure O Pressurized
- ☐ Onshore Terminal/Tank Farm Equipment and Piping
- ☐ Onshore Equipment and Piping Associated with Belowground Storage
- ☐ Onshore Pump/Meter Station Equipment and Piping
- ☐ Onshore Pipeline, Including Valve Sites
- ☐ Offshore Platform/Deepwater Port, Including Platform-mounted Equipment and Piping
- ☐ Offshore Pipeline, Including Riser and Riser Bend

*3. Item involved in Accident: *(select only one)*

☐ Pipe ⇨ Specify: O Pipe Body O Pipe Seam

3.a Nominal diameter of pipe (in): /__/__/./__/__/__/

3.b Wall thickness (in): /__/./__/__/__/

3.c SMYS (Specified Minimum Yield Strength) of pipe (psi): /__/__/__/,/__/__/__/

3.d Pipe specification: ____________________________

3.e Pipe Seam ⇨ Specify: O Longitudinal ERW - High Frequency O Single SAW O Flash Welded O Longitudinal ERW - Low Frequency O DSAW O Continuous Welded O Longitudinal ERW – Unknown Frequency O Furnace Butt Welded O Spiral Welded ERW O Spiral Welded SAW O Spiral Welded DSAW O Lap Welded O Seamless O Other _______________________

3.f Pipe manufacturer: ______________________________

3.g Year of manufacture: /__/__/__/__/

3.h Pipeline coating type at point of Accident

⇨ Specify: O Fusion Bonded Epoxy O Coal Tar O Asphalt O Polyolefin O Extruded Polyethylene O Field Applied Epoxy O Cold Applied Tape O Paint O Composite O None O Other _____________________________

☐ Weld, including heat-affected zone ⇨ Specify: O Pipe Girth Weld O Other Butt Weld O Fillet Weld O Other____________

☐ Valve O Mainline ⇨ Specify: O Butterfly O Check O Gate O Plug O Ball O Globe O Other ________________________

3.i Mainline valve manufacturer: _____________________________

3.j Year of manufacture: /__/__/__/__/

O Relief Valve

O Auxiliary or Other Valve

- ☐ Pump
- ☐ Meter/Prover
- ☐ Scraper/Pig Trap
- ☐ Sump/Separator
- ☐ Repair Sleeve or Clamp
- ☐ Hot Tap Equipment
- ☐ Stopple Fitting
- ☐ Flange
- ☐ Relief Line
- ☐ Auxiliary Piping (e.g. drain lines)
- ☐ Tubing
- ☐ Instrumentation
- ☐ Tank/Vessel ⇨ Specify: O Single Bottom System O Double Bottom System O Tank Shell O Chime O Roof/Roof Seal O Roof Drain System O Mixer O Pressure Vessel Head or Wall O Appurtenance O Other ______________________________
- ☐ Other _________________________________

4. Year item involved in Accident was installed: /__/__/__/__/

*5. Material involved in Accident: *(select only one)*

- ☐ Carbon Steel
- ☐ Material other than Carbon Steel ⇨ Specify: ____

*6. Type of Accident involved: *(select only one)*

- ☐ Mechanical Puncture ⇨ Approx. size: /__/__/__/__/__/./__/in. (axial) by /__/__/__/__/./__/in. (circumferential)
- ☐ Leak ⇨ Select Type: O Pinhole O Crack O Connection Failure O Seal or Packing O Other
- ☐ Rupture ⇨ Select Orientation: O Circumferential O Longitudinal O Other ______________________________

  Approx. size: /__/__/__/__/__/./__/ in. (widest opening) by /__/__/__/__/__/./__/in. (length circumferentially or axially)
- ☐ Overfill or Overflow
- ☐ Other ⇨ Describe: ____

PART D – ADDITIONAL CONSEQUENCE INFORMATION

1. Wildlife impact: ○ Yes ○ No
   - 1.a If Yes, specify all that apply:
     - ☐ Fish/aquatic
     - ☐ Birds
     - ☐ Terrestrial

*2. Soil contamination: ○ Yes ○ No

3. Long term impact assessment performed or planned: ○ Yes ○ No

4. Anticipated remediation: ○ Yes ○ No (not needed)
   - 4.a If Yes, specify all that apply:
     - ☐ Surface water ☐ Groundwater ☐ Soil ☐ Vegetation ☐ Wildlife

*5. Water contamination: ○ Yes ⇨ *(Complete 5.a – 5.c below)* ○ No
   - *5.a Specify all that apply:
     - ☐ Ocean/Seawater
     - ☐ Surface
     - ☐ Groundwater
     - ☐ Drinking water ⇨ *(Select one or both)* ○ Private Well ○ Public Water Intake
   - *5.b Estimated amount released in or reaching water: / / / /,/ / / /./ / / Barrels
   - *5.c Name of body of water, if commonly known: ______________________________________

*6. At the location of this Accident, had the pipeline segment or facility been identified as one that "could affect" a High Consequence Area (HCA) as determined in the Operator's Integrity Management Program? ○ Yes ○ No

*7. Did the released commodity reach or occur in one or more High Consequence Area (HCA)? ○ Yes ○ No
   - 7.a If Yes, specify HCA type(s): *(select all that apply)*
     - ☐ Commercially Navigable Waterway
       Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?
       ○ Yes ○ No
     - ☐ High Population Area
       Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?
       ○ Yes ○ No
     - ☐ Other Populated Area
       Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?
       ○ Yes ○ No
     - ☐ Unusually Sensitive Area (USA) – Drinking Water
       Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?
       ○ Yes ○ No
     - ☐ Unusually Sensitive Area (USA) – Ecological
       Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?
       ○ Yes ○ No

*8. Estimated cost to Operator:
   - 8.a Estimated cost of public and non-Operator private property damage paid/reimbursed by the Operator $ / / / /,/ / / /,/ / / /
   - 8.b Estimated cost of commodity lost $ / / / /,/ / / /,/ / / /
   - 8.c Estimated cost of Operator's property damage & repairs $ / / / /,/ / / /,/ / / /
   - 8.d Estimated cost of Operator's emergency response $ / / / /,/ / / /,/ / / /
   - 8.e Estimated cost of Operator's environmental remediation $ / / / /,/ / / /,/ / / /
   - 8.f Estimated other costs $ / / / /,/ / / /,/ / / /
     Describe ____
   - 8.g Estimated total costs (sum of above) $ / / / /,/ / / /,/ / / /

PART E – ADDITIONAL OPERATING INFORMATION

*1. Estimated pressure at the point and time of the Accident (psig): /__/__/,/__/__/__/

*2. Maximum Operating Pressure (MOP) at the point and time of the Accident (psig) : /__/__/,/__/__/__/

*3. Describe the pressure on the system or facility relating to the Accident: *(select only one)*

- ☐ Pressure did not exceed MOP
- ☐ Pressure exceeded MOP, but did not exceed 110% of MOP
- ☐ Pressure exceeded 110% of MOP

*4. Not including pressure reductions required by PHMSA regulations (such as for repairs and pipe movement), was the system or facility relating to the Accident operating under an established pressure restriction with pressure limits below those normally allowed by the MOP?

- ☐ No
- ☐ Yes ⇨ *(Complete 4.a and 4.b below)*
  - *4.a Did the pressure exceed this established pressure restriction? O Yes O No
  - *4.b Was this pressure restriction mandated by PHMSA or the State? O PHMSA O State O Not mandated

*5. Was "Onshore Pipeline, Including Valve Sites" OR "Offshore Pipeline, Including Riser and Riser Bend" selected in PART C, Question 2?

- ☐ No
- ☐ Yes ⇨ *(Complete 5.a – 5.f below)*

5.a Type of upstream valve used to initially isolate release source: O Manual O Automatic O Remotely Controlled

5.b Type of downstream valve used to initially isolate release source: O Manual O Automatic O Remotely Controlled O Check Valve

5.c Length of segment initially isolated between valves (ft): /__/__/__/,/__/__/__/

5.d Is the pipeline configured to accommodate internal inspection tools?

- ☐ Yes
- ☐ No ⇨ Which physical features limit tool accommodation? *(select all that apply)*
  - O Changes in line pipe diameter
  - O Presence of unsuitable mainline valves
  - O Tight or mitered pipe bends
  - O Other passage restrictions (i.e. unbarred tee's, projecting instrumentation, etc.)
  - O Extra thick pipe wall (applicable only for magnetic flux leakage internal inspection tools)
  - O Other ⇨ Describe:____

5.e For this pipeline, are there operational factors which significantly complicate the execution of an internal inspection tool run?

- ☐ No
- ☐ Yes ⇨ Which operational factors complicate execution? *(select all that apply)*
  - O Excessive debris or scale, wax, or other wall build-up
  - O Low operating pressure(s)
  - O Low flow or absence of flow
  - O Incompatible commodity
  - O Other ⇨ Describe:____

5.f Function of pipeline system: *(select only one)*

- ☐ > 20% SMYS Regulated Trunkline/Transmission
- ☐ > 20% SMYS Regulated Gathering
- ☐ ≤ 20% SMYS Regulated Trunkline/Transmission
- ☐ ≤ 20% SMYS Regulated Gathering
- ☐ ≤ 20% SMYS "Unregulated" Trunkline/Transmission
- ☐ ≤ 20% SMYS "Unregulated" Gathering

*6. Was a Supervisory Control and Data Acquisition (SCADA)-based system in place on the pipeline or facility involved in the Accident?

- ☐ No
- ☐ Yes ⇨ 6.a Was it operating at the time of the Accident? O Yes O No
  - 6.b Was it fully functional at the time of the Accident? O Yes O No
  - 6.c Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident? O Yes O No
  - 6.d Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident? O Yes O No

*7. Was a CPM leak detection system in place on the pipeline or facility involved in the Accident?

- ☐ No
- ☐ Yes ⇨ 7.a Was it operating at the time of the Accident? O Yes O No
  - 7.b Was it fully functional at the time of the Accident? O Yes O No
  - 7.c Did CPM leak detection system information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident? O Yes O No
  - 7.d Did CPM leak detection system information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident? O Yes O No

*8. How was the Accident initially identified for the Operator? *(select only one)*

- ☐ CPM leak detection system or SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations)
- ☐ Static Shut-in Test or Other Pressure or Leak Test
- ☐ Controller
- ☐ Air Patrol
- ☐ Notification from Public
- ☐ Notification from Third Party that caused the Accident
- ☐ Local Operating Personnel, including contractors
- ☐ Ground Patrol by Operator or its contractor
- ☐ Notification from Emergency Responder
- ☐ Other ____

*8.a If "Controller", "Local Operating Personnel, including contractors", "Air Patrol", or "Ground Patrol by Operator or its contractor" is selected in Question 8, specify the following: *(select only one)*

O Operator employee O Contractor working for the Operator

*9. Was an investigation initiated into whether or not the controller(s) or control room issues were the cause of or a contributing factor to the Accident? *(select only one)*

- ☐ Yes, but the investigation of the control room and/or controller actions has not yet been completed by the Operator *(Supplemental Report required)*
- ☐ No, the facility was not monitored by a controller(s) at the time of the Accident
- ☐ No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: *(provide an explanation for why the Operator did not investigate)*
  ____
  ____
  ____
- ☐ Yes, specify investigation result(s): *(select all that apply)*
  - O Investigation reviewed work schedule rotations, continuous hours of service (while working for the Operator) and other factors associated with fatigue
  - O Investigation did NOT review work schedule rotations, continuous hours of service (while working for the Operator) and other factors associated with fatigue *(provide an explanation for why not)*
    ____
    ____
    ____
  - O Investigation identified no control room issues
  - O Investigation identified no controller issues
  - O Investigation identified incorrect controller action or controller error
  - O Investigation identified that fatigue may have affected the controller(s) involved or impacted the involved controller(s) response
  - O Investigation identified incorrect procedures
  - O Investigation identified incorrect control room equipment operation
  - O Investigation identified maintenance activities that affected control room operations, procedures, and/or controller response
  - O Investigation identified areas other than those above ⇨ Describe: ______________________
    ____
    ____
    ____

PART F – DRUG & ALCOHOL TESTING INFORMATION	

*1. As a result of this Accident, were any Operator employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?

O No
O Yes ⇨ *1.a Specify how many were tested: /__/__/

*1.b Specify how many failed: /__/__/

*2. As a result of this Accident, were any Operator contractor employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?

O No
O Yes ⇨ *2.a Specify how many were tested: /__/__/

*2.b Specify how many failed: /__/__/

PART G – APPARENT CAUSE	*Select only one box from PART G in the shaded column on the left representing the APPARENT Cause of the Accident, and answer the questions on the right. Describe secondary, contributing, or root causes of the Accident in the narrative (PART H).*

G1 - Corrosion Failure – *only one sub-cause can be picked from shaded left-hand column

☐ External Corrosion	*1. Results of visual examination: ○ Localized Pitting ○ General Corrosion ○ Other ____________________ *2. Type of corrosion: *(select all that apply)* ○ Galvanic ○ Atmospheric ○ Stray Current ○ Microbiological ○ Selective Seam ○ Other ____________________ *3. The type(s) of corrosion selected in Question 2 is based on the following: *(select all that apply)* ○ Field examination ○ Determined by metallurgical analysis ○ Other ____________________ *4. Was the failed item buried under the ground? ○ Yes ⇨ *4.a Was failed item considered to be under cathodic protection at the time of the Accident? ○ Yes ⇨ Year protection started: / / / / / ○ No *4.b Was shielding, tenting, or disbonding of coating evident at the point of the Accident? ○ Yes ○ No *4.c Has one or more Cathodic Protection Survey been conducted at the point of the Accident? ○ Yes, CP Annual Survey ⇨ Most recent year conducted: / / / / / ○ Yes, Close Interval Survey ⇨ Most recent year conducted: / / / / / ○ Yes, Other CP Survey ⇨ Most recent year conducted: / / / / / ○ No ○ No ⇨ 4.d Was the failed item externally coated or painted? ○ Yes ○ No *5. Was there observable damage to the coating or paint in the vicinity of the corrosion? ○ Yes ○ No
☐ Internal Corrosion	*6. Results of visual examination: ○ Localized Pitting ○ General Corrosion ○ Not cut open ○ Other ____________________ *7. Cause of corrosion: *(select all that apply)* ○ Corrosive Commodity ○ Water drop-out/Acid ○ Microbiological ○ Erosion ○ Other ____________________ *8. The cause(s) of corrosion selected in Question 7 is based on the following: *(select all that apply)* ○ Field examination ○ Determined by metallurgical analysis ○ Other ____________________ *9. Location of corrosion: *(select all that apply)* ○ Low point in pipe ○ Elbow ○ Other____________________ *10. Was the commodity treated with corrosion inhibitors or biocides? ○ Yes ○ No 11. Was the interior coated or lined with protective coating? ○ Yes ○ No 12. Were cleaning/dewatering pigs (or other operations) routinely utilized? ○ Not applicable - Not mainline pipe ○ Yes ○ No 13. Were corrosion coupons routinely utilized? ○ Not applicable - Not mainline pipe ○ Yes ○ No

Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Tank/Vessel.

14. List the year of the most recent inspections:
   - 14.a API Std 653 Out-of-Service Inspection / / / / / ○ No Out-of-Service Inspection completed
   - 14.b API Std 653 In-Service Inspection / / / / / ○ No In-Service Inspection completed

Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.

15. Has one or more internal inspection tool collected data at the point of the Accident?
   O Yes O No

   15.a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:
   - O Magnetic Flux Leakage Tool /__/__/__/__/
   - O Ultrasonic /__/__/__/__/
   - O Geometry /__/__/__/__/
   - O Caliper /__/__/__/__/
   - O Crack /__/__/__/__/
   - O Hard Spot /__/__/__/__/
   - O Combination Tool /__/__/__/__/
   - O Transverse Field/Triaxial /__/__/__/__/
   - O Other ______________________ /__/__/__/__/

16. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?
   O Yes ⇨ Most recent year tested: /__/__/__/__/ Test pressure (psig): /__/__/__/__/__/
   O No

17. Has one or more Direct Assessment been conducted on this segment?
   O Yes, and an investigative dig was conducted at the point of the Accident ⇨ Most recent year conducted: /__/__/__/__/
   O Yes, but the point of the Accident was not identified as a dig site ⇨ Most recent year conducted: /__/__/__/__/
   O No

18. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?
   O Yes O No

   18.a If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:
   - O Radiography /__/__/__/__/
   - O Guided Wave Ultrasonic /__/__/__/__/
   - O Handheld Ultrasonic Tool /__/__/__/__/
   - O Wet Magnetic Particle Test /__/__/__/__/
   - O Dry Magnetic Particle Test /__/__/__/__/
   - O Other ______________________ /__/__/__/__/

G2 - Natural Force Damage - *only one **sub-cause** can be picked from shaded left-hand column

☐ **Earth Movement, NOT due to Heavy Rains/Floods**	1. Specify: O Earthquake O Subsidence O Landslide O Other __________________
☐ **Heavy Rains/Floods**	2. Specify: O Washout/Scouring O Flotation O Mudslide O Other _______________
☐ **Lightning**	3. Specify: O Direct hit O Secondary impact such as resulting nearby fires
☐ **Temperature**	4. Specify: O Thermal Stress O Frost Heave O Frozen Components O Other ____________________________
☐ **High Winds**	
☐ **Other Natural Force Damage**	*5. Describe: ____

Complete the following if any Natural Force Damage sub-cause is selected.

*6. Were the natural forces causing the Accident generated in conjunction with an extreme weather event? O Yes O No

*6.a If Yes, specify: (*select all that apply*) O Hurricane O Tropical Storm O Tornado O Other ___________________________

G3 – Excavation Damage - *only one **sub-cause** can be picked from shaded left-hand column

☐ **Excavation Damage by Operator (First Party)**	
☐ **Excavation Damage by Operator's Contractor (Second Party)**	
☐ **Excavation Damage by Third Party**	
☐ **Previous Damage due to Excavation Activity**	**Complete Questions 1-5 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.**

1. Has one or more internal inspection tool collected data at the point of the Accident?
   O Yes O No

   1.a If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:

   - O Magnetic Flux Leakage /__/__/__/__/
   - O Ultrasonic /__/__/__/__/
   - O Geometry /__/__/__/__/
   - O Caliper /__/__/__/__/
   - O Crack /__/__/__/__/
   - O Hard Spot /__/__/__/__/
   - O Combination Tool /__/__/__/__/
   - O Transverse Field/Triaxial /__/__/__/__/
   - O Other ____________________ /__/__/__/__/

2. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained? O Yes O No

3. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?

   O Yes ⇨ Most recent year tested: /__/__/__/__/
   Test pressure (psig): /__/__/,/__/__/__/

   O No

4. Has one or more Direct Assessment been conducted on the pipeline segment?

   O Yes, and an investigative dig was conducted at the point of the Accident
   ⇨ Most recent year conducted: /__/__/__/__/

   O Yes, but the point of the Accident was not identified as a dig site
   ⇨ Most recent year conducted: /__/__/__/__/

   O No

5. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?
   O Yes O No

   5.a If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:

   - O Radiography /__/__/__/__/
   - O Guided Wave Ultrasonic /__/__/__/__/
   - O Handheld Ultrasonic Tool /__/__/__/__/
   - O Wet Magnetic Particle Test /__/__/__/__/
   - O Dry Magnetic Particle Test /__/__/__/__/
   - O Other ________________________ /__/__/__/__/

Complete the following if Excavation Damage by Third Party is selected as the sub-cause.

6. Did the Operator get prior notification of the excavation activity? O Yes O No

   *6.a If Yes, Notification received from: *(select all that apply)* O One-Call System O Excavator O Contractor O Landowner

Complete the following mandatory CGA-DIRT Program questions if any Excavation Damage sub-cause is selected.

7. Do you want PHMSA to upload the following information to CGA-DIRT (www.cga-dirt.com)? O Yes O No

*8. Right-of-Way where event occurred: *(select all that apply)*

- ☐ Public ⇨ Specify: O City Street O State Highway O County Road O Interstate Highway O Other
- ☐ Private ⇨ Specify: O Private Landowner O Private Business O Private Easement
- ☐ Pipeline Property/Easement
- ☐ Power/Transmission Line
- ☐ Railroad
- ☐ Dedicated Public Utility Easement
- ☐ Federal Land
- ☐ Data not collected
- ☐ Unknown/Other

*9. Type of excavator: *(select only one)*

O Contractor O County O Developer O Farmer O Municipality O Occupant
O Railroad O State O Utility O Data not collected O Unknown/Other

*10. Type of excavation equipment: *(select only one)*

O Auger O Backhoe/Trackhoe O Boring O Drilling O Directional Drilling
O Explosives O Farm Equipment O Grader/Scraper O Hand Tools O Milling Equipment
O Probing Device O Trencher O Vacuum Equipment O Data not collected O Unknown/Other

*11. Type of work performed: *(select only one)*

O Agriculture O Cable TV O Curb/Sidewalk O Building Construction O Building Demolition
O Drainage O Driveway O Electric O Engineering/Surveying O Fencing
O Grading O Irrigation O Landscaping O Liquid Pipeline O Milling
O Natural Gas O Pole O Public Transit Authority O Railroad Maintenance O Road Work
O Sewer (Sanitary/Storm) O Site Development O Steam O Storm Drain/Culvert O Street Light
O Telecommunications O Traffic Signal O Traffic Sign O Water O Waterway Improvement
O Data not collected O Unknown/Other

*12. Was the One-Call Center notified? O Yes O No

*12.a If Yes, specify ticket number: /_/

*12.b If this is a State where more than a single One-Call Center exists, list the name of the One-Call Center notified: ____

*13. Type of Locator: O Utility Owner O Contract Locator O Data not collected O Unknown/Other

*14. Were facility locate marks visible in the area of excavation? O No O Yes O Data not collected O Unknown/Other

*15. Were facilities marked correctly? O No O Yes O Data not collected O Unknown/Other

*16. Did the damage cause an interruption in service? O No O Yes O Data not collected O Unknown/Other

*16.a If Yes, specify duration of the interruption: /___/___/___/___/ hours

(This CGA-DIRT section continued on next page with Question 17.)

*17. Description of the CGA-DIRT Root Cause *(select only the one predominant first level CGA-DIRT Root Cause and then, where available as a choice, the one predominant second level CGA-DIRT Root Cause as well)*:

☐ One-Call Notification Practices Not Sufficient: *(select only one)*
- O No notification made to the One-Call Center
- O Notification to One-Call Center made, but not sufficient
- O Wrong information provided

☐ Locating Practices Not Sufficient: *(select only one)*
- O Facility could not be found/located
- O Facility marking or location not sufficient
- O Facility was not located or marked
- O Incorrect facility records/maps

☐ Excavation Practices Not Sufficient: *(select only one)*
- O Excavation practices not sufficient (other)
- O Failure to maintain clearance
- O Failure to maintain the marks
- O Failure to support exposed facilities
- O Failure to use hand tools where required
- O Failure to verify location by test-hole (pot-holing)
- O Improper backfilling

☐ One-Call Notification Center Error

☐ Abandoned Facility

☐ Deteriorated Facility

☐ Previous Damage

☐ Data Not Collected

☐ Other / None of the Above *(explain)* ____
____
____
____

G4 - Other Outside Force Damage - *only one **sub-cause** can be picked from shaded left-hand column	
☐ **Nearby Industrial, Man-made, or Other Fire/Explosion as Primary Cause of Accident**	
☐ **Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation**	1. Vehicle/Equipment operated by: *(select only one)* O Operator O Operator's Contractor O Third Party
☐ **Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels Set Adrift or Which Have Otherwise Lost Their Mooring**	2. Select one or more of the following IF an extreme weather event was a factor: O Hurricane O Tropical Storm O Tornado O Heavy Rains/Flood O Other ___________________________
☐ **Routine or Normal Fishing or Other Maritime Activity NOT Engaged in Excavation**	
☐ **Electrical Arcing from Other Equipment or Facility**	
☐ **Previous Mechanical Damage NOT Related to Excavation**	**Complete Questions 3-7 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.** 3. Has one or more internal inspection tool collected data at the point of the Accident? O Yes O No 3.a If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: O Magnetic Flux Leakage /__/__/__/__/ O Ultrasonic /__/__/__/__/ O Geometry /__/__/__/__/ O Caliper /__/__/__/__/ O Crack /__/__/__/__/ O Hard Spot /__/__/__/__/ O Combination Tool /__/__/__/__/ O Transverse Field/Triaxial /__/__/__/__/ O Other ___________________ /__/__/__/__/ 4. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained? O Yes O No 5. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident? O Yes ⇨ Most recent year tested: /__/__/__/__/ Test pressure (psig): /__/__/,/__/__/__/ O No 6. Has one or more Direct Assessment been conducted on the pipeline segment? O Yes, and an investigative dig was conducted at the point of the Accident ⇨ Most recent year conducted: /__/__/__/__/ O Yes, but the point of the Accident was not identified as a dig site ⇨ Most recent year conducted: /__/__/__/__/ O No *(This section continued on next page with Question 7.)*

	7. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002? O Yes O No 7.a If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted: O Radiography / / / / / O Guided Wave Ultrasonic / / / / / O Handheld Ultrasonic Tool / / / / / O Wet Magnetic Particle Test / / / / / O Dry Magnetic Particle Test / / / / / O Other ________________________ / / / / /
☐ **Intentional Damage**	8. Specify: O Vandalism O Terrorism O Theft of transported commodity O Theft of equipment O Other ____________________________________
☐ **Other Outside Force Damage**	*9. Describe: ____

G5 - Material Failure of Pipe or Weld	**Use this section to report material failures ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is "Pipe" or "Weld."** *Only one **sub-cause** can be picked from shaded left-hand column

1. The sub-cause selected below is based on the following: *(select all that apply)*

☐ Field Examination ☐ Determined by Metallurgical Analysis ☐ Other Analysis________________________

☐ Sub-cause is Tentative or Suspected; Still Under Investigation *(Supplemental Report required)*

☐ **Construction-, Installation-, or Fabrication-related** ☐ **Original Manufacturing-related (NOT girth weld or other welds formed in the field)**	2. List contributing factors: *(select all that apply)* ☐ Fatigue- or Vibration-related: O Mechanically-induced prior to installation (such as during transport of pipe) O Mechanical Vibration O Pressure-related O Thermal O Other ________________________________ ☐ Mechanical Stress ☐ Other ________________________________
☐ **Environmental Cracking-related**	3. Specify: O Stress Corrosion Cracking O Sulfide Stress Cracking O Hydrogen Stress Cracking O Other ____________________________

Complete the following if any Material Failure of Pipe or Weld sub-cause is selected.

*4. Additional factors: *(select all that apply)* O Dent O Gouge O Pipe Bend O Arc Burn O Crack O Lack of Fusion O Lamination O Buckle O Wrinkle O Misalignment O Burnt Steel O Other ________________________________

*5. Has one or more internal inspection tool collected data at the point of the Accident? O Yes O No

*5.a If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:

O Magnetic Flux Leakage Tool /__/__/__/__/
O Ultrasonic /__/__/__/__/
O Geometry /__/__/__/__/
O Caliper /__/__/__/__/
O Crack /__/__/__/__/
O Hard Spot /__/__/__/__/
O Combination Tool /__/__/__/__/
O Transverse Field/Triaxial /__/__/__/__/
O Other ________________________ /__/__/__/__/

*6. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?

O Yes ⇨ Most recent year tested: /__/__/__/__/ Test pressure (psig): /__/__/,/__/__/__/
O No

*7. Has one or more Direct Assessment been conducted on the pipeline segment?

O Yes, and an investigative dig was conducted at the point of the Accident ⇨ Most recent year conducted: /__/__/__/__/
O Yes, but the point of the Accident was not identified as a dig site ⇨ Most recent year conducted: /__/__/__/__/
O No

*8. Has one or more non-destructive examination(s) been conducted at the point of the Accident since January 1, 2002?

O Yes O No

*8.a If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:

O Radiography /__/__/__/__/
O Guided Wave Ultrasonic /__/__/__/__/
O Handheld Ultrasonic Tool /__/__/__/__/
O Wet Magnetic Particle Test /__/__/__/__/
O Dry Magnetic Particle Test /__/__/__/__/
O Other ______________________________ /__/__/__/__/

G6 - Equipment Failure - *only one **sub-cause** can be picked from shaded left-hand column

☐ **Malfunction of Control/Relief Equipment**	1. Specify: *(select all that apply)* O Control Valve O Instrumentation O SCADA O Communications O Block Valve O Check Valve O Relief Valve O Power Failure O Stopple/Control Fitting O ESD System Failure O Other ______________________
☐ **Pump or Pump-related Equipment**	2. Specify: O Seal/Packing Failure O Body Failure O Crack in Body O Appurtenance Failure O Other ______________________
☐ **Threaded Connection/Coupling Failure**	3. Specify: O Pipe Nipple O Valve Threads O Mechanical Coupling O Threaded Pipe Collar O Threaded Fitting O Other ______________________
☐ **Non-threaded Connection Failure**	4. Specify: O O-Ring O Gasket O Seal (NOT pump seal) or Packing O Other ______________________
☐ **Defective or Loose Tubing or Fitting**	
☐ **Failure of Equipment Body (except Pump), Tank Plate, or other Material**	
☐ **Other Equipment Failure**	*5. Describe: ______________________ ______________________

Complete the following if any Equipment Failure sub-cause is selected.

*6. Additional factors that contributed to the equipment failure: *(select all that apply)*

- O Excessive vibration
- O Overpressurization
- O No support or loss of support
- O Manufacturing defect
- O Loss of electricity
- O Improper installation
- O Mismatched items (different manufacturer for tubing and tubing fittings)
- O Dissimilar metals
- O Breakdown of soft goods due to compatibility issues with transported commodity
- O Valve vault or valve can contributed to the release
- O Alarm/status failure
- O Misalignment
- O Thermal stress
- O Other ______________________

G7 - Incorrect Operation - *only one **sub-cause** can be picked from shaded left-hand column

☐ **Damage by Operator or Operator's Contractor NOT Related to Excavation and NOT due to Motorized Vehicle/Equipment Damage**	
☐ **Tank, Vessel, or Sump/Separator Allowed or Caused to Overfill or Overflow**	1. Specify: O Valve misalignment O Incorrect reference data/calculation O Miscommunication O Inadequate monitoring O Other ___________________________________
☐ **Valve Left or Placed in Wrong Position, but NOT Resulting in a Tank, Vessel, or Sump/Separator Overflow or Facility Overpressure**	
☐ **Pipeline or Equipment Overpressured**	
☐ **Equipment Not Installed Properly**	
☐ **Wrong Equipment Specified or Installed**	
☐ **Other Incorrect Operation**	*2. Describe: ____

Complete the following if any Incorrect Operation sub-cause is selected.

*3. Was this Accident related to: *(select all that apply)*
- O Inadequate procedure
- O No procedure established
- O Failure to follow procedure
- O Other: ____

*4. What category type was the activity that caused the Accident:
- O Construction
- O Commissioning
- O Decommissioning
- O Right-of-Way activities
- O Routine maintenance
- O Other maintenance
- O Normal operating conditions
- O Non-routine operating conditions (abnormal operations or emergencies)

*5. Was the task(s) that led to the Accident identified as a covered task in your Operator Qualification Program? O Yes O No

*5.a If Yes, were the individuals performing the task(s) qualified for the task(s)?
- O Yes, they were qualified for the task(s)
- O No, but they were performing the task(s) under the direction and observation of a qualified individual
- O No, they were not qualified for the task(s) nor were they performing the task(s) under the direction and observation of a qualified individual

G8 – Other Accident Cause - *only one **sub-cause** can be picked from shaded left-hand column

☐ **Miscellaneous**	*1. Describe: ____ ____
☐ **Unknown**	*2. Specify: O Investigation complete, cause of Accident unknown O Still under investigation, cause of Accident to be determined* *(*Supplemental Report required)*

PART H – NARRATIVE DESCRIPTION OF THE ACCIDENT	*(Attach additional sheets as necessary)*

*PART I – PREPARER AND AUTHORIZED SIGNATURE

*Preparer's Name (type or print)

Preparer's Telephone Number

Preparer's Title (type or print)

Preparer's E-mail Address

Preparer's Facsimile Number

Authorized Signature

*Date

Authorized Signature Telephone Number

*Authorized Signature's Name (type or print)

Authorized Signature's Title (type or print)

Authorized Signature's E-mail Address

APPENDIX H

WORST CASE DISCHARGE SCENARIOS

INTRODUCTION

This appendix identifies potential causes for oil discharges and discusses the response efforts that are necessary for successful mitigation. Included in this appendix are hypothetical scenarios for various types of spills that have the potential to occur along the system. It is anticipated that The Company will respond to spills in a consistent manner regardless of the location. Therefore, the guidelines discussed in this appendix will apply to all spills whenever possible.

The Department of Transportation/Pipeline and Hazardous Materials Safety Administration (DOT/PHMSA) requires that pipeline operators calculate a worst case discharge amount for each response zone. The calculations and descriptions are as follows:

DOT/PHMSA Discharge Volume Calculation

- **Worst Case Discharge**
  The largest volume (bbls) of the following:
  - *Pipeline's maximum release time (hrs.), plus the maximum shutdown response time (hrs.), multiplied by the maximum flow rate (bph), plus the largest line drainage volume after shutdown of the line section.*

    -- OR --
  - *Largest foreseeable discharge for the line section is based on the maximum historic discharge, if one exists, adjusted for any subsequent corrective action or preventive action taken.*

    -- OR --
  - *Capacity of the single largest breakout tank or battery of tanks within a single secondary containment system, adjusted for the capacity or size of the secondary containment system.*

Scenario Types

The occurrence of a Worst Case Discharge (WCD) could be the result of any number of scenarios along the pipeline system including:

- Piping rupture.
- Piping leak, under pressure and not under pressure.
- Explosion or fire.
- Equipment failure (e.g. pumping system failure, relief valve failure, or other general equipment relevant to operational activities associated with internal or external facility transfers).

The response actions to each of these scenarios are outlined in Section 1.0 OSPRP Quick Guide. The response resources are identified in a quick reference format. Pipeline response personnel list/telephone numbers and other internal/external resources telephone numbers are detailed in Sections 7.0 and 8.0.

WORST CASE DISCHARGE SCENARIOS

DOT/PHMSA WORST CASE DISCHARGE = 12,469 BBLS

The PHMSA Worst Case discharge for Beta Offshore is considered to be a discharge that does not exceed 12,469 barrels.

DOT/PHMSA PIPELINE WORST CASE DISCHARGE = 12,469 BBLS

The Worst Case Discharge is calculated by using the method identified under 49 CFR 194.105(b)(1) - The pipeline's maximum release time in hours, plus the maximum shutdown response time in hours, multiplied by the maximum flow rate expressed in barrels per hour, plus the largest line drainage volume after shutdown of the line section. The following calculations are used to determine the Worst Case Discharge:

16 Inch San Pedro Bay Pipeline

Length between Station 570+00 to 0+66.00:		56,933.23 feet
Line Diameter:		16 inch
Wall Thickness:		0.5 inches
Pipeline liquid volume per foot:		0.2186 bbls/foot
Pipeline maximum release time:		0.046 Hr
Maximum shutdown time:		0.046 Hr
Maximum flow rate:		250 BPH
Largest line drainage volume:		12,446 Bbls
Worst Case Discharge	=	(0.046 Hr + 0.046 Hr)* 250 BPH
	=	23 Bbls
	=	23 Bbls+ 12,446 Bbls
	=	12,469 Bbls

Pipeline Worst Case Discharge = 12,469 Bbls

***Note**:* Adverse weather will not affect detection or shut down times.

Response Requirement

The Company has identified sufficient response resources, by contract or other approved means, to respond to a worst case discharge to the maximum extent practicable. These response resources include:

- Resources capable of arriving at the staging area within the applicable response tier requirements for non-high volume areas (Tier 1 = 12 hours; Tier 2 = 36 hours; Tier 3 = 60 hours).

- Resources capable of oil recovery in inclement weather conditions (*i.e.* heavy rain, snow, ice).

WORST CASE DISCHARGE SCENARIOS (Cont'd)

PHMSA PIPELINE WORST CASE DISCHARGE = 12,469 BBLS

Notes

- Contracted and Company owned equipment and manpower resources are detailed in Appendices D and E.

- Telephone references are provided in Sections 7.0 and 8.0.

PHMSA MAXIMUM HISTORIC DISCHARGE

- There have been no historic discharges from Beta Offshore owned/operated pipeline segments or breakout tanks. If a discharge occurs the Worst Case Discharge information provided will be reevaluated against actual discharge volumes and revised as appropriate.

PHMSA BREAKOUT TANK WORST CASE DISCHARGE = 3,000 Bbls

Description

Beta Pump Station, 10,000 barrel, Crude Oil

Volume

The worst case discharge scenario involving breakout tankage uses the single largest volume tank in the response zone, adjusted for the size of the secondary containment system. Applicable adjustment(s) for the largest tank include:

Spill Prevention Measures	Percent Reduction Allowed
Built Repaired to API standards	10%
Overfill protection standards	5%
Testing/cathodic protection	5%
Secondary containment capacity greater than 100% capacity of tank and designed according to NFPA 30	50%

The maximum level of the tank at Beta Pump Station allows for a maximum fill volume of 10,000 barrels. Thus, a 70% reduction yields a Worst Case Discharge amount of 3,000 Bbls.

REASONABLE WORST CASE SPILL

CALIFORNIA OFFICE OF SPILL PREVENTION AND RESPONSE (OSPR) REASONABLE WORST CASE SPILL

The Reasonable Worst Case Spill (RWCS) is calculated by using the method identified under 14 CCR § 817.02(d)(1)(E)

The pipeline system leak detection time, plus the shutdown response time, multiplied by the highest measured oil flow rate over the preceding 12-month period. Add to this calculation the total volume of oil that would leak from the pipeline after it is shut in. This volume should be calculated by taking into account the effects of hydrostatic pressure, gravity, frictional wall forces, length of pipeline segment, tie-ins with other pipelines, and other factors. The 1986 Shell Civil Engineering Study and the Westhollow Technology Center Study dated February 3, 1999 (refer to Appendix J) were utilized to determine the OSRP RWCS:

Pipeline liquid volume per foot:	0.2186 bbls/foot
Pipeline leak detection System time:	0.046 Hr
Shutdown response time:	0.046 Hr
Highest measured oil flow rate:	250 BPH
Largest line drainage volume:	3,111 Bbls

RWCS = [(0.046 Hr + 0.046 Hr)* 250 BPH] + 3,111 Bbls = 23 Bbls + 3,111 Bbls

RWCS = 3,134 Bbls

***Note**: Adverse weather will not affect detection or shut down times.*

OSPR TABLES
FOR REASONABLE WORST CASE RESPONSE PLANNING VOLUME

PERSISTENCE FACTORS				
Oil Group	**Group 1**	**Group 2**	**Group 3**	**Group 4**
On-Water Volumes	.20	.50	.50	.50
EMULSIFICATION FACTORS				
Oil Group	**Group 1**	**Group 2**	**Group 3**	**Group 4**
Emulsification	1.0	1.8	2.0	1.4

DAILY RECOVERY RATES (HIGH VOLUME PORTS)				
Delivery Time (Hrs)	6	24	36	60
Bbls/Day Capability	23,437	31,250	46,875	78,125

DAILY RECOVERY RATES FACILITY/TRANSFER AREAS AND SANTA BARBARA CHANNEL AREA			
Delivery Time (Hrs)	12	36	60
Bbls/Day Capability	19,531	35,156	66,406

OSPR – RESPONSE PLANNING VOLUME CALCULATIONS

On-Water Planning Volume
Response Planning Volume = RPV Reasonable Worst Case Spill = RWCS Persistence Factor = PF Emulsification Factor = EF
RPV = RWCS X PF X EF = 3,134 bbls X 0.50 X 2.0 = 3,134 bbls

BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT (BSEE)
WORST CASE DISCHARGE VOLUME DETERMINATION

DETERMINATION OF VOLUME FOR WCD SCENARIOS, WCD SCENARIOS AND FACILITY INFORMATION

Production Operation < 10 Miles from Shore

FACILITY INFORMATION				
TYPE OF OPERATION	FACILITY NAME	ID NUMBER/ PIPELINE SEGMENT	AREA/BLOCK	MILES FROM SHORE
Production Platform	Platform Elly		6C 3337	8.56
Factors considered: Type of operation; volume and type of oil; seasonal variations; proximity to beaches, waterfowl, other marine and shoreline resources, and areas of special economic or environmental importance.				

Production Operation > 10 Miles from Shore

The Company does not own or operate production platforms or pipelines, or conduct exploratory operations in the Pacific Ocean > 10 Miles from shore.

Platform Elly Production Operation < 10 Miles from Shore		
	30 CFR 254.47 (a) Worst Case Discharge Calculations:	
1)	Maximum capacity of all piping:	473.6 Bbls
2)	Maximum capacity of storage tanks and vessels:	9,562.5 Bbls
3)	Pipeline break:	3,134 Bbls
4)	Daily production volume from highest capacity well blowout	1,215 Bbls
5)	Total of items 1) through 4):	14,385.1 Bbls

VOLUME OF WORST CASE DISCHARGE SCENARIO			
TOTAL ESTIMATED VOLUME (Per 254.47(a))	PRODUCT API	PERCENTAGE OF VOLUME DECREASED (Evaporation based on 12 Hr. ADIOS model)	TOTAL ESTIMATED PLANNING VOLUME
14,385.1 Bbls	12-16	4%	13,809.7

RESOURCE IDENTIFICATION

The following areas are located in the highest potential landfall estimates based on the Trajectory Analysis shown in the pages at the end of this Appendix.

SENSITIVE AREA	CONTACT	PHONE	E-MAIL
Cabrillo Beach Wetlands	California Department of Fish and Wildlife	(916) 358-1312 (24 Hr)	N/A
Los Angeles Harbor Breakwater			
Middle Breakwater			
Golden Shore Marine Reserve			
San Gabriel River			
Alamitos Bay/Los Cerritos Wetlands			
Arrow Point - Catalina Island			
Ship Rock - Catalina Island			
Bird Rock - Catalina Island			
Anaheim Bay (Seal Beach National Wildlife Refuge)	US Fish and Wildlife Service	(760) 607-9768 (24 Hr)	
Inner Bolsa Chica	California Department of Fish and Wildlife	(916) 358-1312 (24 Hr)	
Bolsa Chica - Restored Wetlands	California Department of Fish and Wildlife	(916) 358-1312 (24 Hr)	
Talbert Marsh	California Department of Fish and Wildlife	(916) 358-1312 (24 Hr)	
Newport Slough Wetland	California Department of Fish and Wildlife	(916) 358-1312 (24 Hr)	

Shoreline protection for these areas will be in accordance with the Sector Los Angeles-Long Beach Area Contingency Plan and Southern Sector Area Committee - ACP 5 Area Contingency Plan using the techniques discussed in Section 13 Resource Protection Methods.

INITIAL RESPONSE

The following is a description of the timeline of events which could occur in response to a worst case discharge from Beta Offshore. Adverse weather would not affect response.

Hours 1 to 2:

The responding Beta Offshore personnel would initially stage itself upwind of the release. Upon arrival to the site of the oil spill, a site characterization would be conducted by trained personnel with suitable personal protective and monitoring equipment in order to determine if initial containment and recovery operations may commence. A Site Safety Plan will be developed. (See Section 1 Quick Guide and Section 21 for forms). MSRC's initial response vessel, the Ocean Guardian would be dispatched and arrive within the first hour to begin initial recovery operations.

Additional Beta Offshore Incident Management Team members would begin arriving at the Beta office in Long Beach or MSRC office in Long Beach (as determined by the QI). The Incident Management Team (IMT) would be briefed on incident situation as well as the current resources allotted. Various regulatory agency personnel may also begin arriving within this time frame. Working with the appropriate Federal, State and Local resource agencies through the Unified Command (UC) structure, Beta's Incident Command and IMT will discuss the situation with MSRC to determine if additional resources and contractors will be needed to respond to assist with nearshore protection, shoreline cleanup and disposal operations. A comprehensive table of Oil Spill Response Organization (OSRO) contractor resources is available beginning on page H-16 directly after this discussion.

Due to the high probability of impact, shoreline protection will be initiated to protect Los Angeles and Orange Counties in accordance with the Sector Los Angeles-Long Beach Area Contingency Plan and Southern Sector Area Committee - ACP 5 Area Contingency Plan.

BSEE Worst case discharge (WCD) scenario using Trajectory 3 (page H-25) for the first of January with wind from southeast at 6 knots and current from the northwest at 0.06 knots predicts the 12,469 bbls of crude oil could reach Long Beach harbor within 48 hours.

BSEE Worst case discharge (WCD) scenario using Trajectory 7 (page H-33) for the first of May with wind from southwest at 6 knots and current from the east southeast at 0.20 knots predicts the 12,469 bbls of crude oil could reach Huntington Beach or Bolsa Chica Beach within 48 hours.

Both of these WCD scenarios are considered in this discussion to describe the plan of action for the first 72 hours during the emergency response. Details for each WCD response would vary to some degree depending on whether the oil was heading to the north for a Long Beach landfall or to the south for Huntington Beach landfall. Mobilization and timing would be the same but prioritization for booming sensitive sites would vary depending trajectory.

The IMT would begin the development of an Incident Action Plan (IAP) to address the objectives set forth by the UC. The IAP may contain the following elements:

- Site Safety Plan *(required in all responses),*
- Mobilizing additional resources and personnel to carry out on water containment and recovery of oil and the deployment of resources to establish protection measures developed by the IMT,
- Authorization letter signed by the UC to decant in order to maximize storage,
- Overflight schedule to assess spill size/movement of oil on the water appropriate resources as determined by the UC using support services outlined in Appendix F,

- Estimated spill path trajectories which would support the proposed assignments for the next operational period,
- Recommendations from Environmental Unit for the best technology and methods for responding to and recovering spilled oil from the environment (i.e. mechanical containment/recovery, dispersant application, and/or in-situ burning),
- Assignments for implementing appropriate containment actions if safe and feasible,
- Assignments for additional storage if Operations and Planning determines recovery operations has the potential to exceed onsite storage capacities,
- Establishment of waste management and disposal plan,
- Establishment of Wildlife Branch to handle reports of impacted wildlife.

Hours 2 to 4:

Additional resources from the greater Los Angeles area would arrive at the release location and to the ICP within this time frame, and will be used to deploy additional equipment for containment and recovery operations as necessary. These additional resources are identified in the "Response Equipment" table beginning on Page H-15 following this discussion.

Additional IMT personnel and regulatory agency personnel would continue arriving at the established ICP. A Dispersant Plan and/or In-Situ Burning Plan may be considered by the EUL and Unified Command if the proper conditions permit (Refer to Section 18 for the Dispersant Use Plan and Section 19 for the In-Situ Burning Plan for detailed information). This request may include permission to spray from the FRVs, or the use of aerial applications. The MSRC aircraft (C-130 located in Mesa, AZ, and the King Air BE-90 located in Concord, CA) may be notified for potential dispersant application.

With the information provided by way of aerial surveillance, the IMT would determine the size and scope of the spill. Trajectory analysis (spill movement) would be estimated using the procedures outlined in Section 10 and Appendix H of this plan. The trajectory along with aerial observations would determine if/when the release would impact landfall. Information on the size and movement of the release would be transmitted to MSRC response personnel and to the IMT.

As considered necessary by the IMT, additional MSRC equipment and vessels would get underway from Carpinteria and Ventura Harbor. This includes the MSRC 320 Oil Spill Response Barge (OSRB), staged at Port Hueneme, for deployment. The OSRB has 32,000 barrels of onboard storage and 660 feet of offshore boom.

MSRC has access to contracted commercial fishing vessels with HAZWOPER trained personnel via the Mariner Oil Spill Team (MOST) or Fishermen's Oil Response Team (FORT) programs. As required, these vessels and personnel may be used to support deployment and maintenance of containment boom as well as provide logistical support.

In coordination with State and Federal authorities through the Unified Command, a press release may be issued at this time.

Hours 4 to 12:

Depending on the circumstances, the Incident Action Plan may address the following items between hours four to twelve:

Mechanical recovery of the spilled oil would continue. The Surveillance Group would continue to monitor the movement of oil on the water and work closely with the Trajectory Team to determine if/when landfall was imminent. If landfall was likely, the sensitive sites defined in the ACP would attempt to be protected as directed per specific site strategies in the ACP. If permitted, the use of Dispersants or In-Situ Burning would occur during this period.

The vessels available for the initial response coming from Long Beach, Terminal Island and Ventura would have would have over 9,140 feet of ocean boom and an Estimated Daily Recovery Capacity (EDRC) of 40,506 bbls. Total storage volume on scene at this time would be approximately 6,484 bbls.

Many of the vessels now assigned to the spill are equipped with aerial surveillance and remote sensing. MSRC has developed aerial surveillance and remote sensing resources capable of supporting mechanical recovery, dispersant application, and *in situ* burning.

The aerial surveillance and remote sensing resources can provide essential information to other response resources to enhance their effectiveness in recovery and/or mitigation operations. The California Responder has a FLIR camera and x-band radar. The Ocean Guardian has an IR camera. MSRC has additional oil locating tools in northern California that may be requested for use and on site in 12-24 hours if needed. These tools will assist to direct on-water resources to areas of the thickest recoverable oil. More importantly, such tools also will allow for the expansion of the operating window to include night-time and low light conditions, if safety permits.

In the event wildlife resources are threatened, the Company may work with the California Oiled Wildlife Care Network, California Department of Fish and Wildlife, National Marine Fisheries Service or other related wildlife rescue and rehabilitation services to identify the necessary resources to capture, clean and care for the impacted animals.

Recovery, temporary storage, recycling and/or disposal of oil from offshore operations would be coordinated by the IMT following the procedures discussed in Sections 15 and 16 of this plan. Initial recovered oil storage and transfer sites would be identified and all necessary agencies approvals would be obtained. Recovered oil and oily debris would then be transferred to approved recycling and/or disposal sites.

Hours 12 to 24:

Mechanical recovery of the spilled oil would continue. Within twelve to twenty-four hours after discovery of the release Beta Offshore is expected to have the resources in the response equipment table (Appendix H-15) available for a response to a Worst Case Discharge.

The six vessels now assigned to the response would have over 11,780 feet of ocean boom and an Estimated Daily Recovery Capacity (EDRC) of 49,549 bbls. Total storage volume on scene at this time would be approximately 38,684 bbls.

For the purpose of source control, we will have underwater assessment personnel (shallow air, deep air, and mixed gas divers) and resources (Hysub ROV or Phantom ROV) from Aqueos on site between 12-16 hours from the time of their notification. This contractor has pre-identified supplies to clamp the Beta Offshore pipeline as necessary. To support this function, they have the ability and resources to place a containment dome (connected to an oil bladder for collection purposes) to further support source control efforts.

Hours 24 to 72:

Mechanical recovery of the spilled oil would continue. Air Operations Branch and on-water resources would continue to monitor the movement of oil on the water and work closely with the Planning. If landfall was likely, the sensitive sites defined in the ACP would attempted to be protected as directed per specific site strategies in the ACP. If permitted, the use of Dispersants or In-Situ Burning would continue during this period. If warranted, additional MSRC resources from the Martinez and Richmond CA areas would begin to arrive to assist in the oil spill cleanup and recovery efforts already underway.

Beyond Hour 72:

The oil spill equipment and resources defined through hour 72 are expected to be more than adequate to satisfy any facility or pipeline worst case discharge described in this plan. Nonetheless, MSRC and its contractors have many additional resources located throughout the U.S. that could be "Cascaded" to the response location should the need arise. A list of MSRC's response equipment and locations nationwide is available on MSRC's Internet web-site: https://www.msrc.org.

In the event of a long-term, ongoing release, MSRC would use additional temporary storage (e.g., barges) through existing Letters of Intent and establish a rotating system of temporary storage of recovered oil at sea and offloading the oil. In this way, the rate of recovery of spilled oil will not be limited by the size of at-sea storage devices.

Surveillance

Surveillance will be initiated with the first available aircraft using personnel most readily available at the time the incident is discovered. The observer on the initial over flight will be instructed to document the slick and gather information such as latitude and longitude of leading edge, direction of travel, size, color, etc. and pass this information to the Command Center. A trained observer will be dispatched as soon as possible and will communicate directly with the Command Center to pass on information so that informed decisions regarding deployment of resources can be made. Depending upon the scope and duration of the spill, Operations will utilize Vessel Mounted Infrared Cameras to conduct night operations and/or to position resources for daylight operations. The use of advanced monitoring equipment such as the integrated X-Band/IR system should be taken into consideration during an oil spill response. Utilizing systems such as these can allow for a more precise recovery by allowing response personnel to operate more efficiently 24 hours a day

Response Strategies

Sections 13 and 15 discuss the different response strategies for nearshore, offshore, shallow water and shoreline impacts.

Disposal

Recovery, reuse, and recycling are the best choices for remediation of a spill, thereby reducing the amount of waste disposed of at a solid waste landfill. Treatment is the next best alternative, but incineration and burning for energy recovery have more options within the state. There are some limitations and considerations in incinerating for disposal. Environmental quality of incineration varies with the type and age of the facility. Therefore, when incineration becomes an option during an event, local air quality authorities would be contacted for advice about efficiency and emissions of facilities within their authority. Approval of the local air authorities is a requirement for any incineration option. Landfilling is the last option. Final disposal at a solid or dangerous waste landfill is the least environmentally sound method of dealing with a waste problem.

During an incident, the Company would consult with representatives from the Federal and State On-Scene Coordinator (OSC) to identify the acceptable disposal methods and sites appropriately authorized to receive such wastes. The Company maintains a list of approved disposal sites that satisfy local, state, and federal regulations and Company requirements.

In order to obtain the best overall Incident Disposal Plan, a combination of methods should be used. There is no template or combination of methods that can be used in every situation. Each incident should be reviewed carefully to ensure that appropriate combinations of disposal methods are employed.

Additional Considerations for an Incident Lasting 30 days

For an ongoing blowout lasting for 30 days further support would be required. The following would be items considered for an ongoing spill:

- Additional support vessels – due to maintenance and breakdowns additional vessels would need to be used
- Additional personnel – personnel would need to be relieved so that fatigue would not pose a safety concern
- Additional surveillance equipment – the area of cleanup will continue to grow as the spill continues additional aircraft would be needed to cover the additional area
- Additional logistics support – as supplies are depleted resupplying becomes more difficult over time. Additional logistic support to deliver the needed supplies would be used

Additional Considerations for Blowout Lasting 120 Days

For an ongoing blowout lasting for 120 days (the estimated time to establish a relief well in the event of an uncontrolled blowout) significant further support resources would be required. The following would be items considered for an ongoing spill:

Additional Support Vessels

To ensure continued proper maintenance, as well as to deal with breakdowns, additional vessels would need to be sourced and acquired as needed from the spot market. Additionally, due to the potentially high volume of product being recovered, the size type of storage vessels being used may change.

The large number of vessels being used, in addition to the varying size and type of the vessels, makes utilization of a vessel tracking system necessary to ensure safe and effective operations. The potential for very large vessels also requires the utilization of shore base facilities with a deeper draft than may be in use by initial response vessels. Further credence will be given to draft and beam of vessels when considering the necessary assets and locations for the process of decontamination.

Additional Aircraft

As the coverage area of the spill continues to grow, aerial resources (both fixed wing and rotorcraft) will be added to ensure appropriate surveillance and tactical coverage. Aircraft type may change in order to ensure sufficient range and capability, depending on spill trajectory and weather conditions.

Remote Sensing and Oil Spill Detection Systems

The quantity of product on the water is best estimated using the thickness of that oil. For a long term, uncontrolled blowout, tracking and calculation of the volume of product on the water is critical to developing effective strategies and tactics for on water recovery. As such, the use of remote thickness detection systems may be incorporated as needed to establish precise volume estimates.

In order to maximize the ability and efficiency of response assets, the use of Oil Spill Detection Systems may be incorporated as needed as well. These systems serve to locate product on the water effectively during overnight and/or low visibility operations. Systems are commercially available for both aircraft and vessel mounted applications using several different technologies, including Marine X-Band, side-looking airborne radar (SLAR), and infrared/ultraviolet systems. These systems will be utilized as appropriate for the situation.

Additional Personnel

Additional personnel resources will be needed to periodically relieve response personnel. It will be the duty of contractors to establish rotational schedules for their employees that ensure safe, effective, continued operations. Additional personnel will be sourced as appropriate through contractors to conduct specific operations.

Logistical Support

Logistical capability is paramount in supporting long term spill operations. Supply chains for specific resources will be established with their respective vendors to ensure that those items are readily available for use.

Particular consideration will be given to logistical support for dispersant application and in situ burning. Through their OSRO contracts with MSRC, the Company will have access to 53,725 gallons of COREXIT EC9500A/EC9527A in California and Arizona. As this supply is reduced in an ongoing blowout scenario, the Company/MSRC would access an additional 65,204 gallons of COREXIT EC9500A maintained at various MSRC sites throughout the country.

Depending on the rate of dispersant being applied, which may vary depending on many operational considerations, Nalco (the manufacturer of COREXIT) will be contacted to begin production of additional dispersant supplies. It is projected that Nalco requires 10 to 14 days in order to increase production and make delivery of additional resources. As such, a request to begin additional production will be made no less than 14 days before the projected end of existing supplies based on the daily burn rate experienced during initial response operations.

The Company has ready access to 1,000' of PyroBoom in Long Beach, CA; an additional 1,000' of PyroBoom in Everett, WA; and 16,000' of PyroBoom in Houston, TX through their contract with MSRC. Additional fire-resistant boom, if needed, may be acquired through agreements with other response organizations.

	RESPONSE EQUIPMENT									
Owner	**Equipment**	**EDRC (BPD)**	**Temporary Storage (BBLS)**	**Additional Requirements**	**City**	**State**	**Hours to Procure**	**Hours to Loadout**	**Hours to Travel**	**Hours to Deploy**
MSRC	"California Responder" Transrec 350 Skimmer Stress I Skimmer 2,640 feet 67" Curtain Pressure-Inflatable Boom Fast Advancing Encounter System #4 Level C - X-Band Radar Oil Detection and Thermal Imaging Camera 32' Munson Support Boat	10,567	4,000	Eleven (11) Response Personnel	Terminal Island	CA	2	0	58 min.	2
MSRC	"Recovery 1" 104 feet 60" Fence Boom 2,000 feet 20" Curtain Internal Foam Boom 1,500 feet 43" Curtain Self-Inflatable Boom Two (2) Lori Brush Pack Skimmers, One (1) GT-185 Skimmer, One (1) Stress I Skimmer	9,908	2,215	Three (3) Response Personnel	Terminal Island	CA	1	0	1.5	0
MSRC	30' Kvichak Marco Skimming Vessel	3,588	24	Three (3) Response Personnel	Terminal Island	CA	1	1	1	2
MSRC	"Ocean Guardian" 2,000 feet 43" Curtain Self-Inflatable Boom 70 feet 54" Pressure Inflatable Boom Two (2) Lamar Brush Skimmers	7,420	215	Three (3) Response Personnel	Long Beach (Berth 57)	CA	0.25	0	32 min.	0

RESPONSE EQUIPMENT (Cont'd)

Owner	Equipment	EDRC (BPD)	Temporary Storage (BBLS)	Additional Requirements	City	State	Hours to Procure	Hours to Loadout	Hours to Travel	Hours to Deploy
MSRC	"FRV #2" 2,000 feet 43" Curtain Self-Inflatable Boom 70 feet 54" Pressure Inflatable Boom Two (2) Lamar Brush Skimmers	7,420	215	Three (3) Response Personnel	Ventura	CA	0.25	0	4	0
MSRC	"Response 3" One (1) Lamor 50 Skimmer	1,603	15	Seven (7) Response Personnel	Long Beach (Berth 57)	CA	1	0	45 min.	0
MSRC	"Recon 3" 1,000 feet 43" Curtain Self-Inflatable Boom	---	---	Six (6) Response Personnel	Long Beach (Berth 57)	CA	1	0	50 min.	0
MSRC	"Recon 4" 1,000 feet 43" Curtain Self-Inflatable Boom	---	---	Six (6) Response Personnel	Long Beach (Berth 57)	CA	1	0	50 min.	0
MSRC	800 feet 24" Curtain Internal Foam Boom	---	---	Four (4) Response Personnel, Work Boat	Alamitos Bay	CA	1	1	0	1
MSRC	"MSRC 320" Oil Spill Response Barge (OSRB), 660 feet 67" Curtain Pressure-Inflatable Boom, GT-185 Skimmer 1,374 BPD EDRC, Stress III Skimmer	9,043	32,000	6 - 8 MSRC personnel, Offshore Tug, Work Boat	Port Hueneme	CA	4	0	9	0

	RESPONSE EQUIPMENT (Cont'd)									
Owner	**Equipment**	**EDRC (BPD)**	**Temporary Storage (BBLS)**	**Additional Requirements**	**City**	**State**	**Hours to Procure**	**Hours to Loadout**	**Hours to Travel**	**Hours to Deploy**
Patriot Environmental	6,000' Kepner Seacurtain 6"/12" Boom	---	---	Three (3) Response Personnel, Work Boat	Wilmington	CA	1	0	1	1
Patriot Environmental	Elastec Drum Skimmer Magnum 100	2,742	---	Three (3) Response Personnel, Work Boat	Wilmington	CA	1	0	1	1
Patriot Environmental	Elastec Drum Skimmer Magnum 100G	5,484	---	Three (3) Response Personnel, Work Boat	Wilmington	CA	1	0	1	1
Patriot Environmental	Six (6) Flexi Tank Bladders 1,000 Bbls	---	6,000	---	Wilmington	CA	1	0	1	1
Patriot Environmental	One (1) Flexi Tank Bladder 3,000 Bbls	---	3,000	---	Wilmington	CA	1	0	1	1
Patriot Environmental	Five (5) Vacuum Trucks 70 Bbls each	---	350	One person/truck	Wilmington	CA	1	0	1	1
Patriot Environmental	Six (6) Vacuum Trucks 120 Bbls each	---	720	One person/truck	Wilmington	CA	1	0	1	1
Patriot Environmental	308 Colorado 21' Work Boat	---	---	Three (3) Response Personnel	Wilmington	CA	1	0	1	1
Patriot Environmental	307 Texas 28' Work Boat	---	---	Three (3) Response Personnel	Wilmington	CA	1	0	1	1
Patriot Environmental	Twelve (12) 14' Skiffs	---	---	Two (2) Response Personnel	Wilmington	CA	1	0	1	1

	RESPONSE EQUIPMENT (Cont'd)									
Owner	**Equipment**	**EDRC (BPD)**	**Temporary Storage (BBLS)**	**Additional Requirements**	**City**	**State**	**Hours to Procure**	**Hours to Loadout**	**Hours to Travel**	**Hours to Deploy**
Clean Harbors	Four (4) 18' American Marine, on trailers; Containment Boom 4,500'	---	---	Four (4) Response Personnel, Work Boat	Compton	CA	1	1	1	1
Clean Harbors	30' Custom Flat Work Boat	---	---	Three (3) Response Personnel	Compton	CA	1	1	1	0.5
Clean Harbors	24' Custom Flat Work Boat	---	---	Three (3) Response Personnel	Compton	CA	1	1	1	0.5
Clean Harbors	14' Gregor Work Boat	---	---	Three (3) Response Personnel	Compton	CA	1	1	1	0.5
Clean Harbors	Two (2) 12' Jon Boats	---	---	Two (2) Response Personnel	Compton	CA	1	1	1	0.5

Note: Additional skimming capabilities, containment boom and storage capacity may be sourced from MSRC's STARS Network as needed. Vessels of Opportunity (VOO) will be sourced through MSRC to ensure adequate vessel size, load carrying capability, adequate deck space, and sea keeping capabilities for the equipment deployed and operating environment.

MSRC FIRE BOOM					
Description	**Quantity (feet)**	**City**	**State**	**Time Away**	**Time from Staging to Site**
PyroBoom - Fire-resistant Boom	1,000	Long Beach	CA	1 Hr.	1 Hr.
PyroBoom - Fire-resistant Boom	1,000	Everett	WA	34 Hrs.	1 Hr.
PyroBoom - Fire-resistant Boom	16,000	Houston	TX	48 Hrs.	1 Hr.

MSRC DISPERSANTS					
Dispersants	**Quantity (Gallons)**	**City**	**State**	**Time Away**	**Time from Staging to Site**
COREXIT EC9500A	12,870	Long Beach (Berth 85)	CA	< 2 Hrs.	.50
COREXIT EC9527A	17,900	Carpinteria	CA	< 4 Hrs.	1.5 Hrs.
COREXIT EC9500A	8,650	Carpinteria	CA	< 4 Hrs.	1.5 Hrs.
COREXIT EC9500A	3,300	Mesa	AZ	< 4 Hrs.	1.5 Hrs.
TOTAL	**42,720**				

AIRCRAFT						
Type	**Dispersant Capacity (Gallons)**	**Maximum Flight Duration (Hours)**	**City**	**State**	**Time Away**	**Time from Staging to Site**
C-130	4,125	10	Mesa	AZ	< 4 Hrs.	1.5 Hrs.
King Air BE-90	250-425	8	Concord	CA	< 2.5 Hrs.	1.5 Hrs.

TRAJECTORY: OILMAP Prediction

All trajectories were calculated using OILMAP Prediction model with the following assumptions:

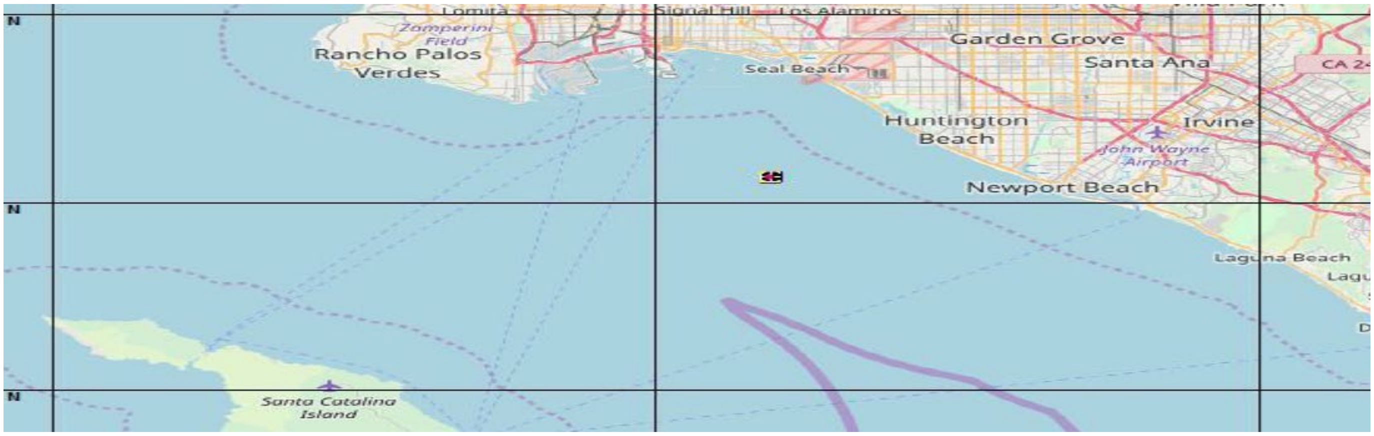
API 16 and 12,469 bbls crude oil released to the ocean over 12.5 hours

Trajectories vary by season, wind direction and speed and current direction and speed.
The following pages illustrate a 48 hour trajectory prediction based on ten (10) different season/wind/current combinations. Chose the one that most closely matches situation for initial incident planning. Use the form in Section 1 (Page 1-19) to request real-time trajectory prediction information as needed.

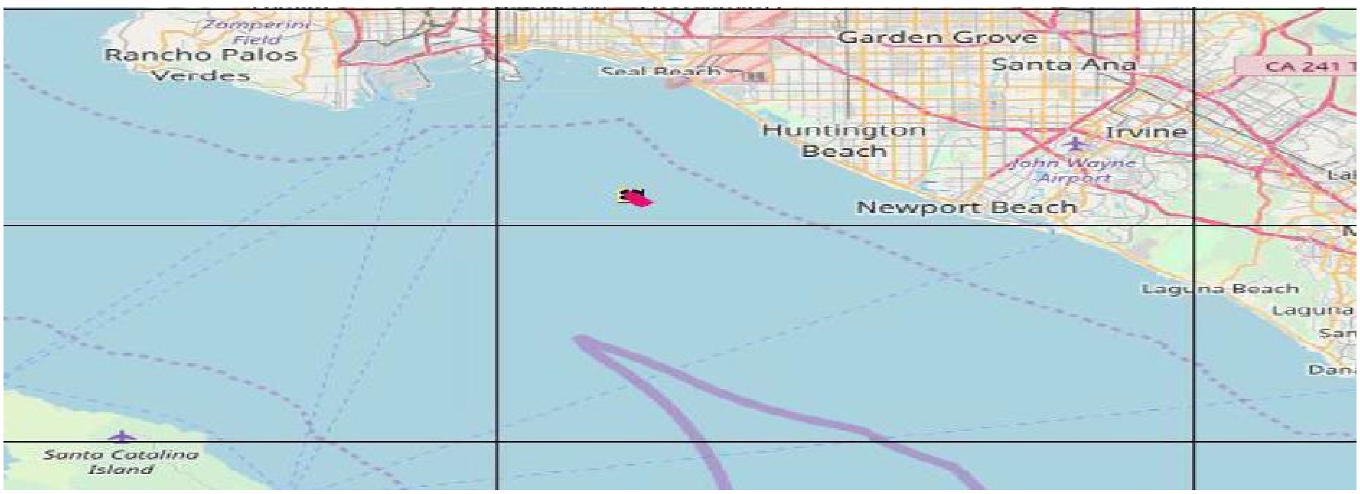
Trajectory Event #	Time Period	Wind Direction	Wind Speed	Current Direction	Current Speed
1	January	From NW	6 knots	To the NNW	0.06 knots
2	January	From W	6 knots	To the NW	0.06 knots
3	January	From SE	6 knots	To the NW	0.06 knots
4	January	From NW	12 knots	To the NW	0.06 knots
5	May	From W	6 knots	To the ESE	0.20 knots
6	May	From NW	6 knots	To the ESE	0.20 knots
7	May	From SW	6 knots	To the ESE	0.20 knots
8	May	From NW	12 knots	To the ESE	0.20 knots
9	September	From NW	4 knots	To the WNW	0.36 knots
10	September	From W	4 knots	To the WNW	0.36 knots

Trajectory Event 1 **January: Wind from NW at 6 knots; Current at 0.06 knots to the NNW**

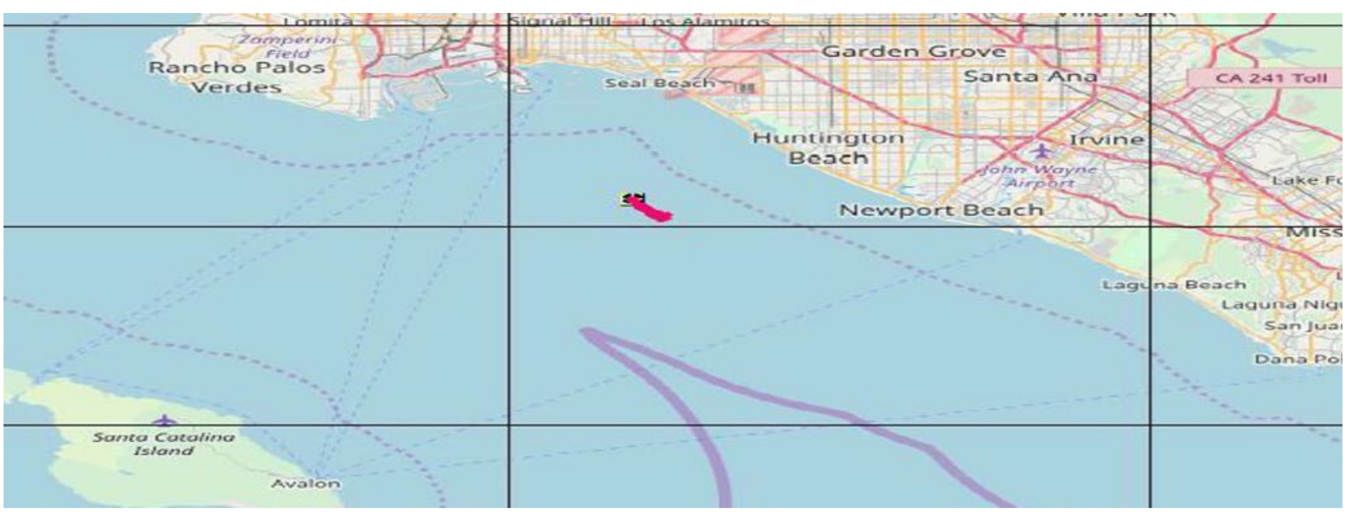
INITIAL SPILL



4 HOURS AFTER INITIAL SPILL

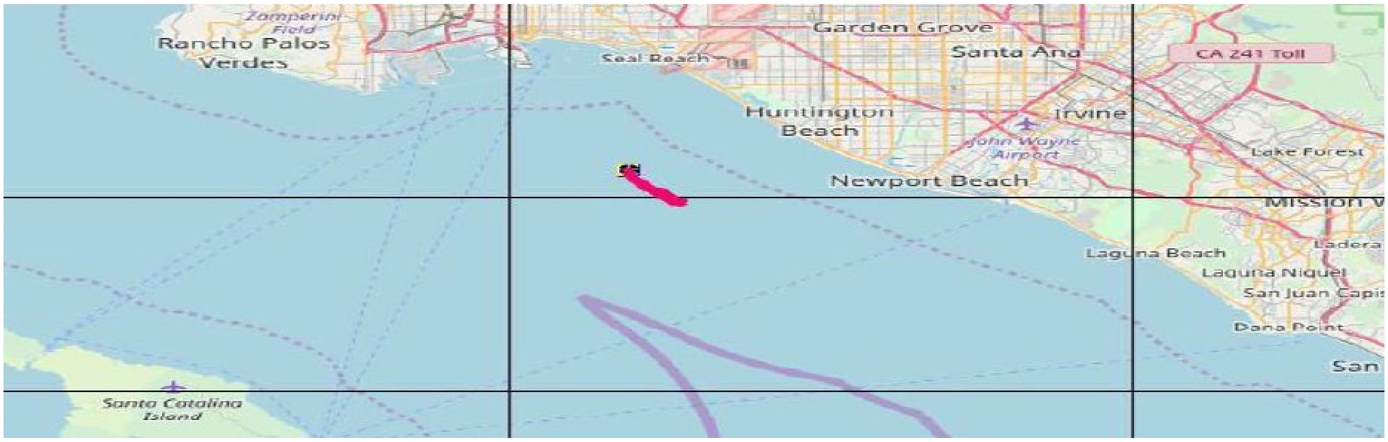


8 HOURS AFTER INITIAL SPILL

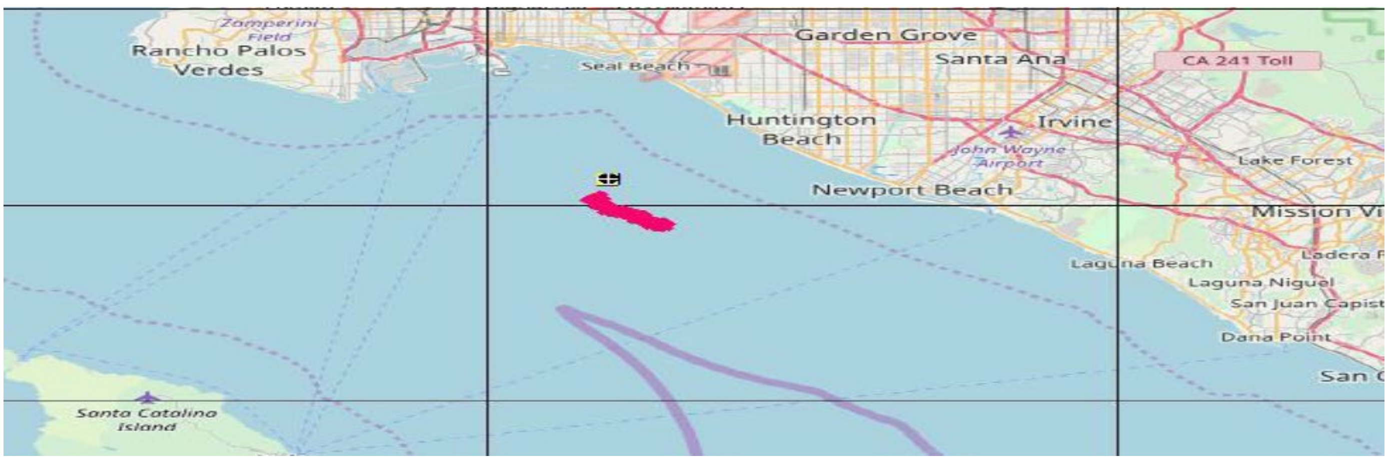


<u>Trajectory Event 1</u> **January: Wind from NW at 6 knots; Current at 0.06 knots to the NNW**

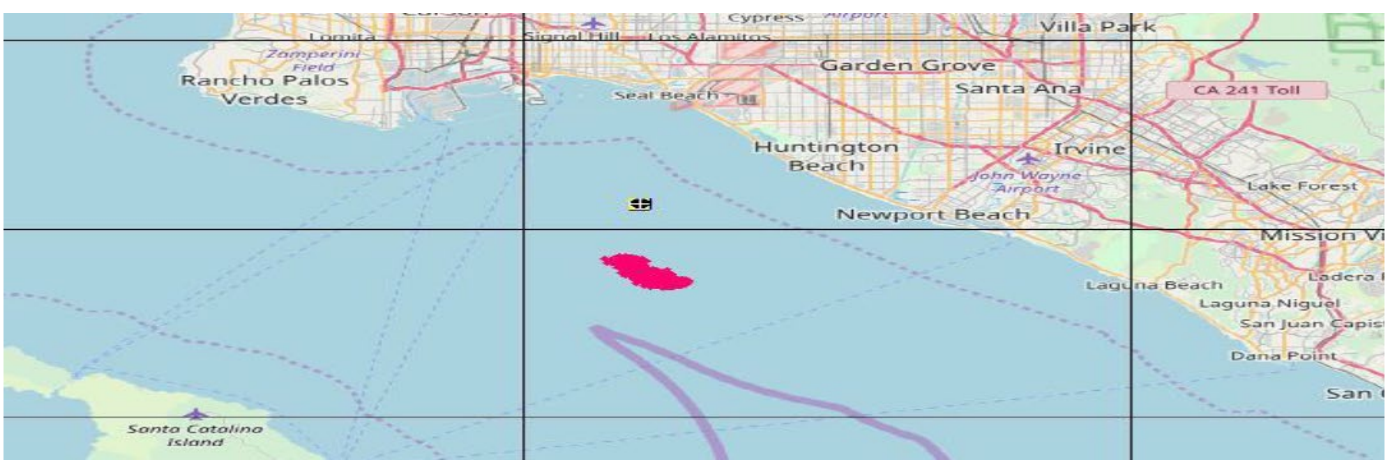
12 HOURS AFTER INITIAL SPILL



24 HOURS AFTER INITIAL SPILL

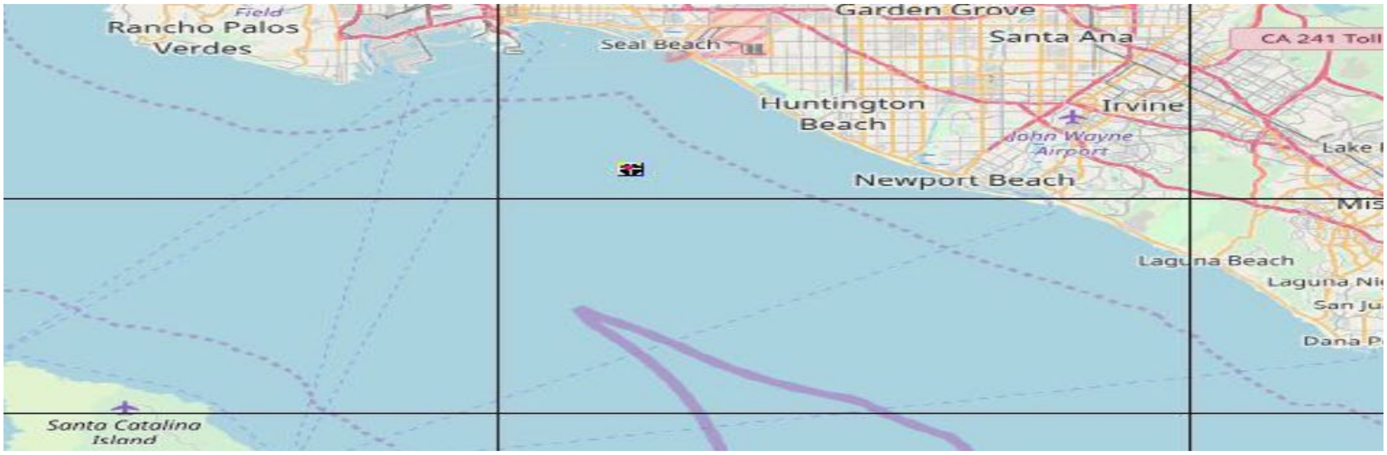


48 HOURS AFTER INITIAL SPILL

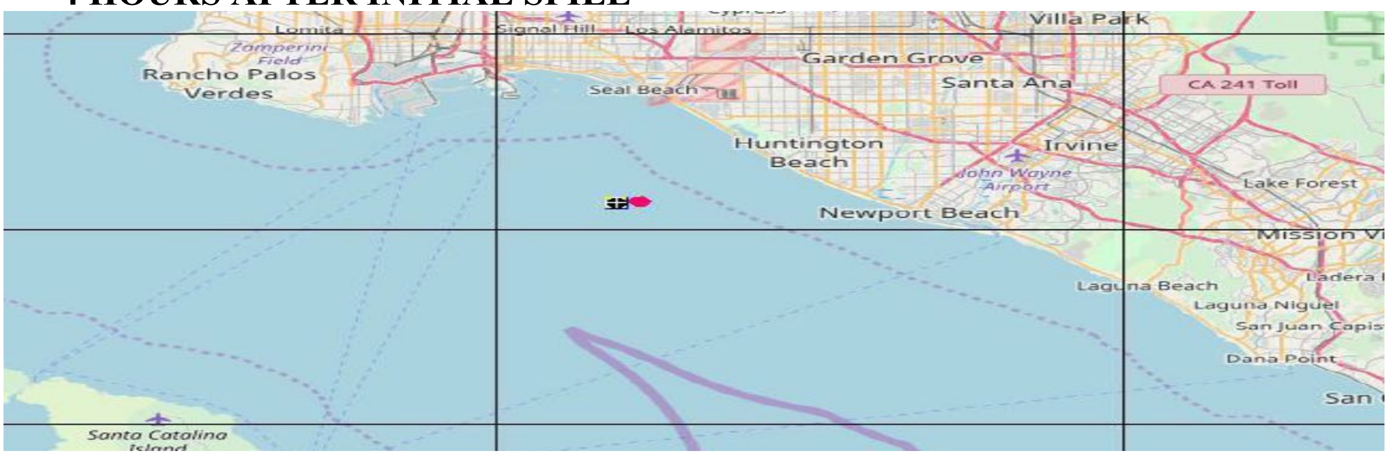


Trajectory Event 2 **January: Wind from W at 6 knots; Current at 0.06 knots to the NW**

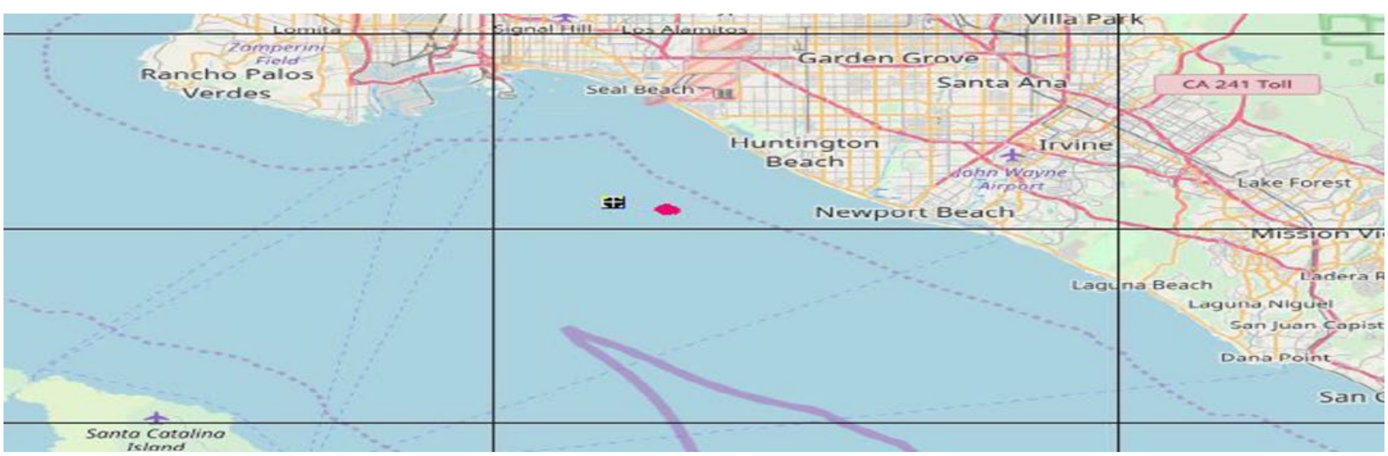
INITIAL SPILL



4 HOURS AFTER INITIAL SPILL

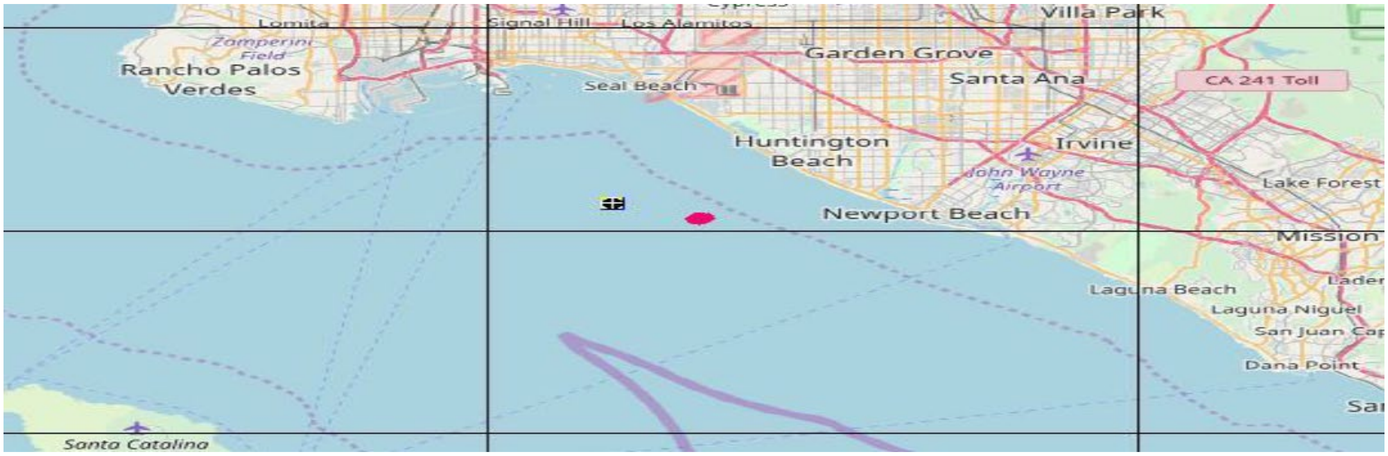


8 HOURS AFTER INITIAL SPILL

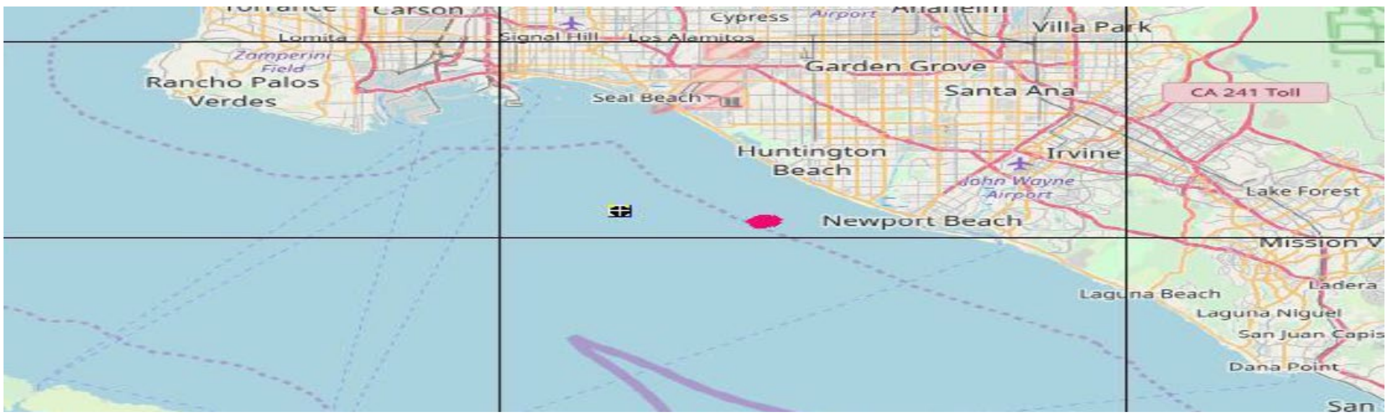


<u>Trajectory Event 2</u> **January: Wind from W at 6 knots; Current at 0.06 knots to the NW**

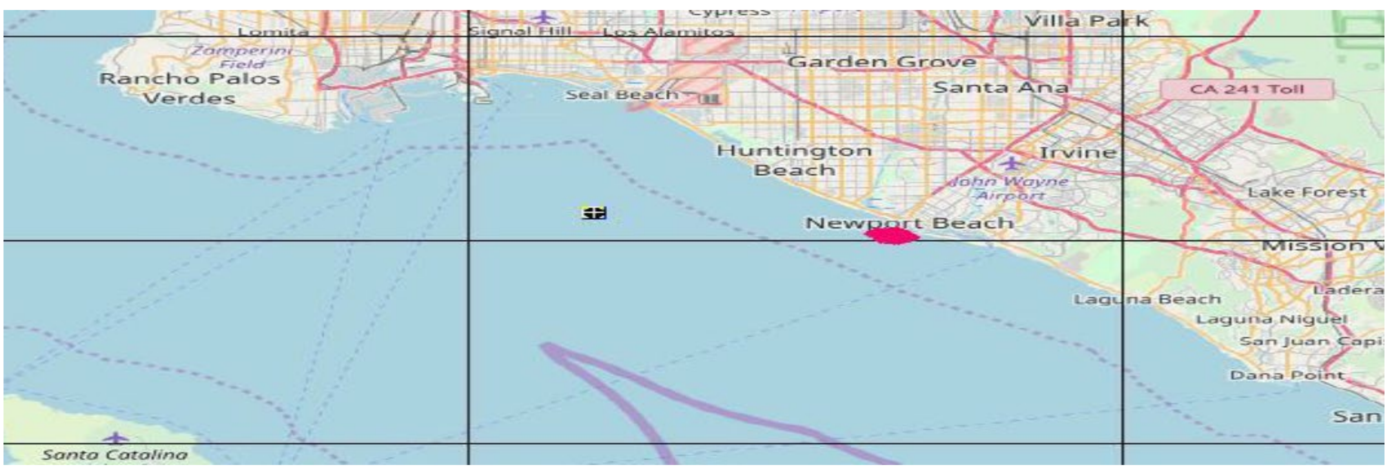
12 HOURS AFTER INITIAL SPILL



24 HOURS AFTER INITIAL SPILL

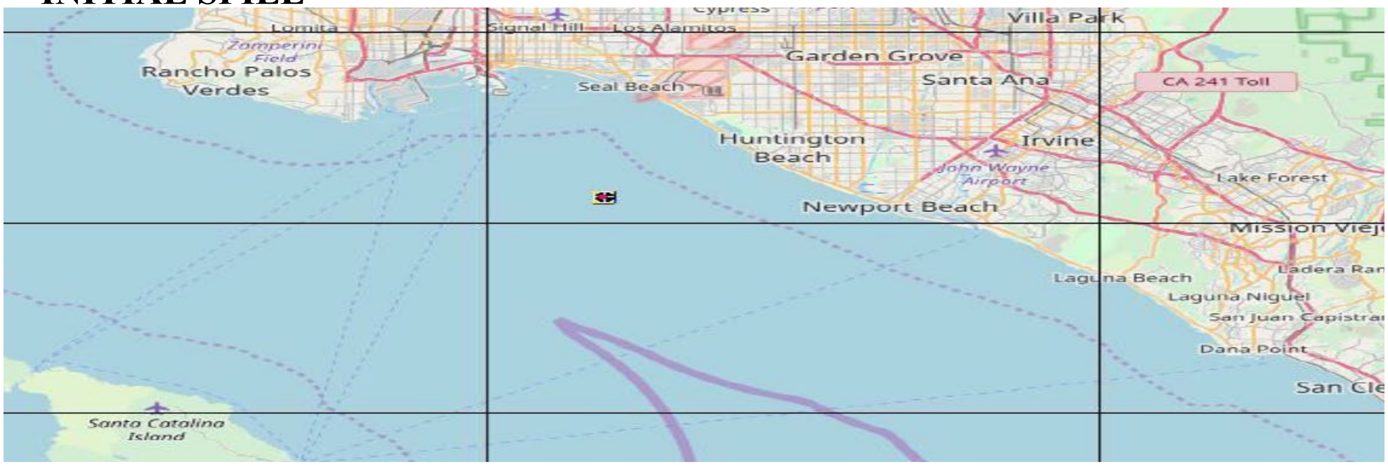


48 HOURS AFTER INITIAL SPILL

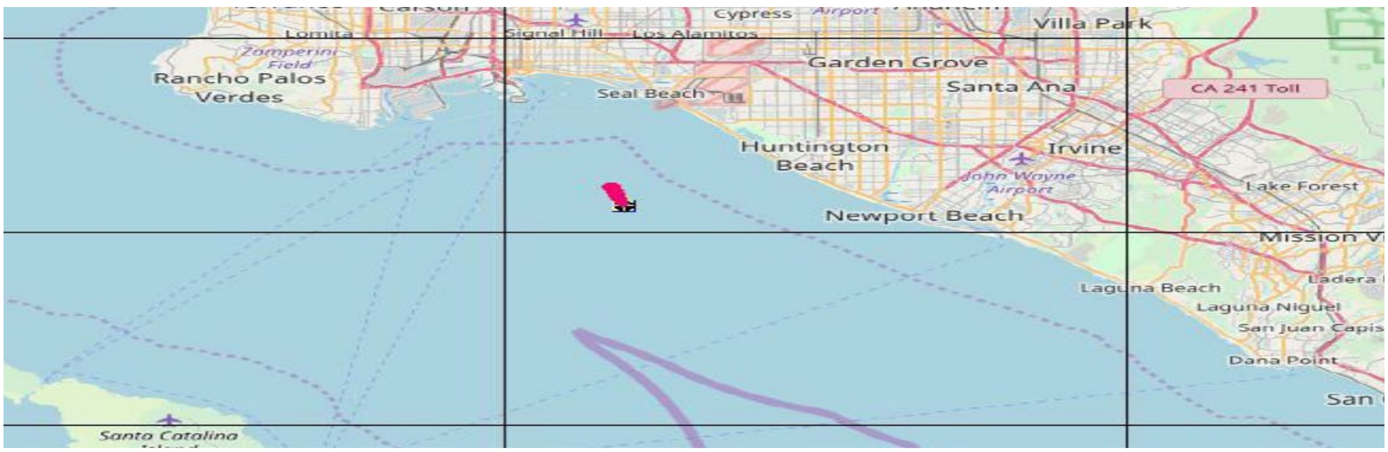


<u>Trajectory Event 3</u> January: Wind from SE at 6 knots; Current at 0.06 knots to the NW

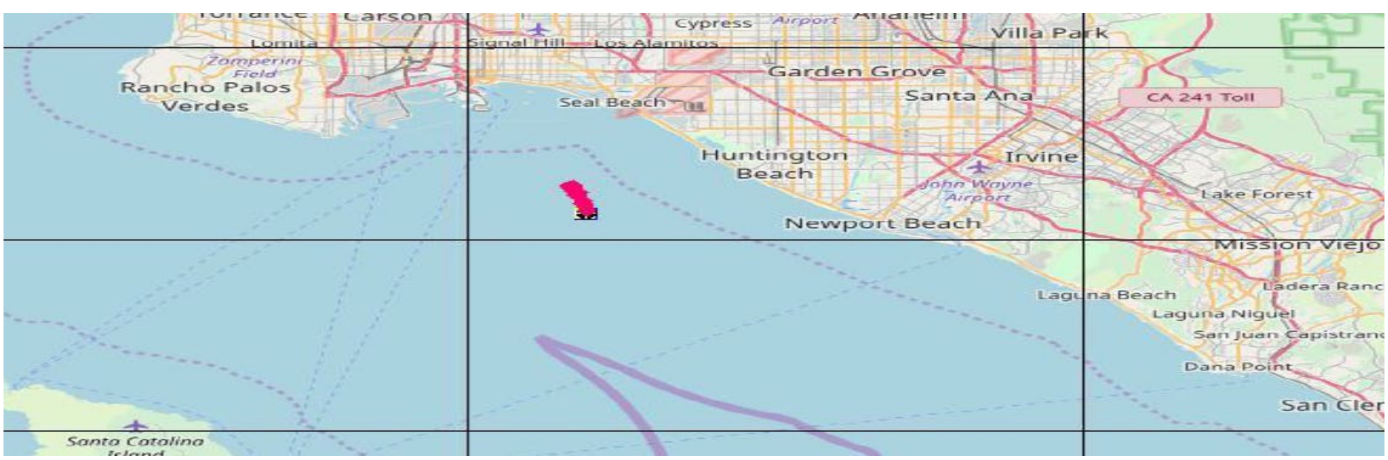
INITIAL SPILL



4 HOURS AFTER INITIAL SPILL

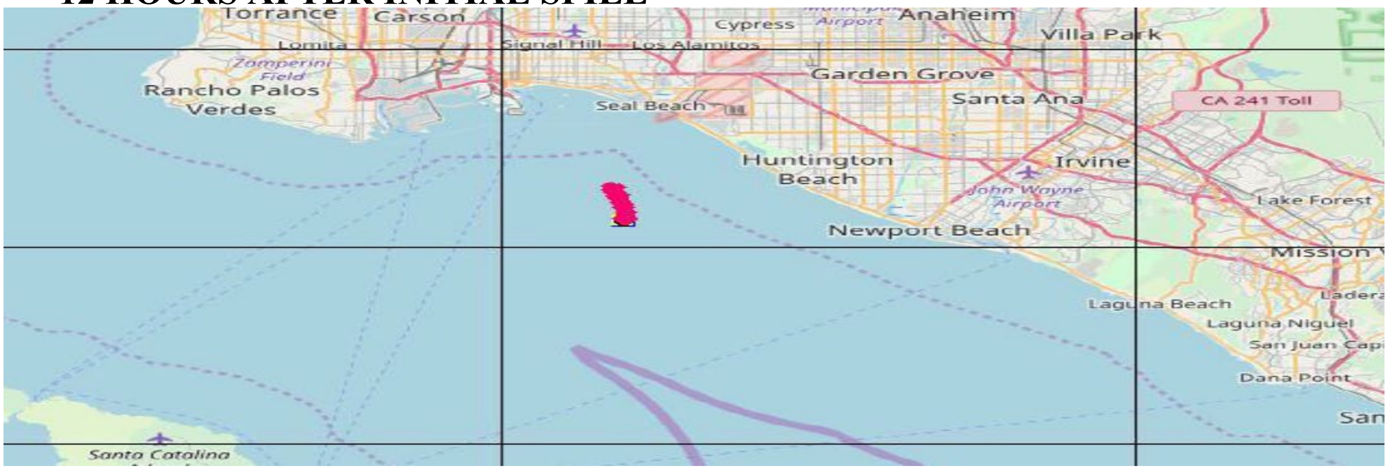


8 HOURS AFTER INITIAL SPILL

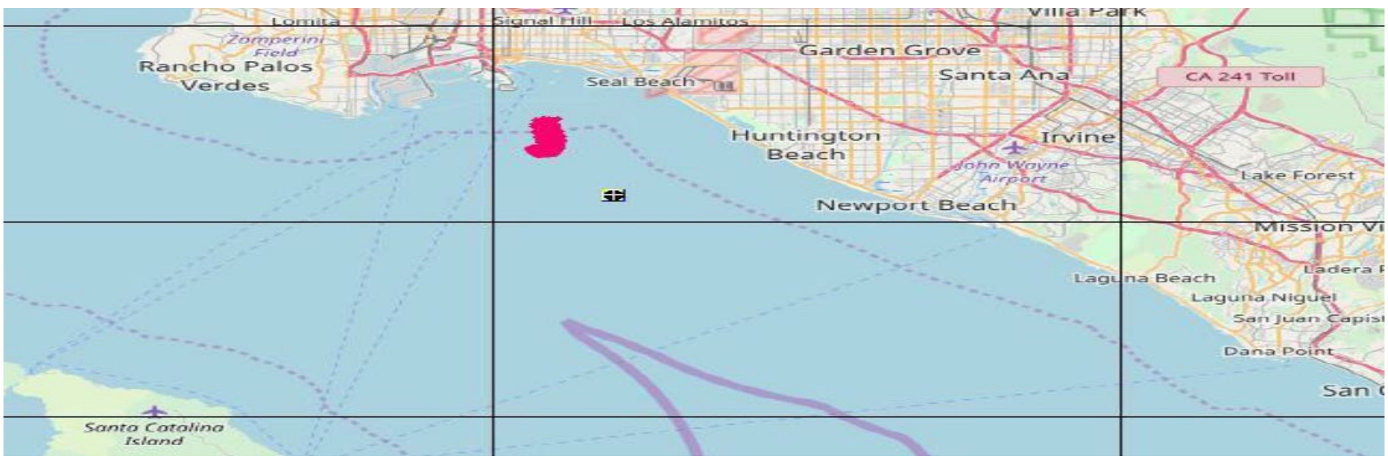


Trajectory Event 3 **January: Wind from SE at 6 knots; Current at 0.06 knots to the NW**

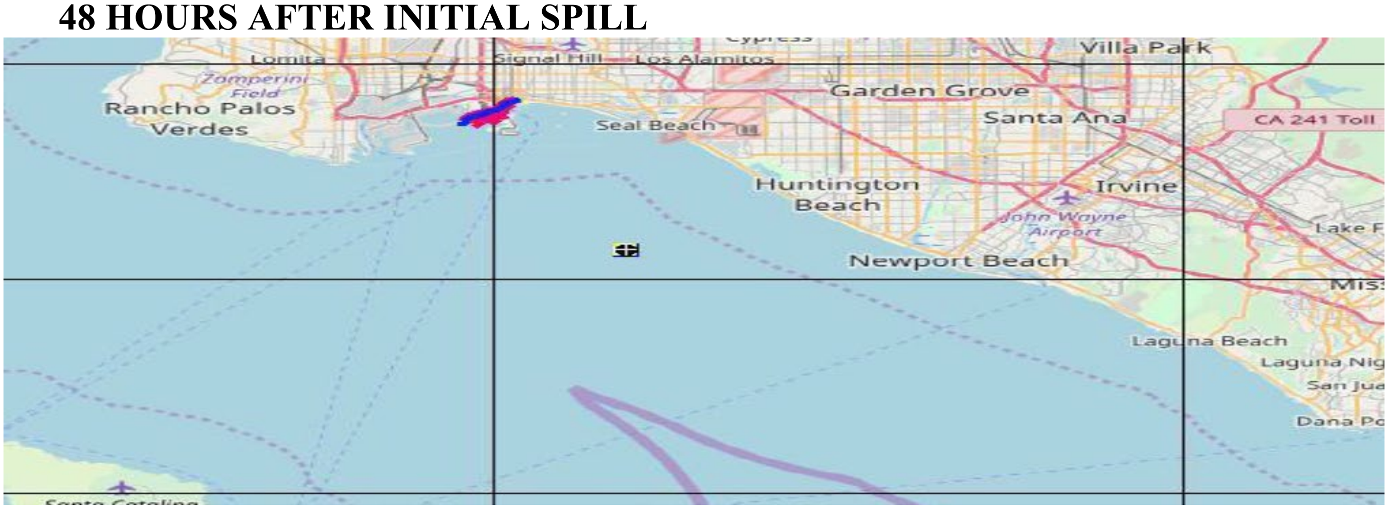
12 HOURS AFTER INITIAL SPILL



24 HOURS AFTER INITIAL SPILL

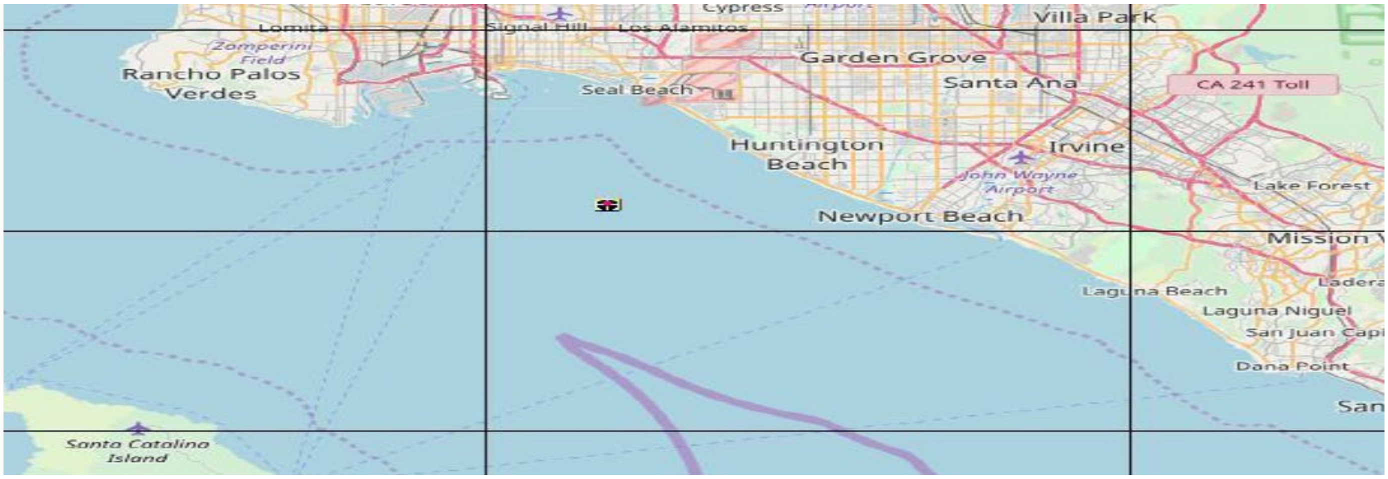


48 HOURS AFTER INITIAL SPILL

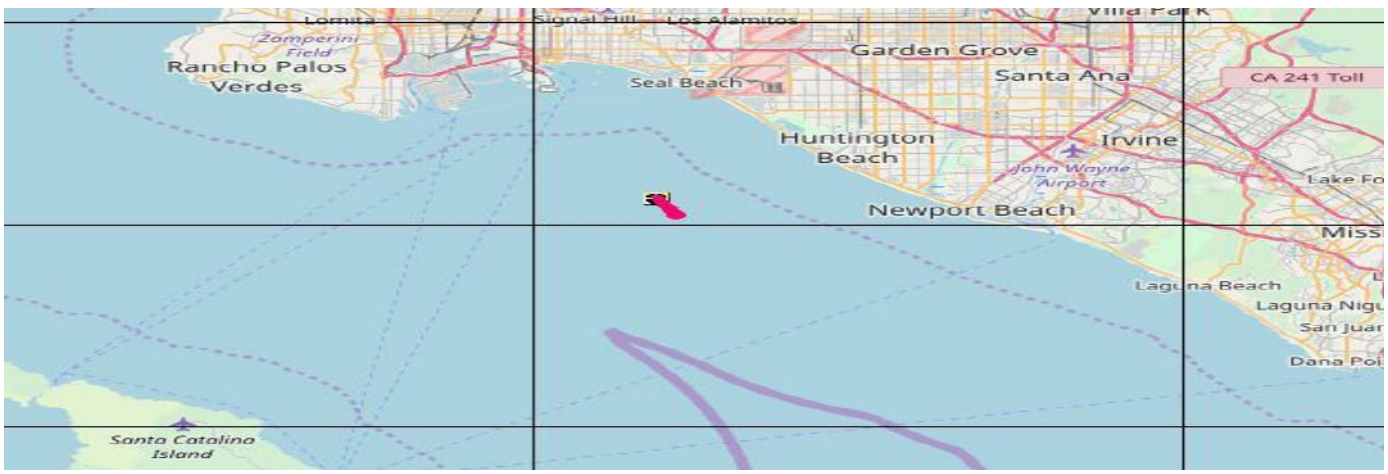


Trajectory Event 4 **January: Wind from NW at 12 knots; Current at 0.06 knots to the NW**

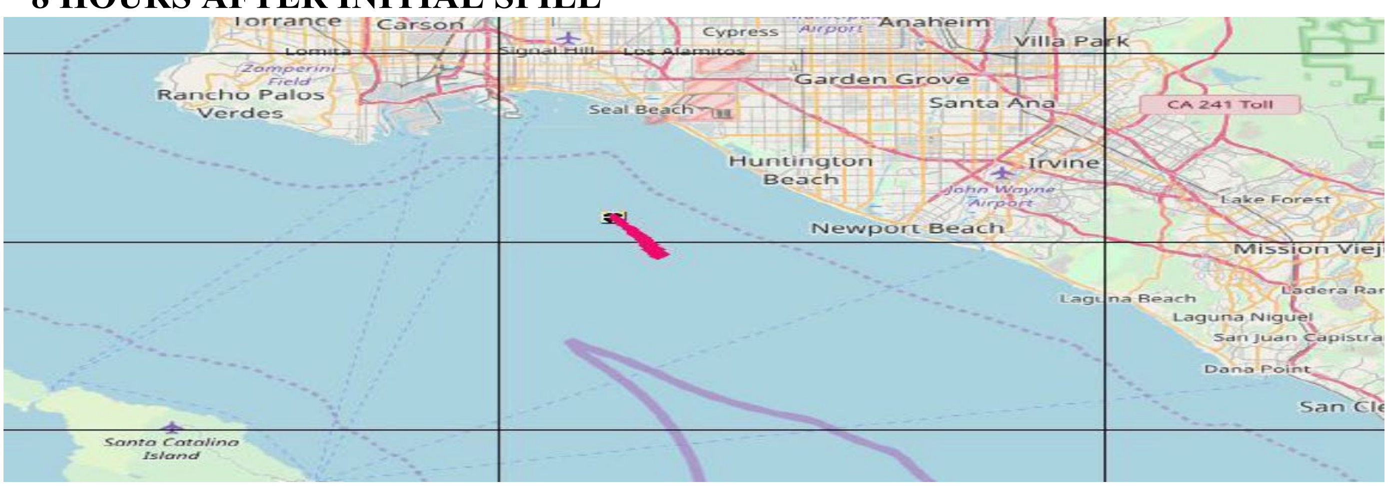
INITIAL SPILL



4 HOURS AFTER INITIAL SPILL

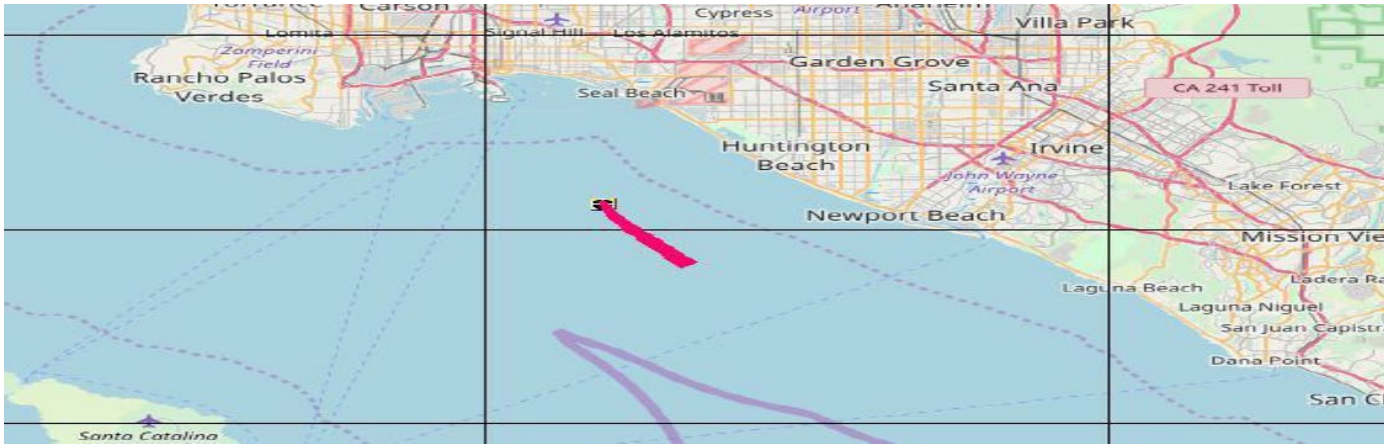


8 HOURS AFTER INITIAL SPILL

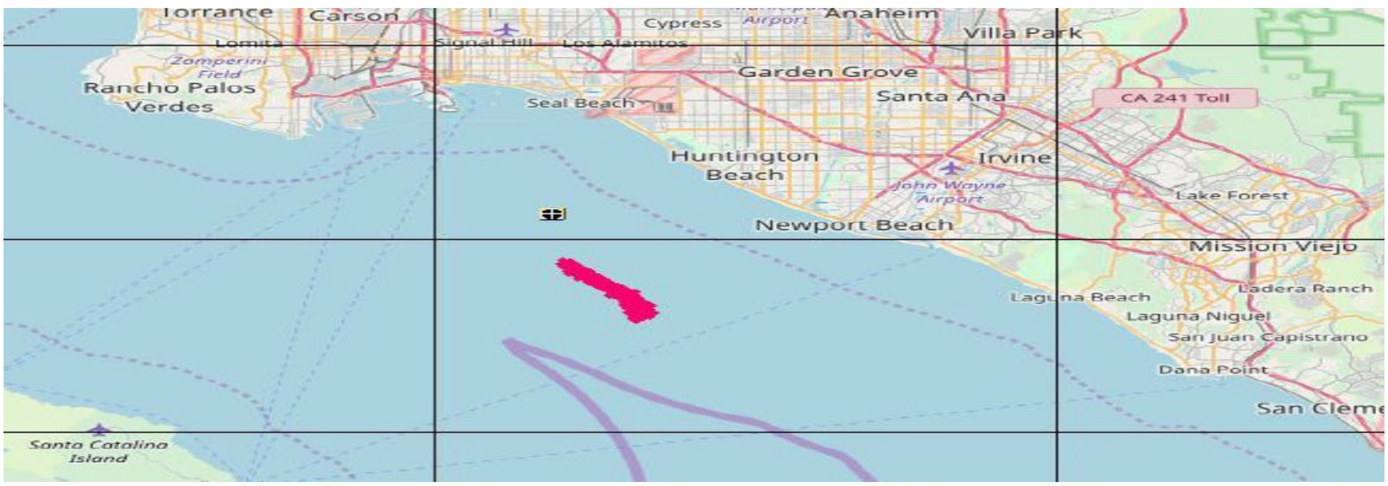


<u>Trajectory Event 4</u> January: Wind from NW at 12 knots; Current at 0.06 knots to the NW

12 HOURS AFTER INITIAL SPILL



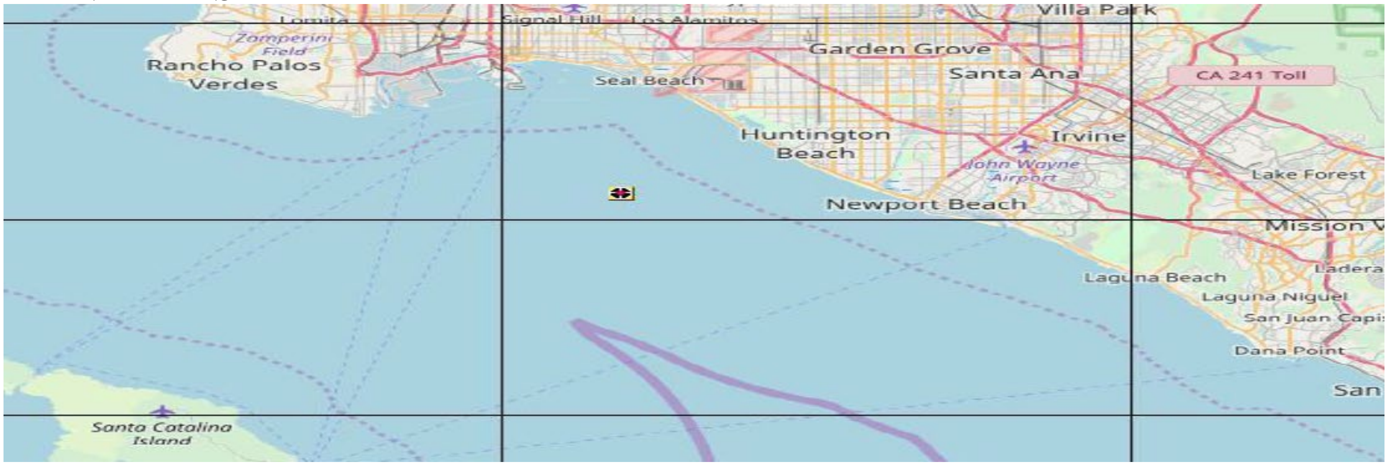
24 HOURS AFTER INITIAL SPILL



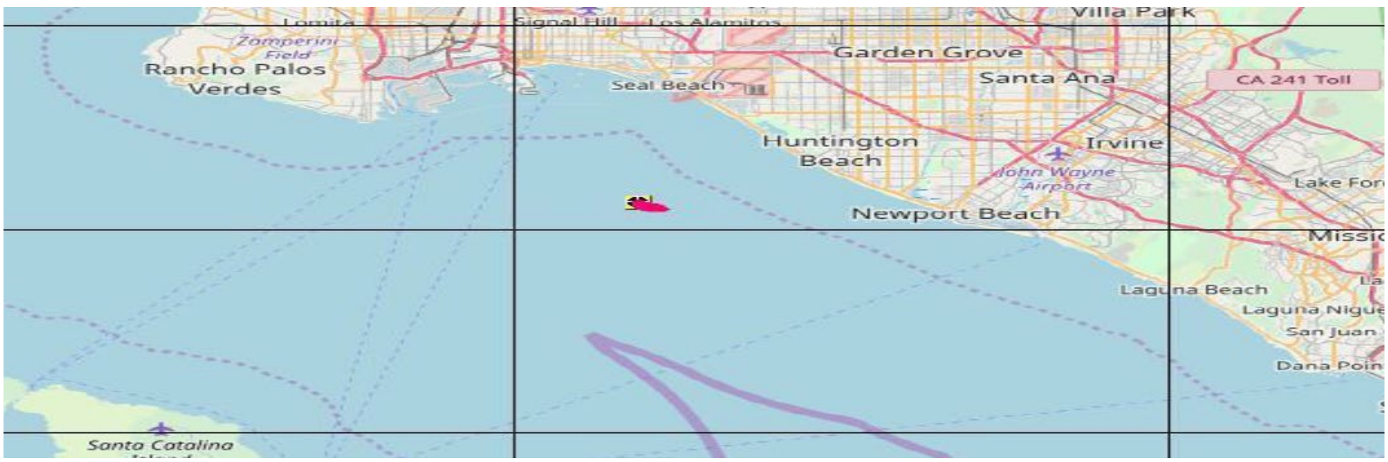
48 HOURS AFTER INITIAL SPILL

<u>Trajectory Event 5</u> May: Wind from W at 6 knots; Current at 0.20 knots to the ESE

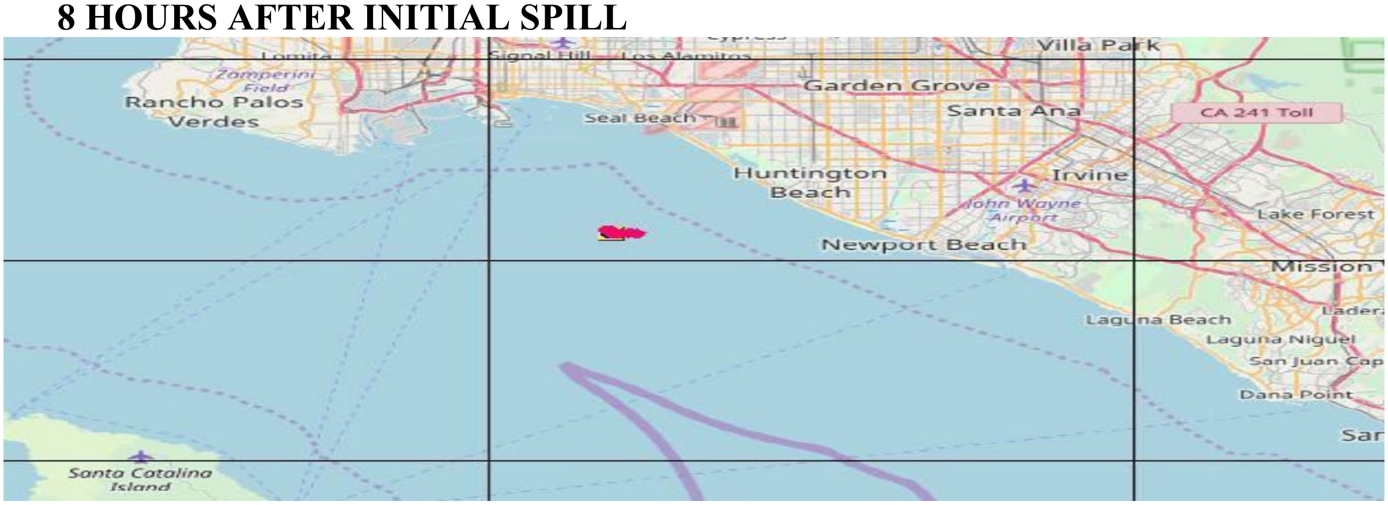
INITIAL SPILL



4 HOURS AFTER INITIAL SPILL

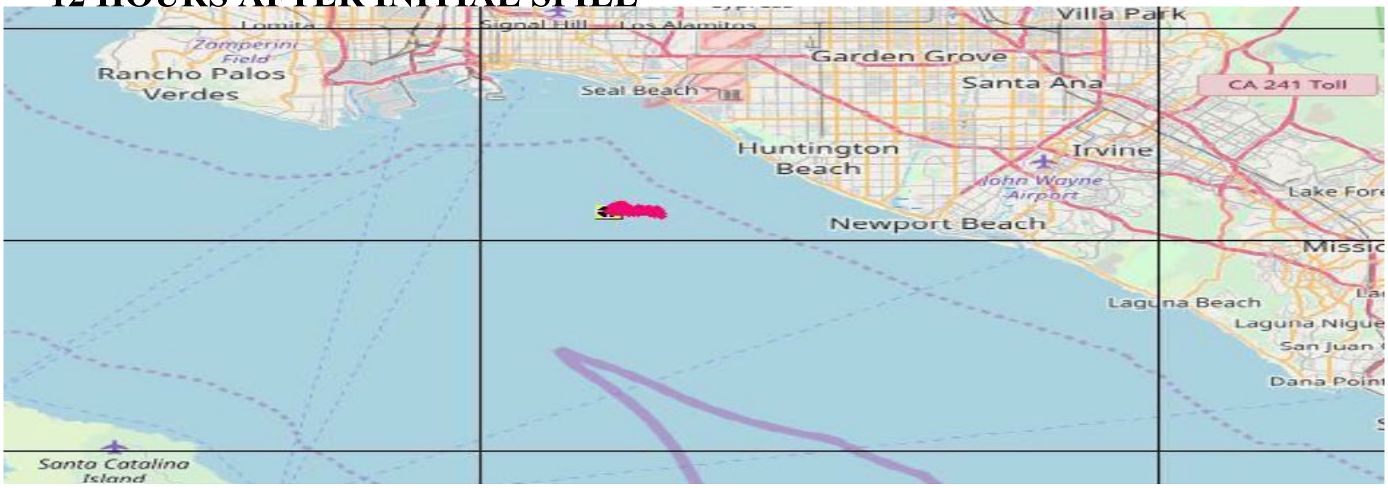


8 HOURS AFTER INITIAL SPILL

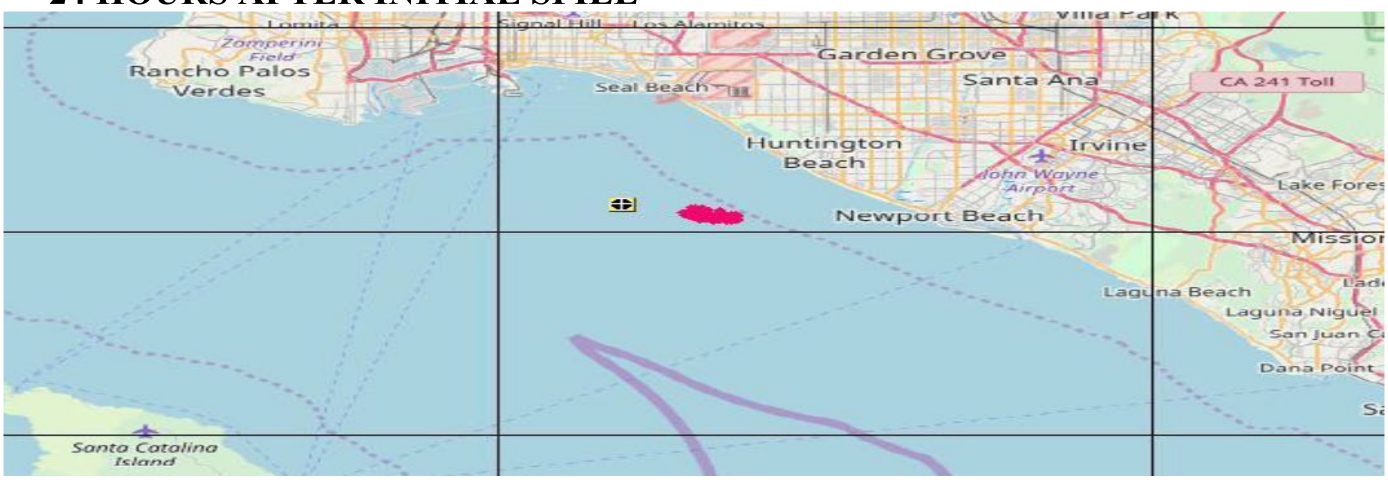


<u>Trajectory Event 5</u> May: Wind from W at 6 knots; Current at 0.20 knots to the ESE

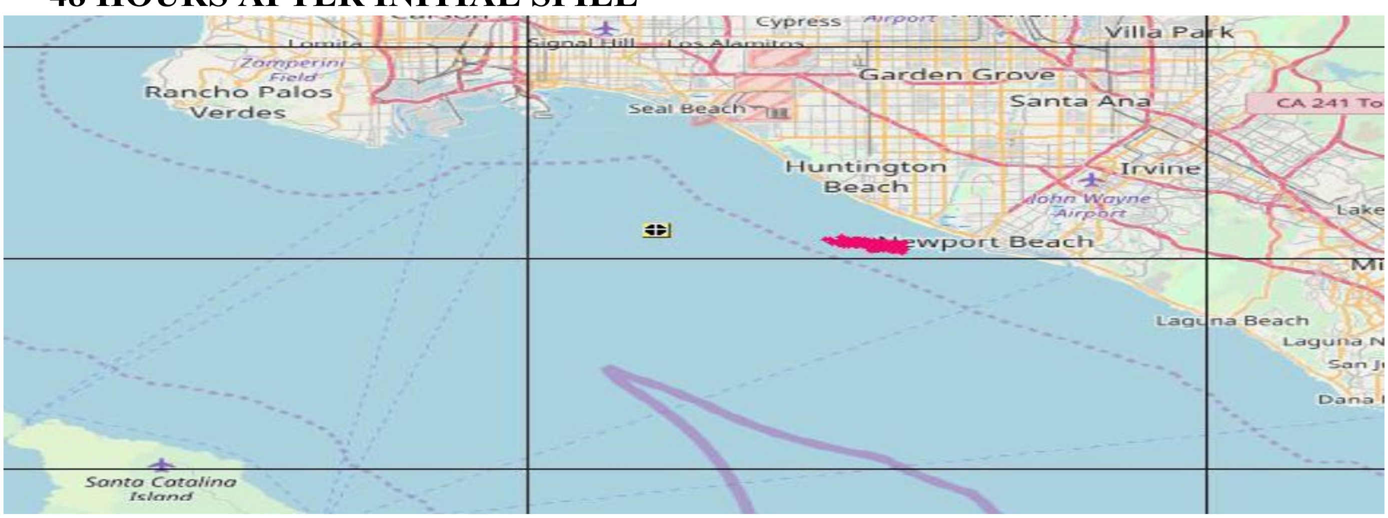
12 HOURS AFTER INITIAL SPILL



24 HOURS AFTER INITIAL SPILL

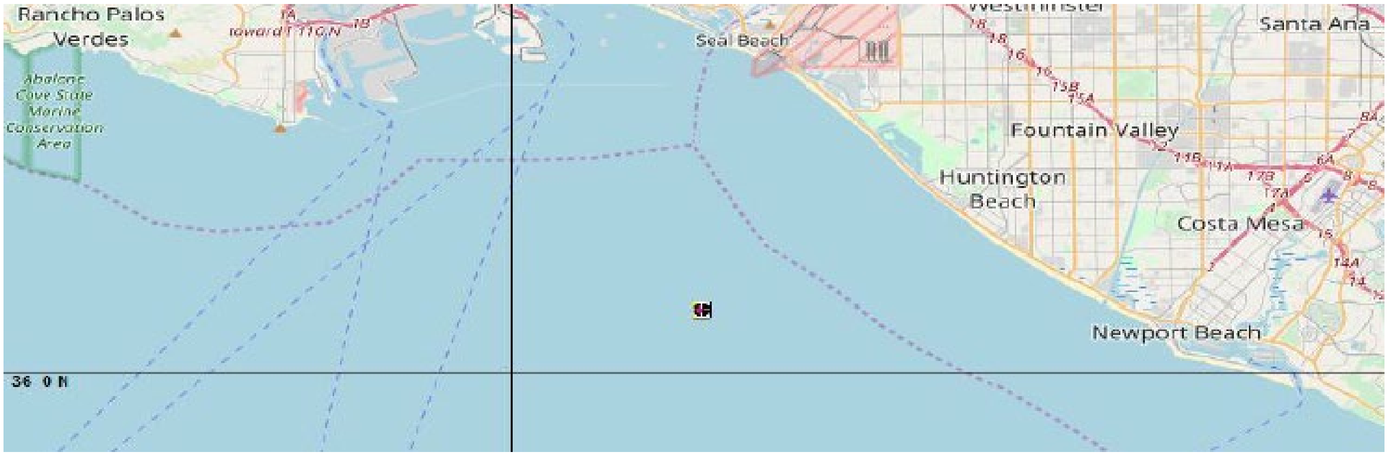


48 HOURS AFTER INITIAL SPILL

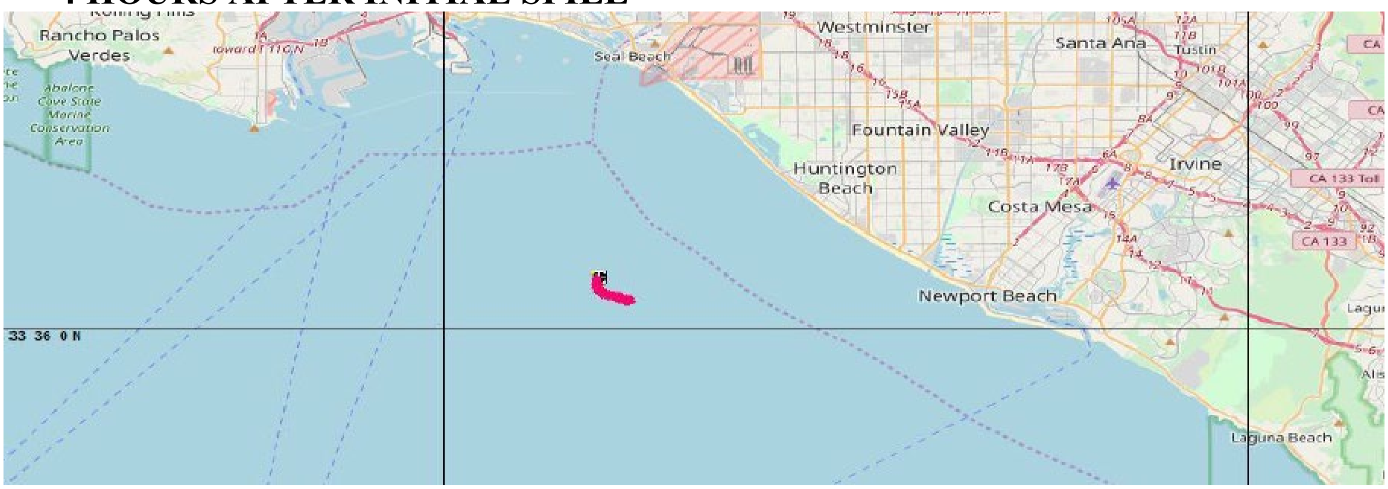


Trajectory Event 6 **May: Wind from NW at 6 knots; Current at 0.20 knots to the ESE**

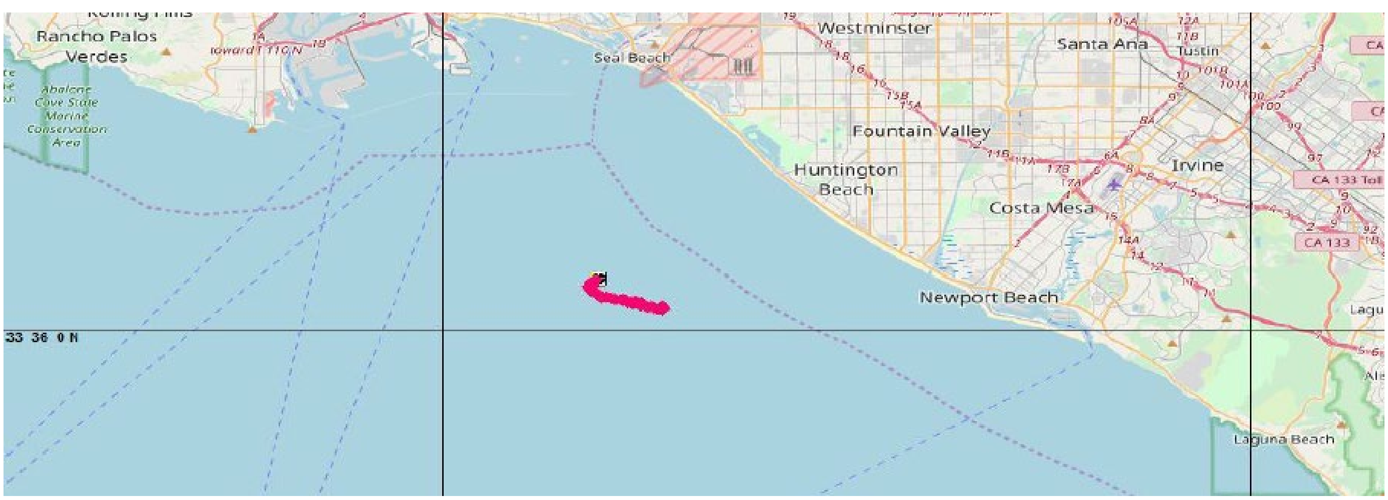
INITIAL SPILL



4 HOURS AFTER INITIAL SPILL

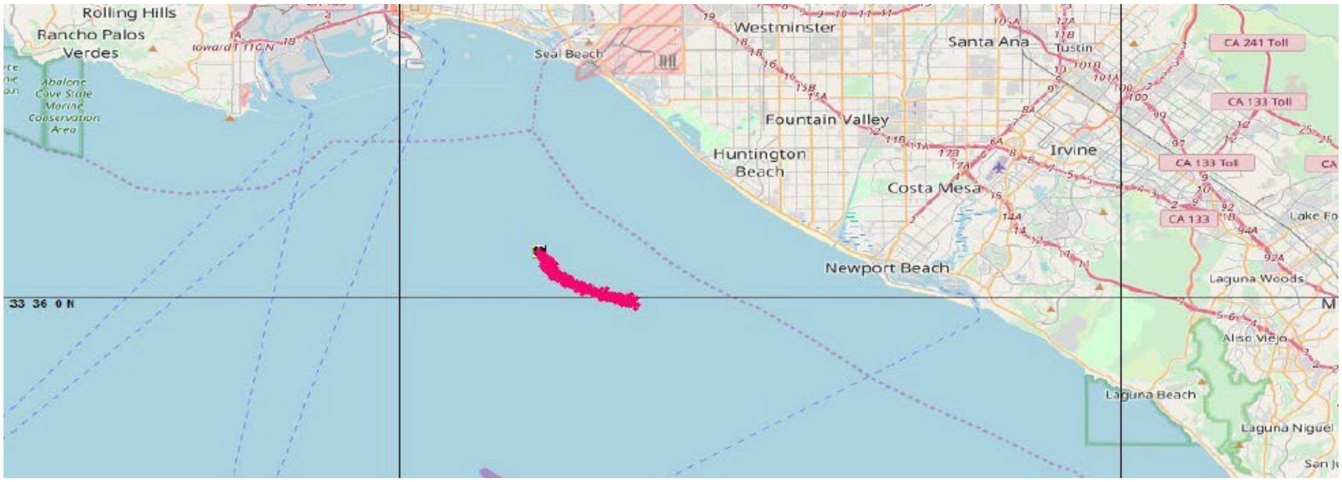


8 HOURS AFTER INITIAL SPILL

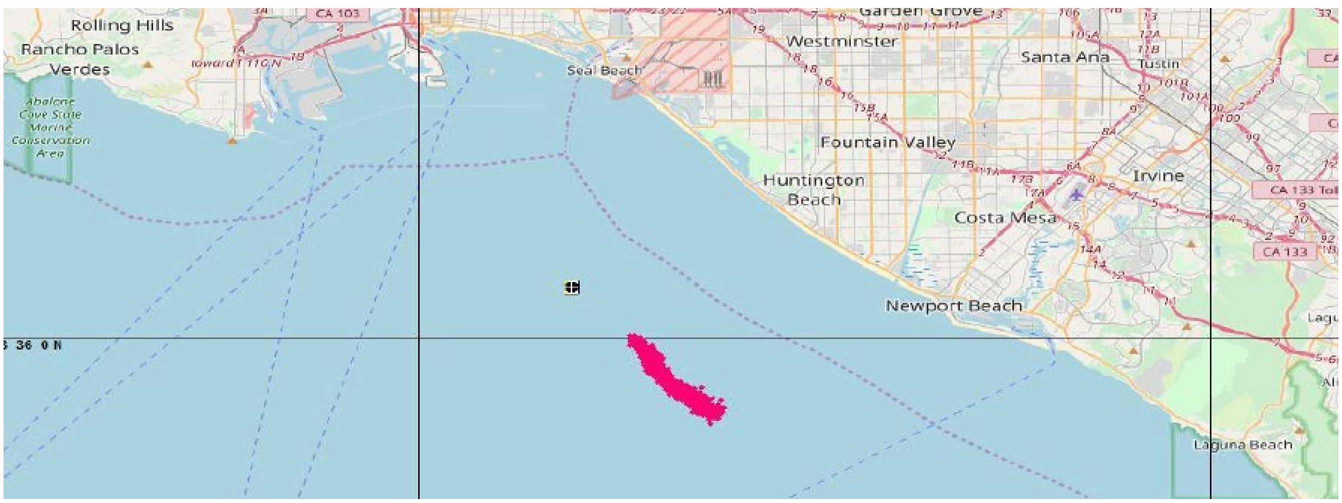


<u>Trajectory Event 6</u>   May: Wind from NW at 6 knots; Current at 0.20 knots to the ESE

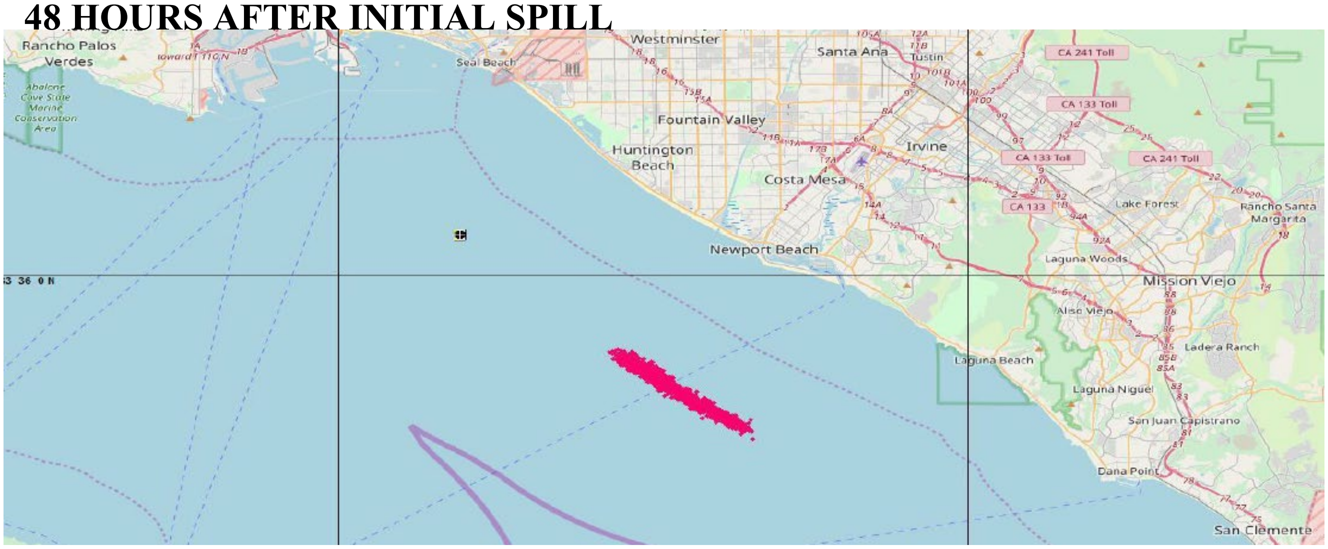
12 HOURS AFTER INITIAL SPILL



24 HOURS AFTER INITIAL SPILL



48 HOURS AFTER INITIAL SPILL

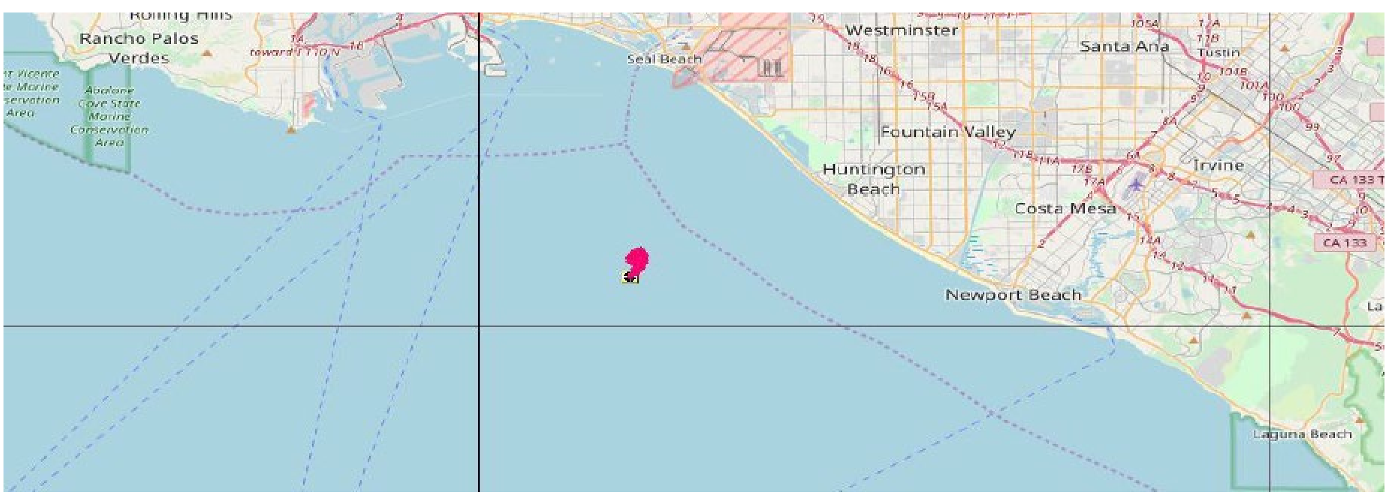


<u>Trajectory Event 7</u> May: Wind from SW at 6 knots; Current at 0.20 knots to the ESE

INITIAL SPILL

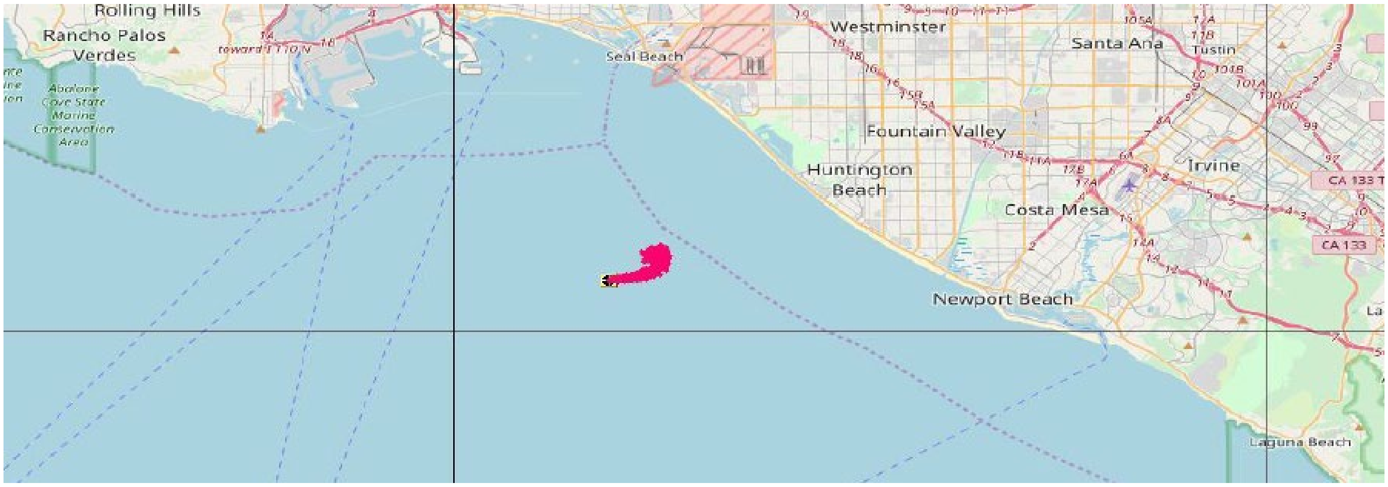
4 HOURS AFTER INITIAL SPILL

8 HOURS AFTER INITIAL SPILL

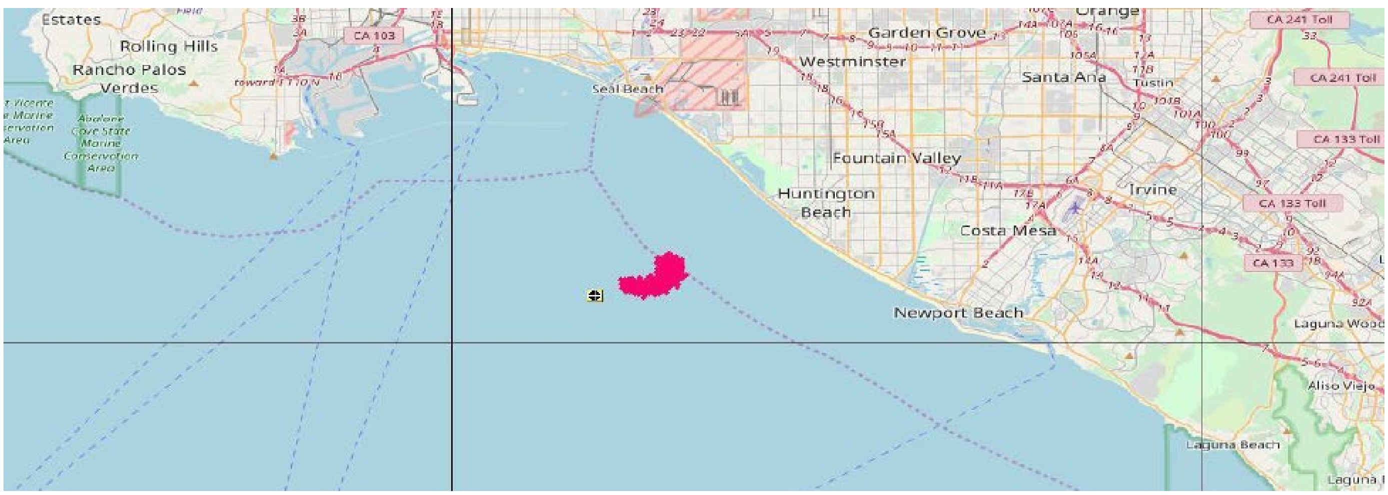


<u>Trajectory Event 7</u> **May: Wind from SW at 6 knots; Current at 0.20 knots to the ESE**

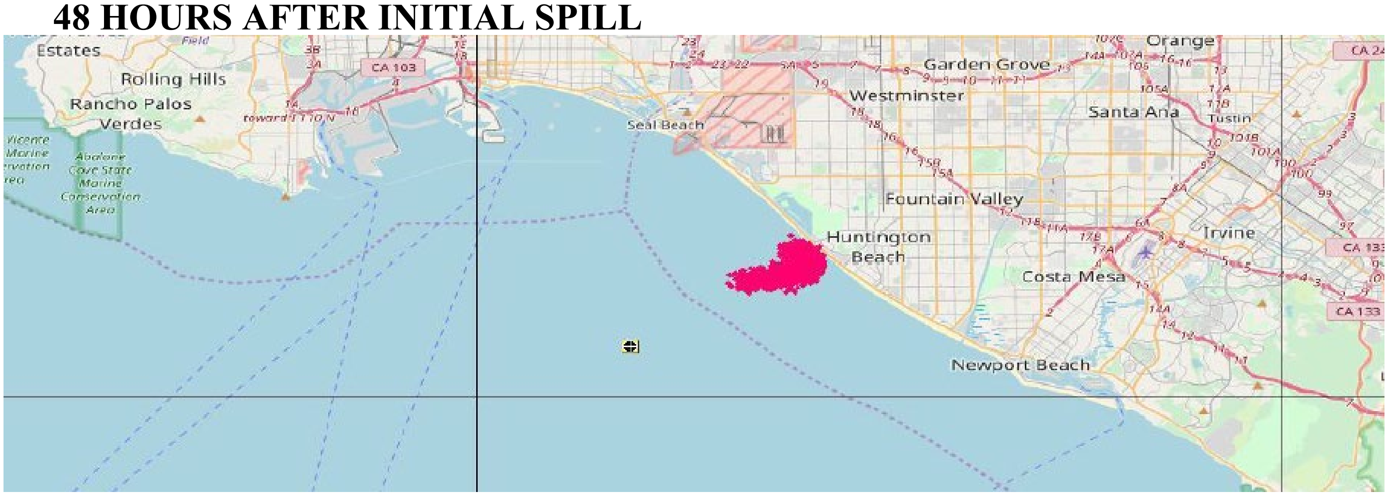
12 HOURS AFTER INITIAL SPILL



24 HOURS AFTER INITIAL SPILL

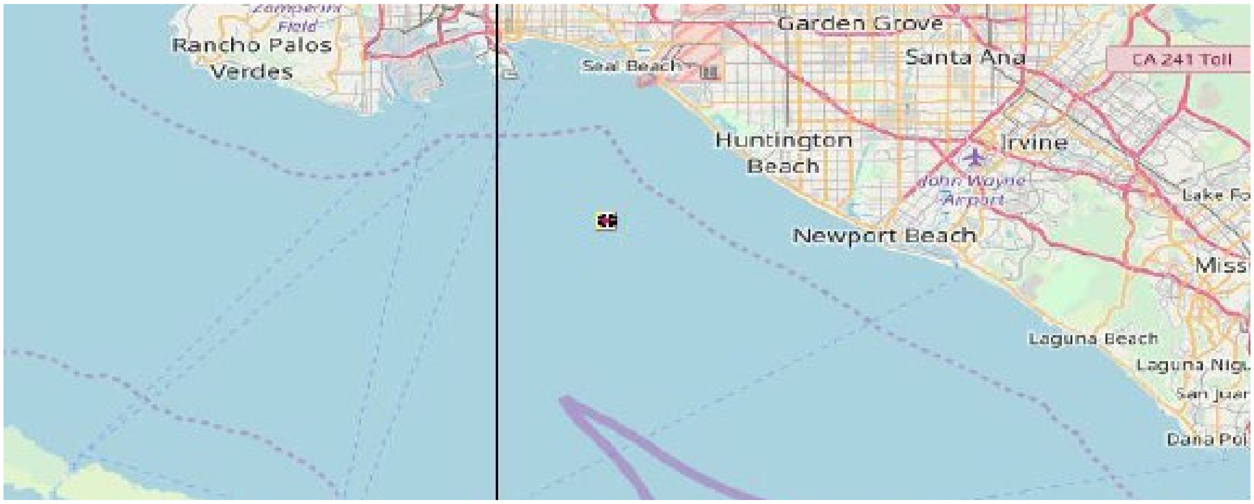


48 HOURS AFTER INITIAL SPILL

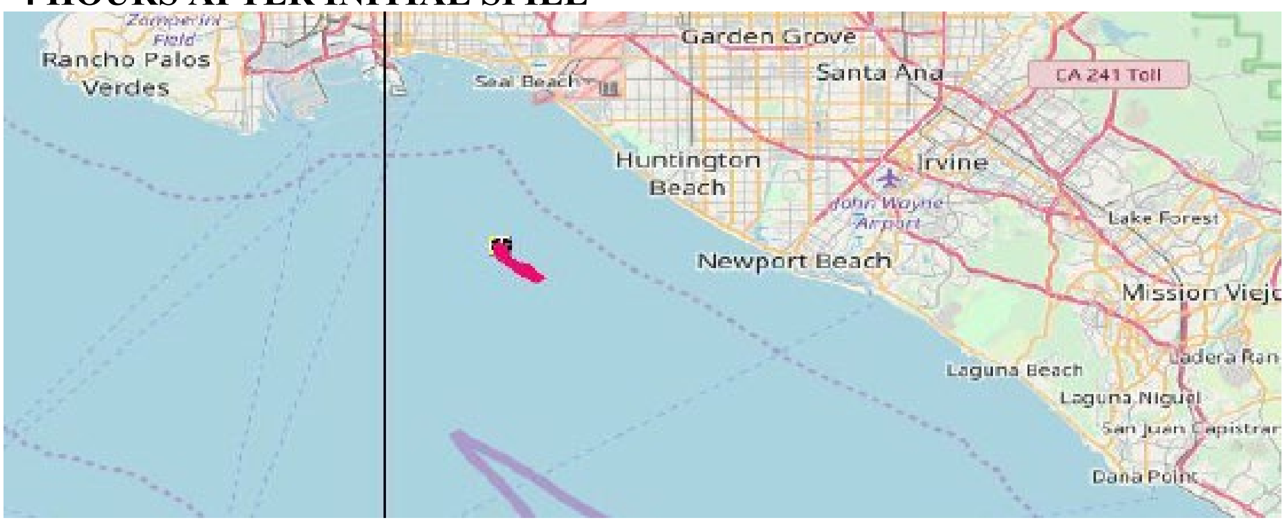


<u>Trajectory Event 8</u>   May: Wind from NW at 12 knots; Current at 0.20 knots to the ESE

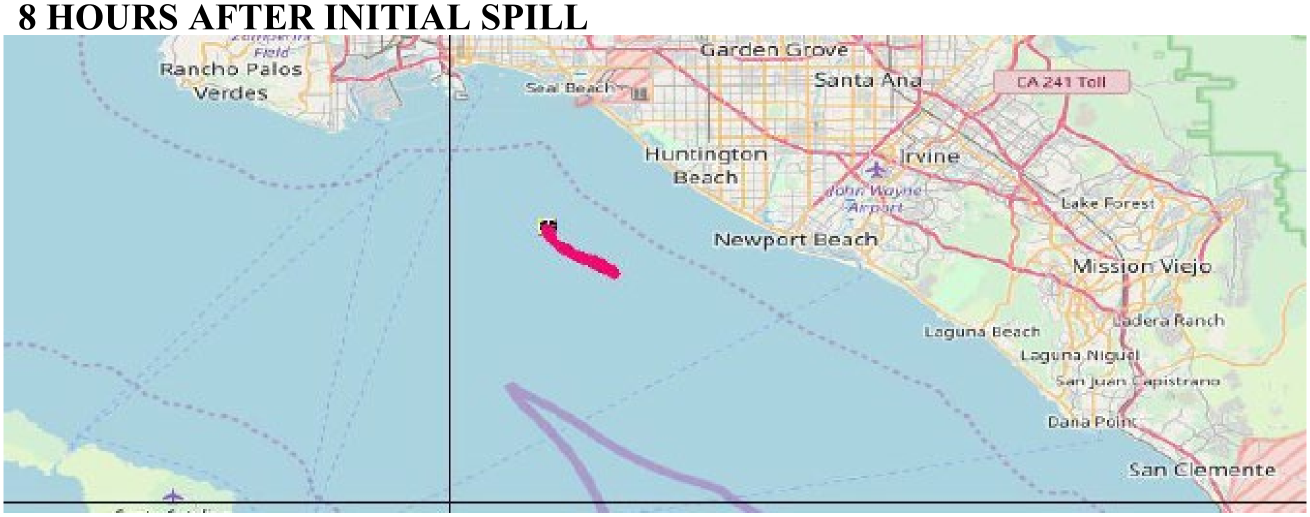
INITIAL SPILL



4 HOURS AFTER INITIAL SPILL

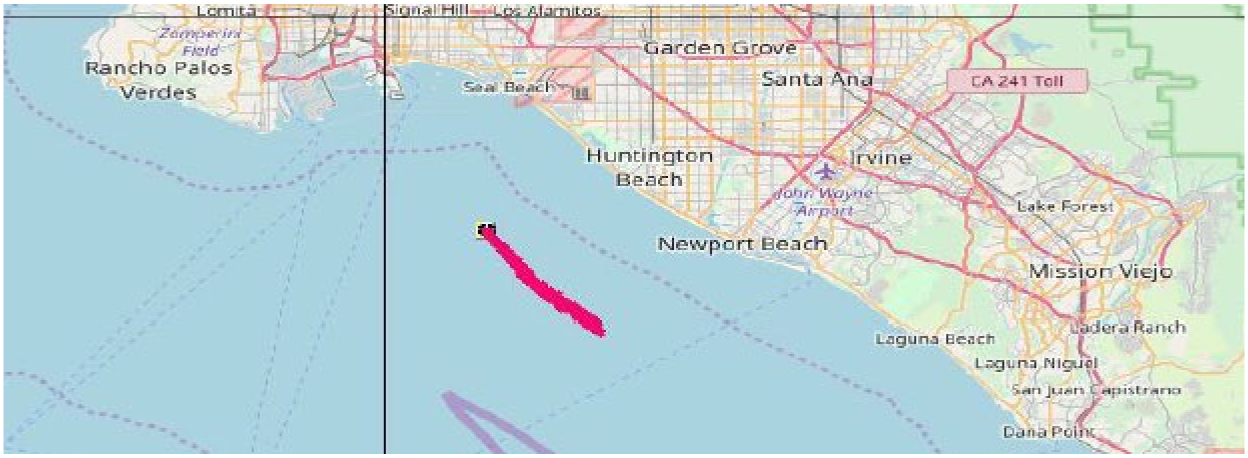


8 HOURS AFTER INITIAL SPILL

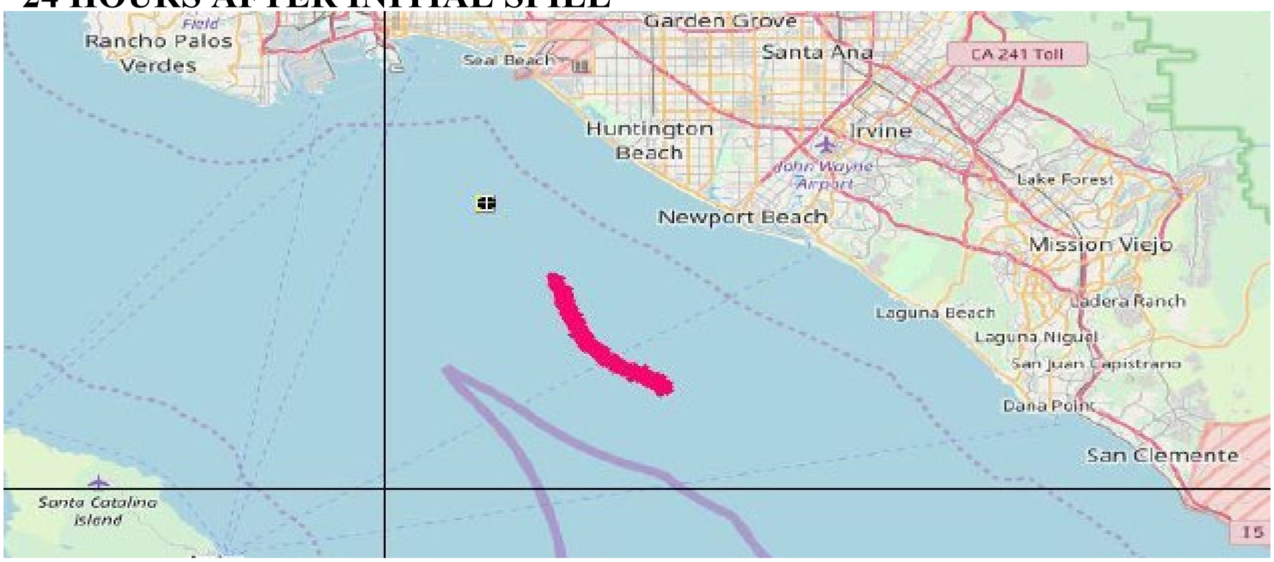


<u>Trajectory Event 8</u> **May: Wind from NW at 12 knots; Current at 0.20 knots to the ESE**

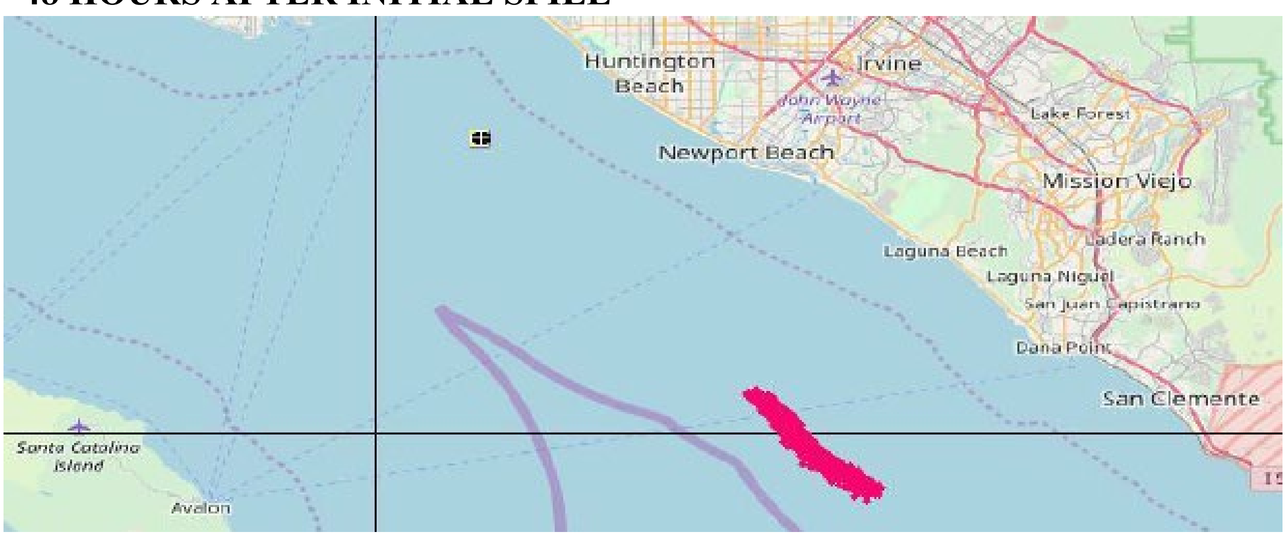
12 HOURS AFTER INITIAL SPILL



24 HOURS AFTER INITIAL SPILL



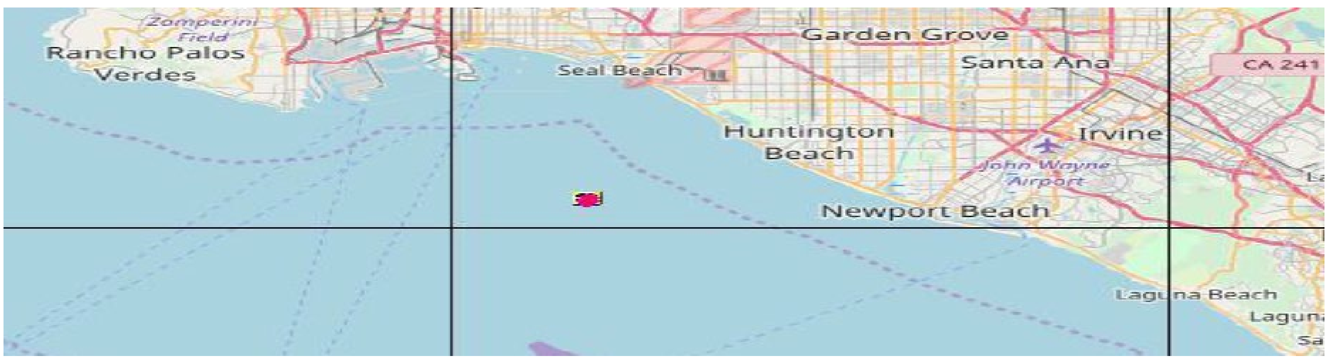
48 HOURS AFTER INITIAL SPILL



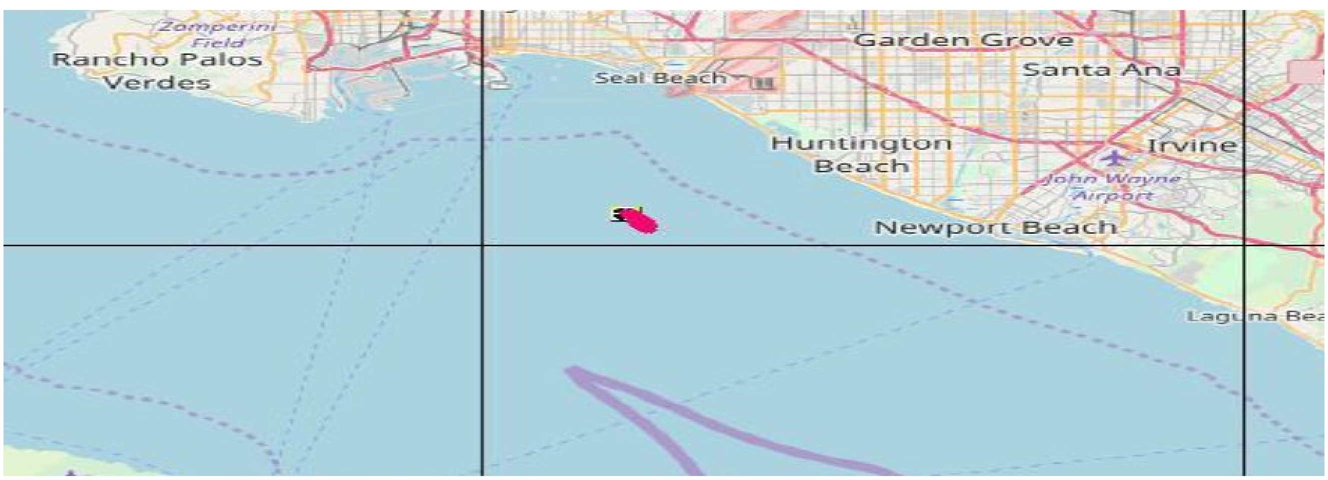
Trajectory Event 9 **September: Wind from NW at 4 knots; Current at 0.36 knots to the WNW**

INITIAL SPILL

4 HOURS AFTER INITIAL SPILL

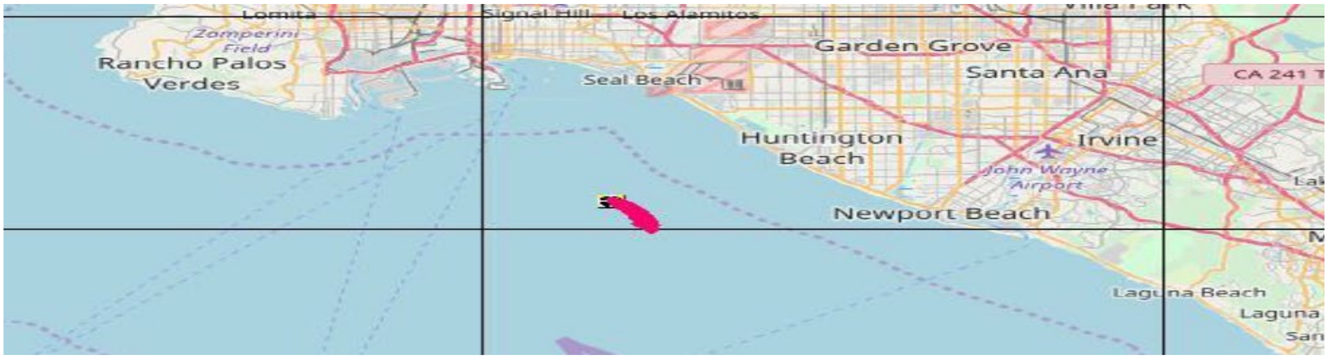


8 HOURS AFTER INITIAL SPILL



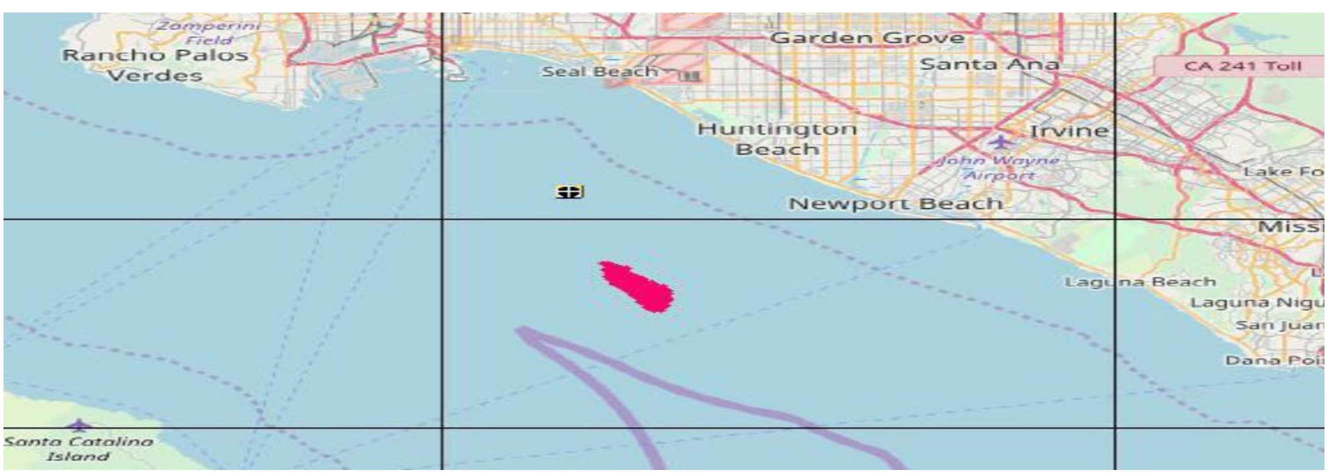
<u>Trajectory Event 9</u> September: Wind from NW at 4 knots; Current at 0.36 knots to the WNW

12 HOURS AFTER INITIAL SPILL



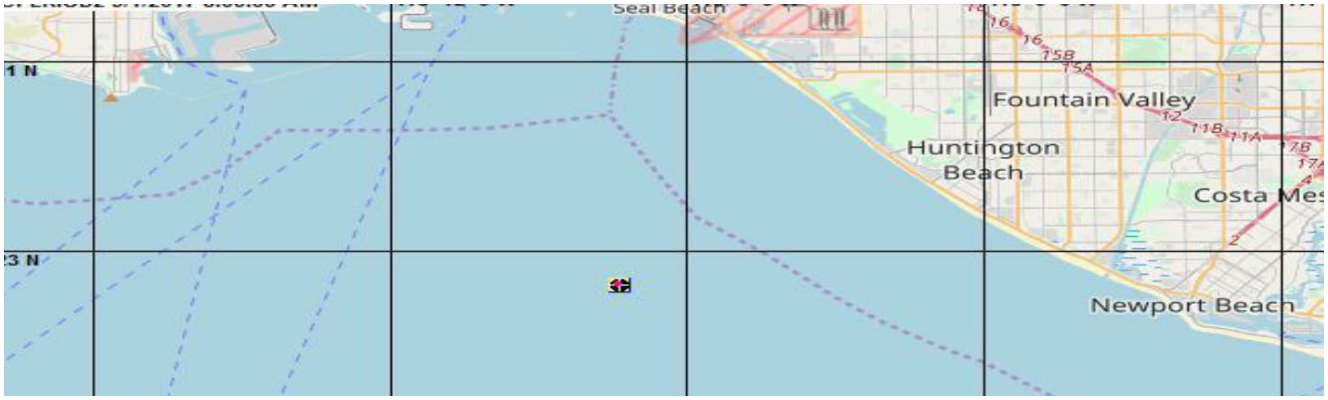
24 HOURS AFTER INITIAL SPILL

48 HOURS AFTER INITIAL SPILL



<u>Trajectory Event 10</u> September: Wind from W at 4 knots; Current at 0.36 knots to the WNW

INITIAL SPILL

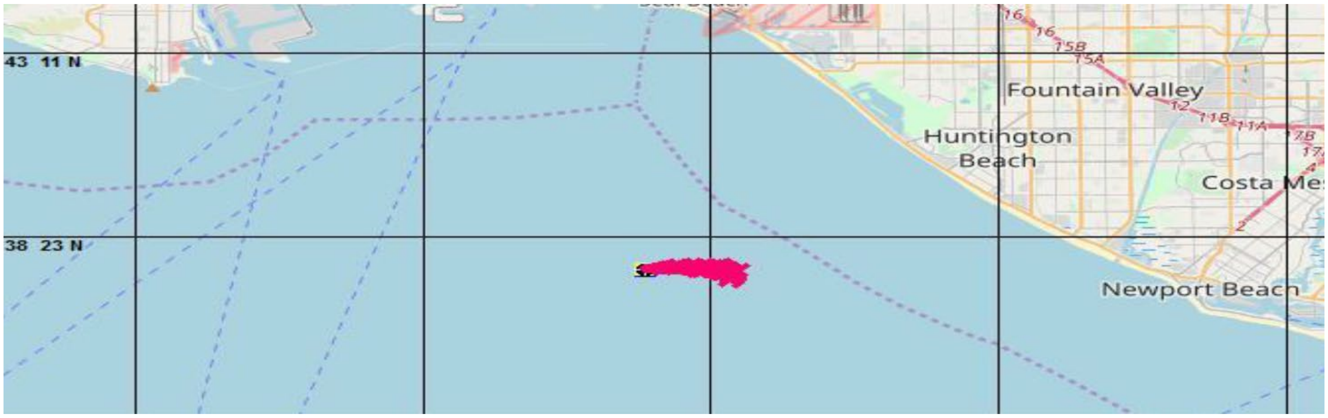


4 HOURS AFTER INITIAL SPILL

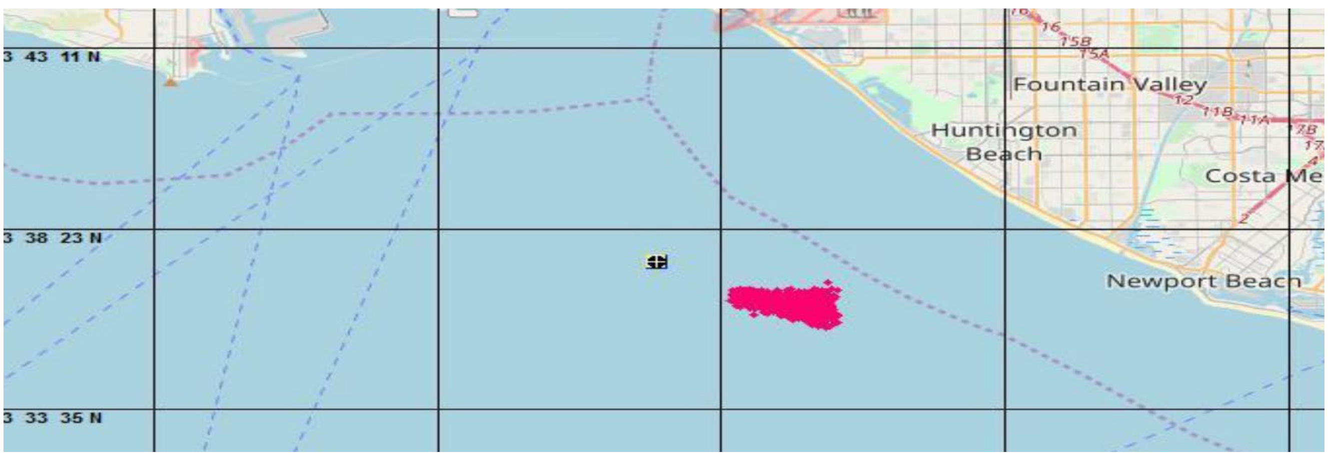
8 HOURS AFTER INITIAL SPILL

Trajectory Event 10 **September: Wind from W at 4 knots; Current at 0.36 knots to the WNW**

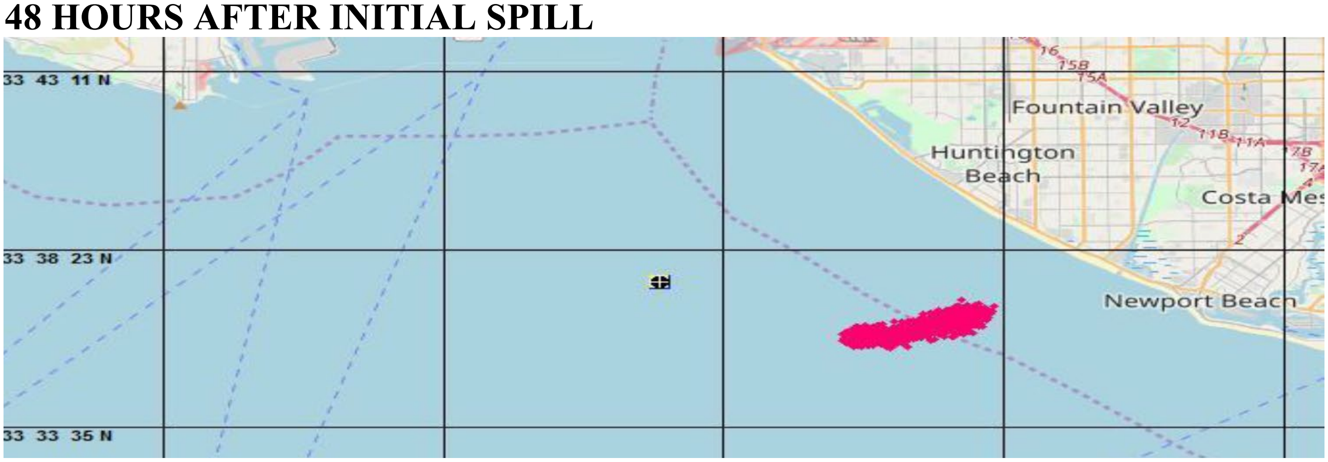
12 HOURS AFTER INITIAL SPILL



24 HOURS AFTER INITIAL SPILL



48 HOURS AFTER INITIAL SPILL



APPENDIX I

OCEANOGRAPHIC, METEOROLOGICAL AND GEOGRAPHIC INFORMATION

I.a. Oceanographic Information I-2
I.b. Meteorological Information I-4
I.c Geographic Information I-7

I.a. OCEANOGRAPHIC INFORMATION

Tides

Tides along the coast from Palos Verdes southward to Oceanside are mixed diurnal and semidiurnal. There are usually two high tides and two low tides each day. The mean tidal range in the San Pedro Bay is about 4 feet, with extremes during spring tides of 6½ feet. Tides are factors in distributing spilled oil across the beach, churning oil throughout intertidal habitats, and thus aggravating the extent to which the oil destroys the food and breeding processes upon which myriad birds and sea creatures depend. Knowledge of and alertness to tides are essential to preventing or minimizing damage from oil.

Ocean Currents

Currents in the Southern California region have speeds generally under 4 knots, with 3 knots about the highest expected. Studies of the Southern California currents generally list three regimes of oceanic current:

Davidson Period: December through February.
Upwelling Period: March through June.
Oceanic Period: July through November.

Ocean currents have some effect on oil spill trajectories, but they are generally overwhelmed by tidal currents near shore, wind-generated surface waves and surf, and the surface winds themselves.

Ocean Waves

Ocean waves are primarily the result of wind and storms. Less frequently, waves are generated by geologic activity such as earthquakes, volcanic activity, and submarine landslides. Tidal action produces another form of wave. Waves that grow in height under the influence of the wind are referred to as wind waves or seas, and the area over which they are generated is termed the fetch. Once the wind waves move out of the fetch area and continue without additional energy input, they are referred to as swell. In Southern California, wind waves are predominantly from the northwest (prevailing winds), and swells may occur from any seaward direction. Wave height and direction may be the result of several different wave trains moving through the area. Sea surface waves range in length from fractions of an inch (capillary waves) to hundreds of miles (tides and tsunamis). Most of the wave energy transmitted on the sea surface appears in the form of wind-generated waves with periods ranging from approximately 5 to 15 seconds. Nearly all of the Southern California coast is protected, to some degree, from swells generated outside the coastal area by the offshore islands. Certain portions of the coast are exposed to essentially unlimited fetches from the west and south, but no location is exposed to swell from all possible seaward directions. The project site lies in an area that is protected from incoming surface wave energy in all but westerly and southeasterly directions. Local wave generation is also limited because the surrounding topography reduces the length of wind fetch. Along the coast from Long Beach to Newport Beach, most significant swells arrive from 260° to 280° and from 160° to 190° True. Even in areas that are exposed to long fetches, swells with periods greater than 10 seconds are altered, at least in direction, by refraction over banks and around the offshore islands. The protection offered by offshore islands is generally so complete that significant waves over the shelf are mainly formed in the local area.

I.a. OCEANOGRAPHIC INFORMATION (Cont'd)

Ocean Waves (Cont'd)

The restricted fetches allow only the development of low waves with short wave lengths and periods. Larger waves (from 6 to 8 feet) are formed during frontal crossings, but again with short wave lengths and periods due to the limited fetch. It is only when gale winds of greater than 35 knots blow from the west that high waves are formed in the local region and travel over the shelf. These winds are most common in the San Pedro Channel where waves as high as 25 feet have occurred. The National Weather Service (NWS) is a line office within NOAA. They are responsible for providing up-to-date weather information in response to oil spills. NWS can provide such information as:

Wind direction.
Wind speed.
Air and sea temperatures.
Direction and height of sea and swell.
Weather forecasts.

Refer to Section 9.0 for applicable phone numbers.

I.b. METEOROLOGICAL INFORMATION

Climate

The general climate of Southern California is classified as a Mediterranean type, having warm, dry summers and mild, wet winters. The controlling synoptic feature is a semi−permanent high pressure system located over the eastern Pacific Ocean. This feature, called the Pacific High, migrates and changes in intensity seasonally. During the summer, the high covers the eastern North Pacific, while in winter it weakens and drifts southward. Thus, during summer, storm systems are deflected to the north, and during winter, they can reach Southern California. The clockwise pattern of the North Pacific Ocean's surface waters generally follows the winds of the atmospheric high pressure system. Thus, California coastal surface currents generally flow southeastward.

Winds

Winds often control the direction and dispersion of an oil spill at sea. High winds have a severe effect on oil spill control and recovery operations at sea. The general wind flow pattern over Southern California is northwesterly throughout the year. Wind speeds typically do not exceed 15 knots and the frequency of storm events is relatively low. Spatial variations in the nearshore region are typically caused by prominent topographic features such as headlands and canyons. Temporal variations result from both diurnal and seasonal effects. Diurnally, the sea breeze/land breeze cycle associated with heating and cooling of the land produces an intensification of the westerly (onshore) winds in the afternoon. Seasonal influences on the wind field include a strengthening of the Eastern North Pacific High and an increase in solar heating of the land mass, both of which occur during the summer months. The result is an increase in the mean wind stress in the Southern California region during the summer and a decrease during the winter. In addition to the foregoing spatial and temporal influences, the predominant westerly airflow over the Southern California region can be altered by three types of synoptic scale events: Catalina Eddies, Santa Ana Winds, and storms. The principal characteristics of each type of event are summarized below.

Catalina Eddies

The Catalina Eddy is a cyclonic cell which can form over the Southern California region at any time of year, and which typically persists for several days. The predominant westerly flow in the coastal region is replaced by weak southerly and southwesterly winds occurring on the eastern side of the eddy. In addition, the feature triggers the formation of stratus overcast throughout the Southern California region.

Santa Ana Winds

Santa Ana winds are caused by the presence of a high pressure cell over the western United States. The normal surface pressure gradient at the coast is temporarily reversed, resulting in offshore flow, elevated daytime temperatures, and cloud-free skies. Occurring most frequently during the fall and winter months, Santa Ana winds tend to be particularly strong at the mouths of canyons. The winds are typically unsteady, with gust velocities which can exceed 50 knots. Despite their intensity, Santa Ana winds tend to reduce incident swell and lower the coastal water level, due to their offshore orientation. Their influence on coastal processes is therefore minimal.

I.b. METEOROLOGICAL INFORMATION (Cont'd)

Storms

Storm winds in the Southern California region are most frequently associated with strong fronts that move through the area from west to east. These extratropical storms can be of either local origin or distant origin in the North Pacific. They generally occur in the late fall and winter months. Strong winds from the southerly quadrant typically precede the arrival of the front, followed by intensified northwesterlies for several days after its passage. Sustained wind speeds of 20-to-25 knots are common. Storm winds can also result from Eastern North Pacific tropical cyclones arriving from the south. Although most such storms dissipate before reaching the Southern California region, they occasionally make landfall accompanied by high winds and damaging tides.

Air and Sea Temperature

Air temperature at the offshore platforms is strongly influenced by the sea surface temperature. Table I-1 shows the air and sea temperature regime in the vicinity of the Beta Unit Complex. The annual average air temperature is 61°F and the average sea temperature is 60°F. Sea temperatures typically vary between 56° and 65°F.

Precipitation

Rainfall along the coast averages about 11 inches annually, with most rain occurring between November and April. Rainfall varies considerably both in annual quantity and in the months of occurrence. Summers are usually very dry. Operations at sea report the occurrence of precipitation averaging 5 percent of the time in winter to only about 1 percent of the time in summer, as noted in Table I−2. Generally, precipitation at sea does not interfere with oil spill containment and cleanup operations; however, very heavy rain is expected to present some difficulties, especially in tracking the spread of oil at sea.

Visibility

Visibility is important in oil spill containment and recovery operations at sea. Low visibility may present difficulties in coordination of vessels and in tracking the movement and spread of oil slicks.

There are approximately 143 clear, 115 partly cloudy and 107 cloudy days per year along the immediate coastline. The sky cover averages about 50 percent, as shown in Table I−2. These observations are reported at the Los Angeles International Airport (LAX) located northeast of the study area. Elevation and distance from the ocean, as well as other topographical features, can influence the amount of cloud cover over the land. Fog and stratus, usually confined to the night and early morning, occur primarily during the summer. The remainder of the partly cloudy and cloudy days are associated with transitory storm systems in winter. Over the ocean, the mean daytime cloud cover is about 55 percent.

Visibility along the coast is frequently restricted by haze, fog, or smoke. Low visibilities are favored by a layer of moist marine air with warm dry air above. Low visibilities usually occur with light winds and stable atmospheric conditions, but at times strong sea breezes can transport an offshore fog bank ashore, lowering the visibility considerably. Heavy fogging resulting in visibility less than 0.25 mile occurs an average of 28 days per year at LAX. Most of these are observed during the winter months. The frequencies of lower ceiling and visibility conditions at the platform locations are expected to be somewhat higher than reported along the coast due to formation and persistence of offshore fog and low clouds.

I.b. METEOROLOGICAL INFORMATION (Cont'd)

Table I-1. Average Temperature in °F in the Vicinity of the Beta Unit Complex.

MONTH	TEMPERATURE (°F)	
	AIR	SEA
January	56	57
February	56	57
March	57	56
April	59	56
May	59	59
June	62	60
July	65	63
August	66	64
September	65	65
October	63	63
November	62	61
December	59	59
Annual Average	**61°F Air**	**60°F Sea**

Table I-2. Cloud Cover and Precipitation in the Vicinity of the Beta Unit Complex.

MONTH	CLOUD COVER% of Time		PRECIPITATION % of Time Occurring
	2/8	5/8	
January	52	25	5
February	52	28	6
March	50	28	3
April	48	40	3
May	50	40	2
June	40	50	1
July	40	50	1
August	40	50	1
September	50	40	1
October	56	38	2
November	54	27	3
December	55	27	4
Annual Average	**50**	**37**	**3**

I.c. GEOGRAPHIC INFORMATION

Physical Geography

The Beta Unit Complex is situated offshore southern California in the San Pedro Bay. The seafloor in the immediate area of the Beta Unit platforms is essentially featureless. The slope at Platform Eureka is to the southeast at about 3 degrees. Soils consist of medium-plasticity silty clay and clayey silt. There is no evidence of slumping or downslope movement in the strata at Platform Eureka. There is no reason to anticipate liquefaction or other ground instabilities in the vicinity of the platform. The slope at the Ellen/Elly platform site is southeasterly at less than 1 degree. Soil samples at the sites indicate that the soils vary from gravels and sand to silts and clay and that the soil profiles are predominantly low-to-medium plasticity silty clays and clayey silts. There is no evidence of slumping or downslope movement in the strata at the platform sites. There is no reason to anticipate liquefaction or other ground instabilities in the vicinity of the platforms. No archaeological/historical resources are known to exist at the Beta Unit Complex, along the pipeline route, or at shore facility locations. The Beta Unit platforms are situated adjacent to the Gulf of Santa Catalina Traffic Separation Scheme; however, the platforms are east of both the shipping lanes and their buffer zones.

The onshore components of the Beta Unit Complex (e.g., pipeline and Beta Pump Station) are situated in the City of Long Beach, California, primarily within the Long Beach harbor area. The pipeline approaches land along the trend of the Los Angeles River, the seaward extremity of which is called Queensway Bay. It makes landfall along the west bank of this bay (referred to as Pier H), just north of the Queen Mary. This shoreline area is topographically flat and consists mainly of manmade areas (e.g., harbor areas, channels, marinas and connecting roads). The Los Angeles/Long Beach Southern Sector - Area Contingency Plan provides information on shoreline/substrate types within the immediate area.

APPENDIX J

BIBLIOGRAPHY

Bibliography J-1

1986 Shell Civil Engineering Study Beta Pipeline Release J-3

1999 Westhollow Technology Center Study....................J-4

2011 InterAct Beta Field OCS California Worst-Case Discharge Scenario J-5

The development, maintenance and utilization of this Plan implements company policy and addresses the following regulatory requirements and guidelines:

- U.S. BSEE Final Rule for Oil Spill Response Requirements for Facilities Located Seaward at the Coast Line (30 CFR 254 Subpart 5 A, B, C, and D).
- U.S. BSEE Notice to Lessees 2012-N06.
- U.S. Department of Transportation 49 CFR Part 194 and 195
- 29 CFR Parts 1910.38 (a) and (b), 1919.120, and 1910.165 - Emergency Action Plans, Hazardous Waste Operations and Emergency Management, and Employee Alarm Systems (OSHA)
- California Code of Regulations Title 8, Chapter 4, Subchapter 7, Group 1, Article 2, §3220 - Emergency Action Plan, and Group 27, Article 165 (§6184) - Employee Alarm Systems (California Department of Industrial Relations)
- California Code of Regulations Title 14, Division 1, Subdivision 4, Chapter 3, Subchapter 3 - Oil Spill Contingency Plans (OSPR)

The applicable Area Contingency Plans for the Facilities are:

- California State Oil Spill Contingency Plan;
- Sector L.A./Long Beach Area Contingency Plan and Southern Sector Area Committee - ACP 5 Area Contingency Plan

The applicable National Contingency Plan for the Facilities is:

- U.S. Environmental Protection Agency; National Oil and Hazardous Substances Pollution Contingency Plan

The following regulations and guidelines are applicable to Company facilities for spill pollution prevention and response:

- Section 4202 of Oil Pollution Act of 1990
- Federal Water Pollution Control Act (FWPCA) (33 U.S.C. 1321(j))
- 49 CFR 195 "*Transportation of Hazardous Liquids by Pipeline*"
- API RP 14C "*Analysis Design, Installation and Testing of Basic Surface Safety Systems on Offshore Production Platform*"
- API RP 75, "*Recommended Practices for Development of a Safety and Environmental Management Program for Outer Continental Shelf (OCS) Operations and Facilities*"
- U.S. Coast Guard Incident Management Handbook (IMH)
- NOAA ICS Forms
- National Preparedness Response Exercise Program (PREP)

1986 SHELL CIVIL ENGINEERING STUDY BETA PIPELINE RELEASE

1986 Shell Civil Engineering Study Beta Pipeline Release

(superseded by 1999 report by Equilon Enterprises)

ENGINEERING CALCULATIONS FOR THE WORST CASE SPILL FROM THE 16-INCH OFFSHORE BETA PIPELINE

SB 2040 OIL SPILL ANALYSIS
SAN PEDRO BAY PIPE LINE

1.0 INTRODUCTION

The San Pedro Bay Pipe Line is a 16 inch pipe line which runs for 17.3 miles from SWEPI's Platform Elly (located nine miles offshore from Huntington Beach in San Pedro Bay) to Long Beach. Approximately 15.3 miles of the line are located offshore of which 10.9 miles runs along the ocean floor with the remainder buried approximately 15 feet below the ocean floor as the line nears Long Beach. Starting at Platform Elly, the first 6.4 miles of the offshore section of the line are located in Federal waters. The remaining 8.9 miles are located offshore in State of California waters.

This analysis will evaluate the amount of oil that could be released from the San Pedro Bay Pipe Line in the event of a complete rupture of the line at an offshore location. This analysis, in attempt to define worst case spill volume scenarios, will make conservative assumptions where assumptions are required.

In the event of a rupture of the San Pedro Bay Pipe Line, the total amount of oil discharged can be described as follows:

Discharged Volume = Volume of Oil Released Prior to Detection of a Leak
+ Volume of Oil Released During Response Time Prior to Initial Shut In of Line
+ Volume of Oil that Drains from Line After Initial Shut In

An analysis of the oil volumes released during each of these three phases follows.

2.0 VOLUME OF OIL RELEASED PRIOR TO DETECTION

The San Pedro Bay Pipe Line Leak Detection System measures the cumulative differential volume of oil shipped offshore from Platform Elly and received onshore at the Beta Pump Station during a moving sixty minute window. In addition, the system monitors the flow rates measured offshore at Platform Elly and onshore at the Beta Pump Station and compares any difference in these rates. Between these two monitoring systems, the maximum volume that could be released prior to detection is 35 barrels.

3.0 VOLUME OF OIL RELEASED DURING RESPONSE PRIOR TO SHUT-IN

The maximum volume of oil that could be released during the response period prior to initiation of pipe line shut-in procedures after a leak is detected is calculated by multiplying the maximum flow rate expected by the length of the response time. Current forecasts project a peak shipping rate from Platform Elly of 11,000 barrels per day, or 7.64 barrels per minute. Assuming a maximum response time of 10 minutes from first alarm to shut-in, the maximum amount of oil released during the response time is 76.4 barrels.

4.0 VOLUME OF OIL THAT DRAINS FROM LINE AFTER INITIAL SHUT-IN

4.1 General Analysis

Left unabated, oil will drain from the pipe line until the hydraulic forces from the static column of oil above the rupture point are balanced by the hydraulic force of the sea water column above the rupture point. However, during the process of shutting down the shipping pumps and shutting-in the pipe line, the hydraulic equilibrium level that will be assumed by the pipe line will change. The actual shift is between the hydraulic equilibrium level assumed by the pipe line immediately after shutting down the shipping pumps, but before the line is blocked in at both the Platform and onshore, and after the line blocked in both onshore and at the platform. In the initial case, atmospheric pressure acts on both the fluid column causing oil to drain from the line as well as the fluid column above the rupture opposing the drainage of oil from the line. In this case, the atmospheric pressure forces balance each other and need not be considered in calculating the hydraulic equilibrium level that would be assumed by the fluids in the pipe line. In the latter case, the shut-in valves at the platform and onshore seal the fluid column in the piping which causes the oil to drain from the line from atmospheric pressure. However, the fluid column above the rupture opposing drainage is still exposed to atmospheric pressure. Therefore, the atmospheric pressure term creates an additional force opposing the drainage of oil from the pipe line and must be considered when calculating the revised hydraulic equilibrium level assumed once the line is shut-in.

Due to the viscosity of the 13 degree API gravity crude in the San Pedro Bay Pipe Line, the rate of release of the oil draining from the pipe line is relatively slow. As a result, it will be necessary to calculate the amount of oil that would drain from the pipe line at the initial hydraulic equilibrium level to determine what, if any, additional drainage will occur after the line is shut-in and the new hydraulic equilibrium level is established. In addition, depending on the length of time required to reach the revised hydraulic equilibrium level, it may be possible to employ emergency measures to temporarily plug the pipe line at the point of rupture to abate the total amount of oil that drains from the pipe line before hydraulic equilibrium is reached.

We will examine the amount of oil that would be released from the pipe line and the amount of time that it would take for that volume of oil to be released for the following three cases:

1) A rupture at the base of Platform Elly
2) A rupture at the three mile limit between State and Federal waters
3) A rupture immediately prior to the pipe line being buried near Long Beach Harbor

This analysis will require that separate evaluations be made for the pipe line segment on the platform side of the rupture and for the pipe line segment on the shore side of the rupture.

It is estimated that approximately two minutes will be required between shut-down of the pumps and shutting-in the pipe line. We will calculate the length of time required for the line to drain to the initial hydraulic equilibrium and compare that to the two minute shut-in time required. If the initial hydraulic equilibrium level is not reached within the two minute time period, we will calculate the revised hydraulic equilibrium level and calculate what, if any additional oil will be released while reaching this level and how long it will take for this to occur.

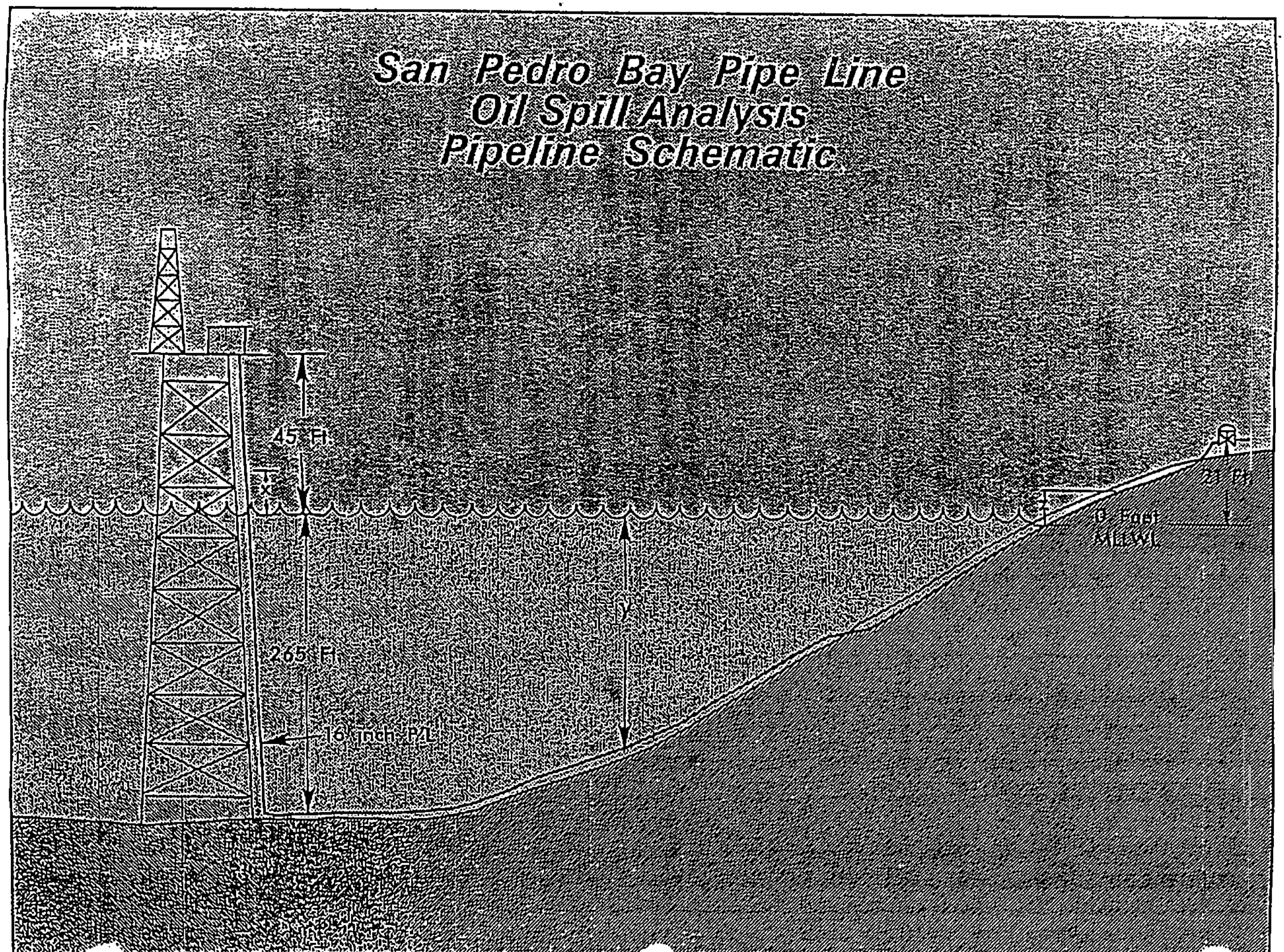
As mentioned previously, it is possible that oil will drain so slowly from the line while reaching the revised hydraulic equilibrium level, that emergency abatement measure can be implemented to stop the release of oil before the revised hydraulic equilibrium level is reached. Given the time required to develop temporary abatement plans, obtain the necessary agency approvals to implement the temporary abatement plans, mobilize response crews, and implement the abatement procedures, it is estimated that the pipe line would continue to drain for up to five days (120 hours) before abatement efforts could be implemented to stop oil drainage from the line. Therefore, all estimates of oil drainage from the line will be curtailed after 120 hours of line drainage if the line has not reached its revised hydraulic equilibrium level.

In developing the hydraulic equilibrium equations for the pipe line segments in the three identified cases, the following variables will be used:

Let y = depth from 0 feet MLLWL to ocean floor at any point above pipe line
Let x = height of pipe line riser at platform above 0 feet MLLWL to which oil will drain before reaching hydraulic equilibrium
Let z = vertical height of pipe line at shore above 0 feet MLLWL to which oil will drain before reaching hydraulic equilibrium

4.1 Baseline Data

Fresh Water at 60 degrees F.:	1 foot of head = 0.434 psi S.G. = 1.0
13 degree API Gravity Oil:	1 foot of head = 0.425 psi S.G. = 0.9792
Sea Water:	1 foot of head = 0.443 S.G. = 1.02 (conservative, some values are listed as 1.03)
Depth of Water at Platform:	-265 feet MLLWL



San Pedro Bay Pipe Line
Oil Spill Analysis
Pipeline Schematic
45 Ft
X
265 Ft
16 inch P/L
Y
0 Foot
MLLW
21 Ft
10488

4.3 Rupture at Base of Platform Elly

4.3.1 Analysis of Platform Segment

Hydraulic forces acting at point of rupture to cause oil to escape:

Oil Column in pipe line riser above 0 feet MLLWL =			0.425 x psi
Oil Column in pipe line from 0 feet MLLWL to Ocean Floor at -265 feet =	(0.425)(265)	=	112.625 psi

Hydraulic forces acting to oppose oil from escaping at point of rupture:

Sea Water Column from 0 feet MLLWL to Ocean Floor at Point of Rupture =	(0.443)(265) =	117.395 psi

$0.425x + 112.625 = 117.395$
$0.425x = 4.77$

$x = 11.22$ feet

We can conclude that all the oil downstream from the shut-in valve on Platform Elly to an elevation of + 11.22 feet MLLWL will drain from the line if the rupture is allowed to leak long enough and the platform shut-in valve remains open. Before determining the rate at which the line will drain, we will first calculate the amount of oil released if this segment of line is allowed to drain until the initial hydraulic equilibrium is reached.

Volume of line downstream of the Platform Elly block valve:

100.00 feet - 8 inch, schedule 80	Volume = 5.65 barrels
10.00 feet - 16 inch, schedule 80	Volume = 1.99 barrels
33.78 feet - 16 inch, schedule 80	Volume = 6.72 barrels
TOTAL VOLUME DRAINED IF LINE REACHES INITIAL HYDRAULIC EQUILIBRIUM LEVEL	**Volume = 14.36 barrels**

Since frictional forces are velocity dependent, they will not change the final equilibrium level but will determine how long it takes for the line to drain to the equilibrium level. Frictional forces or pressure drop due to friction for laminar flow can be calculated using Poiseuille's Equation which is given on the next page.

Poiseuille's Equation:

$$\Delta P_{friction} = \frac{0.000668 \mu L v}{d^2}$$

where μ = absolute, or dynamic, viscosity in centipoise
L = length of line in feet
v = fluid velocity in feet per second
d = pipe internal diameter in inches

In order to use this equation we must understand the variation of the oil viscosity with temperature. Data for the viscosity of 13 degree API gravity oil over a range of temperatures is given below.

Temperature, degrees F.	Dynamic Viscosity, centipoise
50	39,000
60	19,000
80	4,926
90	2,779
100	1,644
110	1,014
120	650
130	431
140	295
150	208
160	150

Calculating $\Delta P_{friction}$ for the various pipe sections upstream of the rupture at the base of the platform:

The average temperature in the 8 inch, schedule 80 pipe is 160 degrees F. Therefore

$$\Delta P_{friction}\ (8\text{ inch, sch. }80) = \frac{(0.000668)(150)(100)v}{7.625^2}$$

$$= 0.172v \text{ psi}$$

The average temperature in the 16 inch, schedule 80 pipe down to 0 feet MLLWL is 160 degrees F. Therefore

$$\Delta P_{friction}\ (16\text{ inch, sch. }80) = \frac{(0.000668)(150)(55)v}{14.314^2}$$

$$= .027v \text{ psi}$$

The average temperature in the 16 inch, schedule 80 pipe from 0 feet MLLWL to -265 feet is 120 degrees F. Therefore:

$$\Delta P_{friction}\ (16\ \text{inch, sch. } 80) = \frac{(0.000668)(650)(265)v}{14.314^2}$$

$$= 0.562v\ \text{psi}$$

Adding the terms for each segment of the pipe line: **$\Delta P_{friction}$ (total) = 0.761v psi**

To determine the amount of time required for the line to reach hydraulic equilibrium, the total frictional pressure drop term must be added to the general hydraulic equation describing the system at any moment:

$$0.425\,x + 112.625 = 0.443y + 0.761v$$

This equation can be approximately solved and value found for v by calculating one foot increments as shown in Table 1 below. While the solution method is somewhat inexact (as it does not account for the frictional resistance resulting from the shear forces acting on the oil as it flows into the water), it does provide a conservative or worst case analysis. As such, the indication that the oil above the initial hydraulic equilibrium level will drain within eleven seconds is somewhat inaccurate. However, it does clearly indicate that essentially all of the oil above the initial hydraulic equilibrium level, 14.36 barrels, would be expected to drain from the piping downstream of the platform shut-in valve before the system assumed a revised hydraulic equilibrium level when the platform shut-in valve is closed and isolates the oil column from atmospheric pressure. Therefore, there is no need to calculate a revised hydraulic equilibrium level.

TABLE 1

[illegible]

[illegible]	[illegible]	[illegible]	VELOCITY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	VELOCITY	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

4.3.2 Analysis of Shore Side Segment

Hydraulic forces acting at point of rupture to cause oil to escape:

Oil Column in the onshore segment of the pipe line above 0 feet MLLWL = **0.425 z psi**
Oil Column in the pipe line from 0 feet MLLWL to Ocean Floor
at -265 feet = (0.425)(265) = **112.625 psi**

Hydraulic forces acting to oppose oil from escaping from pipe line:

Sea Water Column from 0 feet MLLWL to Ocean Floor at -265 feet =
(0.443)(265) = **117.395 psi**

$0.425z + 112.625 = 117.395$
$0.425z = 4.77$

z = 11.22 feet

As before, we can conclude that all the oil from downstream of the shut-in valve located at an elevation of +21 feet MLLWL at the Beta Onshore Station to an elevation of + 11.22 feet MLLWL will drain from the line if the rupture is allowed to leak long enough and the onshore shut-in valve remains open. Before determining the rate at which the line will drain, we will first calculate the amount of oil released if this segment of line is allowed to drain until hydraulic equilibrium is reached. In order to approximate this we will assume that the line has a constant gradient between the Beta Onshore Station and 0 feet MLLWL. As the onshore segment of the pipe line is 1.9724 miles (10,414 feet) long, assuming a constant gradient, the line will decrease one foot in elevation every 495.9 feet. To achieve the 9.78 foot drop in elevation required to reach the hydraulic equilibrium elevation of 11.22 feet MLLWL, it will take 4,850 feet of line. The capacity of this length of line is 1096 barrels. If allowed to drain long enough, this volume would be released at the point of rupture.

Using Poiseuille's equation again, we can calculate the frictional forces in the various line segments on the shore side of the rupture.

The onshore section of line is 16 inch, schedule 30 (0.375 inch wall thickness) and is buried. Because the line is buried the oil temperature in the line is approximately 60 degrees F. Therefore:

$$\Delta P_{friction} \text{ (16 inch, sch. 30, onshore)} = \frac{(0.000668)(19{,}000)(10{,}414)v}{15.25^2}$$

$$= 568.34v$$

The initial offshore segment is 16 inch, schedule 40 (0.500 inch wall thickness) and is buried for a distance of 23,400 feet. The temperature in this segment of line is also 60 degrees F. Therefore:

$$\Delta P_{friction}\ (16\ \text{inch, sch. 40, buried offshore}) = \frac{(0.000668)(19.000)(23.400)v}{15.00^2}$$

$$= 1{,}319.97v$$

The next segment of the pipe line lays on the ocean floor for 14,421 feet out to the three mile limit between State and Federal Waters. This section of pipe is 16 inch, schedule 40 with an average fluid temperature of 50 degrees F. Therefore:

$$\Delta P_{friction}\ (16\ \text{inch, sch. 40, on bottom offshore}) = \frac{(0.000668)(39.000)(14.421)v}{15.00^2}$$

$$= 1{,}669.76v$$

The final segment of pipe lays on the ocean floor for 33,416 feet out to Platform Elly. This section of pipe is 16 inch, schedule 80 (0.844 inch wall thickness), with an average fluid temperature of 50 degrees F. Therefore:

$$\Delta P_{friction}\ (16\ \text{inch, sch. 80, on bottom offshore}) = \frac{(0.000668)(39.000)(33.416)v}{14.314^2}$$

$$= 4{,}248.87v$$

Adding the terms for each segment of the pipe line: $\Delta P_{friction}\ \textbf{(total)} = 7{,}806.94v$

To determine the amount of time required for the line to reach hydraulic equilibrium, the total frictional pressure drop term must be added to the general hydraulic equation describing the system at any moment:

$$0.425z + 112.625 = 0.443y + 7{,}806.94v$$

This equation can be approximately solved by calculating solutions for v at constant incremental vertical elevation intervals as shown in Table 2 on the next page. Assuming a constant gradient in elevation, the volume of oil in each incremental elevation drop can be calculated and the time to release that volume of oil calculated based on the value of v determined. While the solution method is somewhat inexact (as it does not account for the frictional resistance resulting from the shear forces acting on the oil as it flows into the water), it does provide a conservative or worst case analysis.

TABLE 2
RUPTURE AT PLATFORM
SHORE SIDE SEGMENT

HORIZONTAL DISTANCE OF PIPE DRAINED (FEET)	DISTANCE ABOVE 0 FEET MLLWL (Z – FT)	DEPTH TO POINT OF RUPTURE (Y – FT)	VELOCITY (FT/SEC)	TIME TO DRAIN TEN HORIZ. FEET (SEC)	CUM. DRAIN TIME (HRS)	VOLUME OF PIPE DRAINED (BBLS)	CUM. VOLUME OF PIPE DRAINED (BBLS)
10	21.00	265	0.000532	18789.27	5.22	2.26	2.26
20	20.98	265	0.000531	18828.10	10.45	2.26	4.52
30	20.96	265	0.000530	18867.10	15.69	2.26	6.78
40	20.94	265	0.000529	18906.26	20.94	2.26	9.04
50	20.92	265	0.000528	18945.58	26.20	2.26	11.30
60	20.90	265	0.000527	18985.06	31.48	2.26	13.56
70	20.88	265	0.000526	19024.71	36.76	2.26	15.82
80	20.86	265	0.000525	19064.53	42.06	2.26	18.08
90	20.84	265	0.000523	19104.51	47.37	2.26	20.34
100	20.82	265	0.000522	19144.66	52.68	2.26	22.60
110	20.80	265	0.000521	19184.98	58.01	2.26	24.86
120	20.78	265	0.000520	19225.47	63.35	2.26	27.12
130	20.76	265	0.000519	19266.14	68.70	2.26	29.38
140	20.74	265	0.000518	19306.97	74.07	2.26	31.64
150	20.72	265	0.000517	19347.98	79.44	2.26	33.90
160	20.70	265	0.000516	19389.16	84.83	2.26	36.16
170	20.68	265	0.000515	19430.52	90.23	2.26	38.42
180	20.66	265	0.000514	19472.05	95.63	2.26	40.68
190	20.64	265	0.000512	19513.76	101.05	2.26	42.94
200	20.62	265	0.000511	19555.66	106.49	2.26	45.20
210	20.60	265	0.000510	19597.73	111.93	2.26	47.46
220	20.58	265	0.000509	19639.98	117.39	2.26	49.72
230	20.56	265	0.000508	19682.42	122.85	2.26	51.98
240	20.54	265	0.000507	19725.04	128.33	2.26	54.24
250	20.52	265	0.000506	19767.84	133.82	2.26	56.50
260	20.50	265	0.000505	19810.83	139.33	2.26	58.76
270	20.48	265	0.000504	19854.01	144.84	2.26	61.02
280	20.46	265	0.000503	19897.38	150.37	2.26	63.28
290	20.44	265	0.000501	19940.93	155.91	2.26	65.54
300	20.42	265	0.000500	19984.68	161.46	2.26	67.80
310	20.40	265	0.000499	20028.62	167.02	2.26	70.06
320	20.37	265	0.000498	20072.76	172.60	2.26	72.32
330	20.35	265	0.000497	20117.08	178.19	2.26	74.58
340	20.33	265	0.000496	20161.61	183.79	2.26	76.84
350	20.31	265	0.000495	20206.33	189.40	2.26	79.10
360	20.29	265	0.000494	20251.25	195.03	2.26	81.36
370	20.27	265	0.000493	20296.38	200.66	2.26	83.62
380	20.25	265	0.000492	20341.70	206.31	2.26	85.88
390	20.23	265	0.000491	20387.22	211.98	2.26	88.14
400	20.21	265	0.000489	20432.95	217.65	2.26	90.40
410	20.19	265	0.000488	20478.89	223.34	2.26	92.66
420	20.17	265	0.000487	20525.03	229.04	2.26	94.92
430	20.15	265	0.000486	20571.38	234.76	2.26	97.18
440	20.13	265	0.000485	20617.95	240.48	2.26	99.44
450	20.11	265	0.000484	20664.72	246.22	2.26	101.70
460	20.09	265	0.000483	20711.70	251.98	2.26	103.96
470	20.07	265	0.000482	20758.90	257.74	2.26	106.22
480	20.05	265	0.000481	20806.32	263.52	2.26	108.48
490	20.03	265	0.000480	20853.95	269.32	2.26	110.74
500	20.01	265	0.000478	20901.80	275.12	2.26	113.00
510	19.99	265	0.000477	20949.87	280.94	2.26	115.26
520	19.97	265	0.000476	20998.16	286.77	2.26	117.52
530	19.95	265	0.000475	21046.68	292.62	2.26	119.78
540	19.93	265	0.000474	21095.42	298.48	2.26	122.04
550	19.91	265	0.000473	21144.38	304.35	2.26	124.30
560	19.89	265	0.000472	21193.58	310.24	2.26	126.58
570	19.87	265	0.000471	21243.00	316.14	2.26	128.82
580	19.85	265	0.000470	21292.66	322.06	2.26	131.08
590	19.83	265	0.000469	21342.54	327.99	2.26	133.34
600	19.81	265	0.000467	21392.66	333.93	2.26	135.60
610	19.79	265	0.000466	21443.02	339.88	2.26	137.86
620	19.77	265	0.000465	21493.62	345.85	2.26	140.12
630	19.75	265	0.000464	21544.45	351.84	2.26	142.38
640	19.73	265	0.000463	21595.53	357.84	2.26	144.64
650	19.71	265	0.000462	21646.85	363.85	2.26	146.90
660	19.69	265	0.000461	21698.41	369.88	2.26	149.16
670	19.67	265	0.000460	21750.22	375.92	2.26	151.42
680	19.65	265	0.000459	21802.27	381.98	2.26	153.68
690	19.63	265	0.000458	21854.58	388.05	2.26	155.94
700	19.61	265	0.000456	21907.14	394.13	2.26	158.20
710	19.59	265	0.000455	21959.95	400.23	2.26	160.46

Extrapolating the data from Table 2 on the previous page, it can be seen that approximately 0.6 gallons of oil (0.014 barrels) would have drained from the shore segment of the pipe line before the onshore shut-in valve is closed. As this represents a negligible reduction in the height oil column, we will need to calculate the revised hydraulic equilibrium level to determine what, if any additional oil drainage will occur before the revised hydraulic equilibrium level is reached and how long this will take to occur.

<u>Hydraulic forces acting at point of rupture to cause oil to escape:</u>

Oil Column in the onshore segment of the pipe line above 0 feet MLLWL = **0.425 z psi**
Oil Column in the pipe line from 0 feet MLLWL to Ocean Floor at -265 feet = (0.425)(265) = **112.625 psi**

<u>Hydraulic forces acting to oppose oil from escaping from pipe line:</u>

Sea Water Column from 0 feet MLLWL to Ocean Floor at -265 feet = (0.443)(265) = **117.395 psi**
Atmospheric Pressure acting on Sea Water Column above rupture = **14.7 psi**

$0.425z + 112.625 = 117.395 + 14.7$
$0.425z = 19.47$

$z = 45.81$ feet

This level is more than 24 feet higher than the elevation of the onshore shut-in valve. Therefore, once the onshore shut-in valve is closed, no additional oil drainage from the pipe line will occur.

4.3.3 Total Release After Shut In

Platform Segment:	14.36 barrels
<u>Shore Side Segment:</u>	<u>0.01 barrels</u>

Total Release After Shut In: 14.37 barrels

4.4 Rupture at Three Mile Limit

4.4.1 Analysis of Platform Segment

Hydraulic forces acting at point of rupture to cause oil to escape:

Oil Column in the pipe line riser at the platform above 0 feet MLLWL =		0.425 x psi
Oil Column in the pipe line riser at the platform from 0 feet MLLWL to Ocean Floor at -265 feet =	(0.425)(265) =	112.625 psi

Hydraulic forces acting to oppose oil from escaping at point of rupture:

Sea water Column from 0 feet MLLWL to Ocean Floor Depth of y at Point of Rupture =	0.443 y psi
Oil Column in the pipe line from -265 feet to Depth y at Point of Rupture =	0.425 (265 -y) psi

Therefore:

$$0.425x + 112.625 = 0.443y + 112.625 - 0.425y$$

At three mile limit y = 65 feet. Therefore

$$0.425x + 112.625 = 28.795 + 112.625 - 27.625$$

x = 2.75 feet

As we have done previously, we can conclude that all the oil from downstream of the shut-in valve on Platform Elly to an elevation of + 2.75 feet MLLWL will drain from the line if the rupture is allowed to leak long enough and the platform shut-in valve remains open. Before determining the rate at which the line will drain, we will first calculate the amount of oil released if this segment of line is allowed to drain until hydraulic equilibrium is achieved.

Volume of line downstream of the block valve:

100.00 feet - 8 inch, schedule 80	Volume = 5.65 barrels
10.00 feet - 16 inch, schedule 80	Volume = 1.99 barrels
42.24 feet - 16 inch, schedule 80	Volume = 8.41 barrels
TOTAL VOLUME DRAINED IF LINE REACHES INITIAL HYDRAULIC EQUILIBRIUM LEVEL	**Volume = 16.05 barrels**

Using Poiseuille's equation again, we can calculate the frictional forces in the various pipe sections upstream of the rupture at the three mile limit:

The average temperature in the 8 inch, schedule 80 pipe is 160 degrees F. Therefore

$$\Delta P_{friction} \text{ (8 inch, sch. 80)} = \frac{(0.000668)(150)(100)v}{7.625^2}$$

$$= 0.172v \text{ psi}$$

The average temperature in the 16 inch, schedule 80 pipe down to 0 feet MLLWL is 160 degrees F. Therefore

$$\Delta P_{friction} \text{ (16 inch, sch. 80)} = \frac{(0.000668)(150)(55)v}{14.314^2}$$

$$= .027v \text{ psi}$$

The average temperature in the 16 inch, schedule 80 pipe from 0 feet MLLWL to -265 feet is 120 degrees F. Therefore

$$\Delta P_{friction} \text{ (16 inch, sch. 80)} = \frac{(0.000668)(650)(265)v}{14.314^2}$$

$$= 0.562v \text{ psi}$$

The final segment of pipe lays on the ocean floor from Platform Elly to the three mile limit for a distance of 33,416. This section of pipe is 16 inch, schedule 80 (0.844 inch wall thickness), with an average fluid temperature of 50 degrees F. Therefore:

$$\Delta P_{friction} \text{ (16 inch, sch. 80, on bottom offshore)} = \frac{(0.000668)(39{,}000)(33{,}416)v}{14.314^2}$$

$$= 4{,}248.87v$$

Adding the terms for each segment of the pipe line: $\Delta P_{friction} \textbf{ (total)} = 4{,}249.631v$

To determine the amount of time required for the line to reach hydraulic equilibrium, the total frictional pressure drop term must be added to the general hydraulic equation describing the system at any moment:

$$0.425\,x = 0.443y - 0.425y + 4{,}249.631v$$

This equation can be approximately solved and value found for v by calculating one foot increments as shown in Table 3 below. While the solution method is somewhat inexact (as it does not account for the frictional resistance resulting from the shear forces acting on the oil as it flows into the water), it does provide a conservative or worst case analysis. As such, the indication that the oil above the hydraulic equilibrium point will drain within thirty hours is somewhat inaccurate. It does indicate that only a limited amount of oil will drain from this pipe line segment before the line is shut-in and assumes a new hydraulic equilibrium level.

TABLE 3
RUPTURE AT THREE MILE UNIT
PLATFORM SEGMENT

NUMBER OF FEET OF PIPE DRAINED	DISTANCE ABOVE 0 FEET MLLWL (X – FT)	DEPTH TO POINT OF RUPTURE (Y – FT)	VELOCITY (FT/SEC)	TIME TO DRAIN ONE FOOT (SEC)	CUM. DRAIN TIME (HRS)
1	45	65	0.0042	234.84	0.07
2	45	65	0.0042	234.84	0.13
3	45	65	0.0042	234.84	0.20
4	45	65	0.0042	234.84	0.26
5	45	65	0.0042	234.84	0.33
6	45	65	0.0042	234.84	0.39
7	45	65	0.0042	234.84	0.46
8	45	65	0.0042	234.84	0.53
9	45	65	0.0042	234.84	0.59
10	45	65	0.0042	234.84	0.64
11	45	65	0.0042	234.84	0.72
12	45	65	0.0042	234.84	0.78
13	45	65	0.0042	234.84	0.85
14	45	65	0.0042	234.84	0.92
15	45	65	0.0042	234.84	0.99
16	45	65	0.0042	234.84	1.05
17	45	65	0.0042	234.84	1.12
18	45	65	0.0042	234.84	1.18
19	45	65	0.0042	234.84	1.25
20	45	65	0.0042	234.84	1.31
21	45	65	0.0042	234.84	1.38
22	45	65	0.0042	234.84	1.43
23	45	65	0.0042	234.84	1.51
24	45	65	0.0042	234.84	1.58
25	45	65	0.0042	234.84	1.64
26	45	65	0.0042	234.84	1.71
27	45	65	0.0042	234.84	1.78
28	45	65	0.0042	234.84	1.84
29	45	65	0.0042	234.84	1.91
30	45	65	0.0042	234.84	1.97
31	45	65	0.0042	234.84	2.04
32	45	65	0.0042	234.84	2.10
33	45	65	0.0042	234.84	2.17
34	45	65	0.0042	234.84	2.24
35	45	65	0.0042	234.84	2.30
36	45	65	0.0042	234.84	2.37
37	45	65	0.0042	234.84	2.43
38	45	65	0.0042	234.84	2.50
39	45	65	0.0042	234.84	2.56
40	45	65	0.0042	234.84	2.63
41	45	65	0.0042	234.84	2.70
42	45	65	0.0042	234.84	2.76
43	45	65	0.0042	234.84	2.83
44	45	65	0.0042	234.84	2.89
45	45	65	0.0042	234.84	2.96
46	45	65	0.0042	234.84	3.02
47	45	65	0.0042	234.84	3.09
48	45	65	0.0042	234.84	3.16
49	45	65	0.0042	234.84	3.22
50	45	65	0.0042	234.84	3.29
51	45	65	0.0042	234.84	3.35
52	45	65	0.0042	234.84	3.42
53	45	65	0.0042	234.84	3.48
54	45	65	0.0042	234.84	3.55
55	45	65	0.0042	234.84	3.62
56	45	65	0.0042	234.84	3.68
57	45	65	0.0042	234.84	3.75
58	45	65	0.0042	234.84	3.81
59	45	65	0.0042	234.84	3.88
60	45	65	0.0042	234.84	3.94
61	45	65	0.0042	234.84	4.01
62	45	65	0.0042	234.84	4.08
63	45	65	0.0042	234.84	4.14
64	45	65	0.0042	234.84	4.21
65	45	65	0.0042	234.84	4.27
66	45	65	0.0042	234.84	4.34
67	45	65	0.0042	234.84	4.40
68	45	65	0.0042	234.84	4.47
69	45	65	0.0042	234.84	4.54
70	45	65	0.0042	234.84	4.60
71	45	65	0.0042	234.84	4.67
72	45	65	0.0042	234.84	4.73
73	45	65	0.0042	234.84	4.80
74	45	65	0.0042	234.84	4.87
75	45	65	0.0042	234.84	4.93
76	45	65	0.0042	234.84	5.00
77	45	65	0.0042	234.84	5.06
78	45	65	0.0042	234.84	5.13
79	45	65	0.0042	234.84	5.19
80	45	65	0.0042	234.84	5.26
81	45	65	0.0042	234.84	5.33
82	45	65	0.0042	234.84	5.39
83	45	65	0.0042	234.84	5.46
84	45	65	0.0042	234.84	5.52
85	45	65	0.0042	234.84	5.59
86	45	65	0.0042	234.84	5.65
87	45	65	0.0042	234.84	5.72
88	45	65	0.0042	234.84	5.78
89	45	65	0.0042	234.84	5.85
90	45	65	0.0042	234.84	5.92
91	45	65	0.0042	234.84	5.98
92	45	65	0.0042	234.84	6.05
93	45	65	0.0042	234.84	6.11
94	45	65	0.0042	234.84	6.18
95	45	65	0.0042	234.84	6.25
96	45	65	0.0042	234.84	6.31
97	45	65	0.0042	234.84	6.38
98	45	65	0.0042	234.84	6.44
99	45	65	0.0042	234.84	6.51
100	45	65	0.0042	234.84	6.57
101	45	65	0.0042	234.84	6.64
102	45	65	0.0042	234.84	6.71
103	45	65	0.0042	234.84	6.77
104	45	65	0.0042	234.84	6.84
105	45	65	0.0042	234.84	6.90
106	45	65	0.0042	234.84	6.97
107	45	65	0.0042	234.84	7.03
108	45	65	0.0042	234.84	7.10
109	45	65	0.0042	234.84	7.17
110	45	65	0.0042	234.84	7.23
111	44	65	0.0041	242.42	7.30
112	43	65	0.0040	248.44	7.37
113	42	65	0.0039	254.77	7.44
114	41	65	0.0038	261.44	7.51
115	40	65	0.0037	268.45	7.59
116	39	65	0.0036	273.84	7.66
117	38	65	0.0035	283.89	7.74
118	37	65	0.0034	291.57	7.82
119	36	65	0.0033	300.73	7.91
120	35	65	0.0032	310.06	7.99
121	34	65	0.0031	320.00	8.08
122	33	65	0.0030	330.58	8.17
123	32	65	0.0029	341.89	8.27
124	31	65	0.0028	353.97	8.37
125	30	65	0.0027	366.94	8.47
126	29	65	0.0026	380.94	8.57
127	28	65	0.0025	396.05	8.68
128	27	65	0.0024	412.38	8.80
129	26	65	0.0023	430.12	8.92
130	25	65	0.0022	449.46	9.04
131	24	65	0.0021	470.61	9.17
132	23	65	0.0020	493.84	9.31
133	22	65	0.0019	519.51	9.44
134	21	65	0.0018	547.99	9.61
135	20	65	0.0017	579.78	9.77
136	19	65	0.0016	615.44	9.94
137	18	65	0.0015	655.81	10.12
138	17	65	0.0014	701.84	10.32
139	16	65	0.0013	754.82	10.53
140	15	65	0.0012	816.45	10.75
141	14	65	0.0011	889.04	11.00
142	13	65	0.0010	975.81	11.27
143	12	65	0.0009	1081.35	11.57
144	11	65	0.0008	1212.45	11.91
145	10	65	0.0007	1378.75	12.29
146	9	65	0.0006	1600.81	12.74
147	8	65	0.0005	1903.64	13.27
148	7	65	0.0004	2354.37	13.92
149	6	65	0.0003	3079.44	14.77
150	5	65	0.0002	4449.88	16.01
151	4	65	0.0001	8018.17	18.24
152	3	65	0.0000	40477.64	29.44

Extrapolating the data from Table 3 on the previous page, it can be seen that only 0.51 feet of the 8 inch, schedule 80 section of the pipe line segment drains prior to the line assuming its revised hydraulic equilibrium level. Therefore, we will need to calculate the revised hydraulic equilibrium level to determine how much oil will be released from the platform segment.

Hydraulic forces acting at point of rupture to cause oil to escape:

Oil Column in the pipe line riser at the platform above 0 feet MLLWL =	**0.425 x**	**psi**
Oil Column in the pipe line riser at the platform from 0 feet MLLWL to Ocean Floor at -265 feet = (0.425)(265) =	**112.625**	**psi**

Hydraulic forces acting to oppose oil from escaping at point of rupture:

Sea water Column from 0 feet MLLWL to Ocean Floor Depth of y at Point of Rupture =	**0.443 y**	**psi**
Oil Column in the pip line from -265 feet to Depth y at Point of Rupture =	**0.425 (265 -y)**	**psi**
Atmospheric Pressure acting on the Sea Water Column =	**14.7**	**psi**

Therefore:

$$0.425x + 112.625 = 0.443y + 112.625 - 0.425y + 14.7$$

At three mile limit y = 65 feet. Therefore

$$0.425x + 112.625 = 28.795 + 112.625 - 27.625 + 14.7$$

x = 37.34 feet

As we have done previously, we can conclude that all of the oil from downstream of the platform shut-in valve on Platform Elly to +37.34 feet MLLWL will drain from the line if allowed to leak long enough. Again referring to Table 3 and extrapolating the data therein, we can see that this will occur in less than eight hours, which is an insufficient amount of time to effect any abatement measures. Therefore, based on the revised hydraulic equilibrium level, the amount of oil released from the platform pipe line segment in this case is:

100.00 feet - 8 inch, schedule 80	Volume = 5.65 barrels
10.00 feet - 16 inch, schedule 80	Volume = 1.99 barrels
7.66 feet - 16 inch, schedule 80	Volume = 1.52 barrels
TOTAL VOLUME DRAINED IF LINE REACHES THE REVISED HYDRAULIC EQUILIBRIUM LEVEL	**Volume = 9.16 barrels**

4.4.2 Analysis of Shore Side Segment

<u>Hydraulic forces acting at point of rupture to cause oil to escape:</u>

Oil Column in onshore pipe line segment above 0 feet MLLWL =	0.425z psi
Oil Column in onshore pipe line segment from 0 feet MLLWL to Ocean Floor at -65 feet = (0.425)(65) =	27.625 psi

<u>Hydraulic forces acting to oppose oil from escaping from pipe line:</u>

Sea water Column from 0 feet MLLWL to Ocean Floor at -65 feet = (0.443)(65) =	28.795 psi

$$0.425z + 27.625 = 28.795$$
$$0.425z = 1.17$$

$$z = 2.75 \text{ feet}$$

As before, we can conclude that all the oil from downstream of the shut-in valve located at an elevation of +21 feet at the Beta Onshore Station to an elevation of + 2.75 feet MLLWL will drain from the line if the rupture is allowed to leak long enough and the onshore shut-in valve remains open. Before determining the rate at which the line will drain, we will first calculate the amount of oil released if this segment of line is allowed to drain until hydraulic equilibrium is achieved. In order to approximate this volume, we will again assume that the line has a constant gradient between the Beta Onshore Station and 0 feet MLLWL. As before, the onshore segment of the pipe line is 1.9724 miles (10,414 feet) long. Assuming a constant gradient, the line will decrease one foot in elevation every 495.9 feet. To achieve the 18.25 foot drop in elevation required to reach the hydraulic equilibrium elevation of 2.75 feet MLLWL, it will take 9,049 feet of line. The capacity of this length of line is 2,044 barrels. If allowed to drain until hydraulic equilibrium is reached, this volume would be released at the point of rupture.

Using Poiseuille's equation again, we can calculate the frictional forces in the various segments if the line on the onshore side of the rupture.

The onshore section of line is 16 inch, schedule 30 (0.375 inch wall thickness) and is buried. Because the line is buried the oil temperature in the line is approximately 60 degrees F. Therefore:

$$\Delta P_{\text{friction}} \text{ (16 inch, sch. 30, onshore)} = \frac{(0.000668)(19{,}000)(10{,}414)v}{15.25^2}$$

$$= 568.34v$$

The initial offshore segment is 16 inch, schedule 40 (0.500 inch w.t.) and is buried for 23,400 feet. The temperature in this segment of line is also 60 degrees F. Therefore:

$$\Delta P_{friction} \text{ (16 inch, sch. 40, buried offshore)} = \frac{(0.000668)(19{,}000)(23{,}400)v}{15.00^2}$$

$$= 1{,}319.97v$$

The next segment of the pipe line lays on the ocean floor for 14,421 feet out to the three mile limit between State and Federal Waters. This section of pipe is 16 inch, schedule 40 with an average fluid temperature of 50 degrees F. Therefore:

$$\Delta P_{friction} \text{ (16 inch, sch. 40, on bottom offshore)} = \frac{(0.000668)(39{,}000)(14{,}421)v}{15.00^2}$$

$$= 1{,}669.76v$$

Adding the terms for each segment of the pipe line: $\Delta P_{friction}$ **(total) = 3,558.07v**

To determine the amount of time required for the line to reach hydraulic equilibrium, the total frictional pressure drop term must be added to the general hydraulic equation describing the system at any moment:

$$0.425z = 1.17 + 3{,}558.07v$$

This equation can be approximately solved by calculating solutions for v at constant incremental vertical elevation intervals as shown in Table 4 on the next page. Assuming a constant gradient in elevation, the volume of oil in each incremental drop in pipe line elevation can be calculated and the time to release that volume of oil calculated based on the value of v determined. While the solution method is somewhat inexact (as it does not account for the frictional resistance resulting from the shear forces acting on the oil as it flows into the water), it does provide a conservative or worst case analysis.

TABLE 4
RUPTURE AT THREE MILE LIMIT
SHORE SIDE SEGMENT

HORIZONTAL DISTANCE OF PIPE DRAINED (FEET)	DISTANCE ABOVE 0 FEET MLLWL (Z – FT)	DEPTH TO POINT OF RUPTURE (Y – FT)	VELOCITY (FT/SEC)	TIME TO DRAIN TEN HORIZ FEET (SEC)	CUM. DRAIN TIME (HRS)	VOLUME OF PIPE DRAINED (BBLS)	CUM. VOLUME OF PIPE DRAINED (BBLS)
10	21.00	65	0.002180	4588.10	1.27	2.26	2.26
20	20.98	65	0.002177	4593.17	2.55	2.26	4.52
30	20.96	65	0.002175	4598.26	3.83	2.26	6.78
40	20.94	65	0.002172	4603.36	5.11	2.26	9.04
50	20.92	65	0.002170	4608.47	6.39	2.26	11.30
60	20.90	65	0.002168	4613.59	7.67	2.26	13.56
70	20.88	65	0.002165	4618.72	8.95	2.26	15.82
80	20.86	65	0.002163	4623.87	10.24	2.26	18.08
90	20.84	65	0.002160	4629.02	11.52	2.26	20.34
100	20.82	65	0.002158	4634.19	12.81	2.26	22.60
110	20.80	65	0.002155	4639.37	14.10	2.26	24.86
120	20.78	65	0.002153	4644.56	15.39	2.26	27.12
130	20.76	65	0.002151	4649.76	16.68	2.26	29.38
140	20.74	65	0.002148	4654.97	17.97	2.26	31.64
150	20.72	65	0.002146	4660.20	19.27	2.26	33.90
160	20.70	65	0.002143	4665.44	20.56	2.26	36.16
170	20.68	65	0.002141	4670.69	21.86	2.26	38.42
180	20.66	65	0.002139	4675.95	23.16	2.26	40.68
190	20.64	65	0.002136	4681.22	24.46	2.26	42.94
200	20.62	65	0.002134	4686.50	25.76	2.26	45.20
210	20.60	65	0.002131	4691.80	27.06	2.26	47.46
220	20.58	65	0.002129	4697.11	28.37	2.26	49.72
230	20.56	65	0.002127	4702.43	29.68	2.26	51.98
240	20.54	65	0.002124	4707.76	30.98	2.26	54.24
250	20.52	65	0.002122	4713.10	32.29	2.26	56.50
260	20.50	65	0.002119	4718.46	33.60	2.26	58.76
270	20.48	65	0.002117	4723.83	34.91	2.26	61.02
280	20.46	65	0.002115	4729.21	36.23	2.26	63.28
290	20.44	65	0.002112	4734.60	37.54	2.26	65.54
300	20.42	65	0.002110	4740.01	38.86	2.26	67.80
310	20.40	65	0.002107	4745.43	40.18	2.26	70.06
320	20.37	65	0.002105	4750.86	41.50	2.26	72.32
330	20.35	65	0.002102	4756.30	42.82	2.26	74.58
340	20.33	65	0.002100	4761.76	44.14	2.26	76.84
350	20.31	65	0.002098	4767.22	45.47	2.26	79.10
360	20.29	65	0.002095	4772.70	46.79	2.26	81.36
370	20.27	65	0.002093	4778.20	48.12	2.26	83.62
380	20.25	65	0.002090	4783.70	49.45	2.26	85.88
390	20.23	65	0.002088	4789.22	50.78	2.26	88.14
400	20.21	65	0.002086	4794.75	52.11	2.26	90.40
410	20.19	65	0.002083	4800.30	53.44	2.26	92.66
420	20.17	65	0.002081	4805.85	54.78	2.26	94.92
430	20.15	65	0.002078	4811.42	56.12	2.26	97.18
440	20.13	65	0.002076	4817.00	57.45	2.26	99.44
450	20.11	65	0.002074	4822.60	58.79	2.26	101.70
460	20.09	65	0.002071	4828.21	60.13	2.26	103.96
470	20.07	65	0.002069	4833.83	61.48	2.26	106.22
480	20.05	65	0.002066	4839.46	62.82	2.26	108.48
490	20.03	65	0.002064	4845.11	64.17	2.26	110.74
500	20.01	65	0.002062	4850.77	65.51	2.26	113.00
510	19.99	65	0.002059	4856.45	66.86	2.26	115.26
520	19.97	65	0.002057	4862.14	68.21	2.26	117.52
530	19.95	65	0.002054	4867.84	69.57	2.26	119.78
540	19.93	65	0.002052	4873.55	70.92	2.26	122.04
550	19.91	65	0.002049	4879.28	72.28	2.26	124.30
560	19.89	65	0.002047	4885.02	73.63	2.26	126.56
570	19.87	65	0.002045	4890.77	74.99	2.26	128.82
580	19.85	65	0.002042	4896.54	76.35	2.26	131.08
590	19.83	65	0.002040	4902.32	77.71	2.26	133.34
600	19.81	65	0.002037	4908.12	79.08	2.26	135.60
610	19.79	65	0.002035	4913.93	80.44	2.26	137.86
620	19.77	65	0.002033	4919.75	81.81	2.26	140.12
630	19.75	65	0.002030	4925.59	83.18	2.26	142.38
640	19.73	65	0.002028	4931.44	84.55	2.26	144.64
650	19.71	65	0.002025	4937.31	85.92	2.26	146.90
660	19.69	65	0.002023	4943.18	87.29	2.26	149.16
670	19.67	65	0.002021	4949.08	88.67	2.26	151.42
680	19.65	65	0.002018	4954.98	90.04	2.26	153.68
690	19.63	65	0.002016	4960.90	91.42	2.26	155.94
700	19.61	65	0.002013	4966.84	92.80	2.26	158.20
710	19.59	65	0.002011	4972.79	94.18	2.26	160.46
720	19.57	65	0.002009	4978.75	95.56	2.26	162.72
730	19.55	65	0.002006	4984.73	96.95	2.26	164.98
740	19.53	65	0.002004	4990.72	98.33	2.26	167.24
750	19.51	65	0.002001	4996.73	99.72	2.26	169.50
760	19.49	65	0.001999	5002.75	101.11	2.26	171.76
770	19.47	65	0.001996	5008.78	102.50	2.26	174.02
780	19.45	65	0.001994	5014.84	103.90	2.26	176.28
790	19.43	65	0.001992	5020.90	105.29	2.26	178.54
800	19.41	65	0.001989	5026.98	106.69	2.26	180.80
810	19.39	65	0.001987	5033.07	108.09	2.26	183.06
820	19.37	65	0.001984	5039.18	109.49	2.26	185.32
830	19.35	65	0.001982	5045.31	110.89	2.26	187.58
840	19.33	65	0.001980	5051.45	112.29	2.26	189.84
850	19.31	65	0.001977	5057.60	113.70	2.26	192.10
860	19.29	65	0.001975	5063.77	115.10	2.26	194.36
870	19.27	65	0.001972	5069.95	116.51	2.26	196.62
880	19.25	65	0.001970	5076.15	117.92	2.26	198.88
890	19.23	65	0.001968	5082.36	119.33	2.26	201.14
900	19.21	65	0.001965	5088.59	120.75	2.26	203.40
910	19.19	65	0.001963	5094.84	122.16	2.26	205.66
920	19.16	65	0.001960	5101.10	123.58	2.26	207.92
930	19.14	65	0.001958	5107.37	125.00	2.26	210.18
940	19.12	65	0.001956	5113.67	126.42	2.26	212.44
950	19.10	65	0.001953	5119.97	127.84	2.26	214.70
960	19.08	65	0.001951	5126.29	129.26	2.26	216.96
970	19.06	65	0.001948	5132.63	130.69	2.26	219.22
980	19.04	65	0.001946	5138.98	132.12	2.26	221.48
990	19.02	65	0.001944	5145.35	133.55	2.26	223.74
1000	19.00	65	0.001941	5151.74	134.98	2.26	226.00

Extrapolating the data from Table 4 on the previous page, it can be seen that approximately 2.49 gallons of oil (0.06 barrels) would have drained from the shore segment of the pipe line before the onshore shut-in valve is closed. As this represents a negligible reduction in the oil column, we will need to calculate the revised hydraulic equilibrium level to determine what, if any additional oil drainage will occur before the revised hydraulic equilibrium level is reached and how long this will take to occur.

<u>Hydraulic forces acting at point of rupture to cause oil to escape:</u>

Oil Column in onshore pipe line segment above 0 feet MLLWL =	**0.425z**	**psi**
Oil Column in onshore pipe line segment from 0 feet MLLWL to Ocean Floor at -65 feet = (0.425)(65) =	**27.625**	**psi**

<u>Hydraulic forces acting to oppose oil from escaping from pipe line:</u>

Sea Water Column from 0 feet MLLWL to Ocean Floor at -65 feet = (0.443)(65) =	**28.795**	**psi**
Atmospheric Pressure acting on Sea Water Column =	**14.7**	**psi**

$0.425z + 27.625 = 28.795 + 14.7$
$0.425z = 15.87$

z = 37.34 feet

This level is more than 16 feet higher than the elevation of the onshore shut-in valve. Therefore, once the onshore shut-in valve is closed, no additional oil drainage from the pipe line will occur.

4.4.3 Total Release After Shut In

Platform Segment:	9.16 barrels
<u>Shore Side Segment:</u>	<u>0.06 barrels</u>

Total Release After Shut In: 9.22 barrels

4.5 Rupture at Point of Burial

4.5.1 Analysis of Platform Segment

Hydraulic forces acting at point of rupture to cause oil to escape:

Oil Column in pipe line riser at platform above 0 feet MLLWL =		0.425 x psi
Oil Column in pipe line riser at platform from 0 feet MLLWL to Ocean Floor at -265 feet =	(0.425)(265) =	112.625 psi

Hydraulic forces acting to oppose oil from escaping at point of rupture:

Sea water Column from 0 feet MLLWL to Ocean Floor Depth of y at Point of Rupture =	0.443 y psi
Oil Column from -265 feet to Depth y at Point of Rupture =	0.425 (265 -y) psi

Therefore:

$$0.425x + 112.625 = 0.443y + 112.625 - 0.425y$$

At point of burial $y = 40$ feet. Therefore

$$0.425x + 112.625 = 17.72 + 112.625 - 17.00$$

x = 1.69 feet

As we have done previously, we can conclude that all the oil from downstream of the shut-in valve on Platform Elly to an elevation of + 1.69 feet MLLWL will drain from the line if the rupture is allowed to leak long enough and the platform shut-in valve remains open. Before determining the rate at which the line will drain, we will first calculate the amount of oil released if this segment of line is allowed to drain until hydraulic equilibrium is achieved.

Volume of line downstream of the block valve:

100.00 feet - 8 inch, schedule 80	Volume = 5.65 barrels
10.00 feet - 16 inch, schedule 80	Volume = 1.99 barrels
43.31 feet - 16 inch, schedule 80	Volume = 8.62 barrels
TOTAL VOLUME DRAINED IF LINE REACHES INITIAL HYDRAULIC EQUILIBRIUM LEVEL	**Volume = 16.26 barrels**

Using Poiseuille's equation again, we can calculate the frictional forces in the various line segments upstream of the rupture at the point of burial:

The average temperature in the 8 inch, schedule 80 pipe is 160 degrees F. Therefore

$$\Delta P_{friction}\ (8\ \text{inch, sch. } 80) = \frac{(0.000668)(150)(100)v}{7.625^2}$$

$$= 0.172v\ \text{psi}$$

The average temperature in the 16 inch, schedule 80 pipe down to 0 feet MLLWL is 160 degrees F. Therefore

$$\Delta P_{friction}\ (16\ \text{inch, sch. } 80) = \frac{(0.000668)(150)(55)v}{14.314^2}$$

$$= .027v\ \text{psi}$$

The average temperature in the 16 inch, schedule 80 pipe from 0 feet MLLWL to -265 feet is 120 degrees F. Therefore

$$\Delta P_{friction}\ (16\ \text{inch, sch. } 80) = \frac{(0.000668)(650)(265)v}{14.314^2}$$

$$= 0.562v\ \text{psi}$$

The first segment of pipe that lays on the ocean floor runs from Platform Elly to the three mile limit for a distance of 33,416. This section of pipe is 16 inch, schedule 80 (0.844 inch wall thickness), with an average fluid temperature of 50 degrees F. Therefore:

$$\Delta P_{friction}\ (16\ \text{inch, sch. 80, on bottom offshore}) = \frac{(0.000668)(39{,}000)(33{,}416)v}{14.314^2}$$

$$= 4{,}248.87v$$

The last segment of the line upstream of the rupture lays on the ocean floor for 14,421 feet from the three mile limit between State and Federal Waters to the point of burial. This section of pipe is 16 inch, schedule 40 with an average fluid temperature of 50 degrees F. Therefore:

$$\Delta P_{friction}\ (16\ \text{inch, sch. 40, on bottom offshore}) = \frac{(0.000668)(39{,}000)(14{,}421)v}{15.00^2}$$

$$= 1{,}669.76v$$

Adding the terms for each segment of the pipe line: $\Delta P_{friction}$ **(total) = 5,919.391v**

To determine the amount of time required for the line to reach hydraulic equilibrium, the total frictional pressure drop term must be added to the general hydraulic equation describing the system at any moment:

$$0.425\,x = 0.443y - 0.425y + 5{,}919.391v$$

This equation can be approximately solved and value found for v by calculating one foot increments as shown in Table 5 below. While the solution method is somewhat inexact (as it does not account for the frictional resistance resulting from the shear forces acting on the oil as it flows into the water), it does provide a conservative or worst case analysis. As such, the indication that the oil above the hydraulic equilibrium point will drain within thirty eight hours is somewhat inaccurate. It does indicate that only a limited amount of oil will drain from this pipe line segment before the line is shut-in and assumes a new hydraulic equilibrium level.

TABLE 5
RUPTURE AT POINT OF BURIAL
PLATFORM SEGMENT

NUMBER OF FEET OF PIPE DRAINED	DISTANCE ABOVE 8 FEET MLLW (X – FT)	DEPTH TO POINT OF RUPTURE (Y – FT)	VELOCITY (FT/SEC)	TIME TO DRAIN ONE FOOT (SEC)	CUM. DRAIN TIME (HRS)	NUMBER OF FEET OF PIPE DRAINED	DISTANCE ABOVE 8 FEET MLLW (X – FT)	DEPTH TO POINT OF RUPTURE (Y – FT)	VELOCITY (FT/SEC)	TIME TO DRAIN ONE FOOT (SEC)	CUM. DRAIN TIME (HRS)
1	45	40	0.0031	321.83	0.09	78	45	40	0.0031	321.83	6.97
2	45	40	0.0031	321.83	0.18	79	45	40	0.0031	321.83	7.06
3	45	40	0.0031	321.83	0.27	80	45	40	0.0031	321.83	7.15
4	45	40	0.0031	321.83	0.36	81	45	40	0.0031	321.83	7.24
5	45	40	0.0031	321.83	0.45	82	45	40	0.0031	321.83	7.33
6	45	40	0.0031	321.83	0.54	83	45	40	0.0031	321.83	7.42
7	45	40	0.0031	321.83	0.63	84	45	40	0.0031	321.83	7.50
8	45	40	0.0031	321.83	0.71	85	45	40	0.0031	321.83	7.59
9	45	40	0.0031	321.83	0.80	86	45	40	0.0031	321.83	7.68
10	45	40	0.0031	321.83	0.89	87	45	40	0.0031	321.83	7.77
11	45	40	0.0031	321.83	0.98	88	45	40	0.0031	321.83	7.86
12	45	40	0.0031	321.83	1.07	89	45	40	0.0031	321.83	7.95
13	45	40	0.0031	321.83	1.16	90	45	40	0.0031	321.83	8.04
14	45	40	0.0031	321.83	1.25	91	45	40	0.0031	321.83	8.13
15	45	40	0.0031	321.83	1.34	92	45	40	0.0031	321.83	8.22
16	45	40	0.0031	321.83	1.43	93	45	40	0.0031	321.83	8.31
17	45	40	0.0031	321.83	1.52	94	45	40	0.0031	321.83	8.40
18	45	40	0.0031	321.83	1.61	95	45	40	0.0031	321.83	8.49
19	45	40	0.0031	321.83	1.70	96	45	40	0.0031	321.83	8.58
20	45	40	0.0031	321.83	1.79	97	45	40	0.0031	321.83	8.67
21	45	40	0.0031	321.83	1.88	98	45	40	0.0031	321.83	8.76
22	45	40	0.0031	321.83	1.97	99	45	40	0.0031	321.83	8.84
23	45	40	0.0031	321.83	2.06	100	45	40	0.0031	321.83	8.93
24	45	40	0.0031	321.83	2.14	101	45	40	0.0031	321.83	9.02
25	45	40	0.0031	321.83	2.23	102	45	40	0.0031	321.83	9.11
26	45	40	0.0031	321.83	2.32	103	45	40	0.0031	321.83	9.20
27	45	40	0.0031	321.83	2.41	104	45	40	0.0031	321.83	9.29
28	45	40	0.0031	321.83	2.50	105	45	40	0.0031	321.83	9.38
29	45	40	0.0031	321.83	2.59	106	45	40	0.0031	321.83	9.47
30	45	40	0.0031	321.83	2.68	107	45	40	0.0031	321.83	9.56
31	45	40	0.0031	321.83	2.77	108	45	40	0.0031	321.83	9.65
32	45	40	0.0031	321.83	2.86	109	45	40	0.0031	321.83	9.74
33	45	40	0.0031	321.83	2.95	110	45	40	0.0031	321.83	9.83
34	45	40	0.0031	321.83	3.04	111	44	40	0.0030	328.32	9.92
35	45	40	0.0031	321.83	3.13	112	43	40	0.0029	337.18	10.01
36	45	40	0.0031	321.83	3.22	113	42	40	0.0028	343.54	10.11
37	45	40	0.0031	321.83	3.31	114	41	40	0.0028	354.35	10.21
38	45	40	0.0031	321.83	3.40	115	40	40	0.0027	362.50	10.31
39	45	40	0.0031	321.83	3.49	116	39	40	0.0027	373.56	10.41
40	45	40	0.0031	321.83	3.58	117	38	40	0.0026	383.83	10.52
41	45	40	0.0031	321.83	3.67	118	37	40	0.0025	394.64	10.63
42	45	40	0.0031	321.83	3.75	119	36	40	0.0025	405.99	10.74
43	45	40	0.0031	321.83	3.84	120	35	40	0.0024	418.18	10.84
44	45	40	0.0031	321.83	3.93	121	34	40	0.0023	431.33	10.96
45	45	40	0.0031	321.83	4.02	122	33	40	0.0022	444.90	11.10
46	45	40	0.0031	321.83	4.11	123	32	40	0.0022	458.38	11.22
47	45	40	0.0031	321.83	4.20	124	31	40	0.0021	473.36	11.34
48	45	40	0.0031	321.83	4.29	125	30	40	0.0020	492.00	11.50
49	45	40	0.0031	321.83	4.38	126	29	40	0.0019	518.87	11.64
50	45	40	0.0031	321.83	4.47	127	28	40	0.0019	531.46	11.79
51	45	40	0.0031	321.83	4.56	128	27	40	0.0018	553.28	11.94
52	45	40	0.0031	321.83	4.65	129	26	40	0.0017	573.60	12.10
53	45	40	0.0031	321.83	4.74	130	25	40	0.0017	597.82	12.26
54	45	40	0.0031	321.83	4.83	131	24	40	0.0016	621.41	12.44
55	45	40	0.0031	321.83	4.92	132	23	40	0.0015	653.72	12.60
56	45	40	0.0031	321.83	5.01	133	22	40	0.0015	683.91	12.81
57	45	40	0.0031	321.83	5.09	134	21	40	0.0014	721.44	13.01
58	45	40	0.0031	321.83	5.18	135	20	40	0.0013	760.85	13.22
59	45	40	0.0031	321.83	5.27	136	19	40	0.0012	804.81	13.44
60	45	40	0.0031	321.83	5.36	137	18	40	0.0012	854.77	13.66
61	45	40	0.0031	321.83	5.45	138	17	40	0.0011	908.86	13.91
62	45	40	0.0031	321.83	5.54	139	16	40	0.0010	973.50	14.20
63	45	40	0.0031	321.83	5.63	140	15	40	0.0010	1044.73	14.30
64	45	40	0.0031	321.83	5.72	141	14	40	0.0009	1131.81	14.81
65	45	40	0.0031	321.83	5.81	142	13	40	0.0008	1231.52	15.13
66	45	40	0.0031	321.83	5.90	143	12	40	0.0007	1351.44	15.53
67	45	40	0.0031	321.83	5.99	144	11	40	0.0007	1498.83	15.94
68	45	40	0.0031	321.83	6.08	145	10	40	0.0006	1676.86	16.41
69	45	40	0.0031	321.83	6.17	146	9	40	0.0005	1908.41	16.94
70	45	40	0.0031	321.83	6.26	147	8	40	0.0005	2204.73	17.33
71	45	40	0.0031	321.83	6.35	148	7	40	0.0004	2625.81	18.36
72	45	40	0.0031	321.83	6.44	149	6	40	0.0003	3234.84	19.10
73	45	40	0.0031	321.83	6.52	150	5	40	0.0003	4213.86	20.35
74	45	40	0.0031	321.83	6.61	151	4	40	0.0002	6046.79	22.03
75	45	40	0.0031	321.83	6.70	152	3	40	0.0001	10943.37	24.96
76	45	40	0.0031	321.83	6.79	153	2	40	0.0000	45133.71	37.84
77	45	40	0.0031	321.83	6.88						

Extrapolating the data from Table 5 on the previous page, it can be seen that only 0.37 feet of the 8 inch, schedule 80 section of the pipe line segment drains prior to the line assuming its revised hydraulic equilibrium level. Therefore, we will need to calculate the revised hydraulic equilibrium level to determine how much oil will be released from the platform segment.

<u>Hydraulic forces acting at point of rupture to cause oil to escape:</u>

Oil Column in pipe line riser at platform above 0 feet MLLWL =		**0.425 x psi**
Oil Column in pipe line riser at platform from 0 feet MLLWL to Ocean Floor at -265 feet =	(0.425)(265) =	**112.625 psi**

<u>Hydraulic forces acting to oppose oil from escaping at point of rupture:</u>

Sea water Column from 0 feet MLLWL to Ocean Floor Depth of y at Point of Rupture =	**0.443 y psi**
Oil Column from -265 feet to Depth y at Point of Rupture =	**0.425 (265 -y) psi**
Atmospheric Pressure acting on Sea Water Column =	**14.7 psi**

Therefore:

$$0.425x + 112.625 = 0.443y + 112.625 - 0.425y + 14.7$$

At point of burial y = 40 feet. Therefore

$$0.425x + 112.625 = 17.72 + 112.625 - 17.00 + 14.7$$

x = 36.28 feet

As we have done previously, we can conclude that all of the oil from downstream of the platform shut-in valve on Platform Elly to +36.28 feet MLLWL will drain from the line if allowed to leak long enough. Again referring to Table 5 and extrapolating the data therein, we can see that this will occur in less than eleven hours, which is an insufficient amount of time to effect any abatement measures. Therefore, based on the revised hydraulic equilibrium level, the amount of oil released from the platform pipe line segment in this case is:

100.00 feet - 8 inch, schedule 80	Volume = 5.65 barrels
10.00 feet - 16 inch, schedule 80	Volume = 1.99 barrels
8.72 feet - 16 inch, schedule 80	Volume = 1.73 barrels
TOTAL VOLUME DRAINED IF LINE REACHES THE REVISED HYDRAULIC EQUILIBRIUM LEVEL	**Volume = 9.37 barrels**

4.5.2 Analysis of Shore Side Segment

Hydraulic forces acting at point of rupture to cause oil to escape:

Oil Column in the onshore pipe line segment above 0 feet MLLWL =		0.425z psi
Oil Column in the onshore pipe line segment from 0 feet MLLWL to Ocean Floor at -40 feet =	(0.425)(65) =	17.000 psi

Hydraulic forces acting to oppose oil from escaping from pipe line:

Sea water Column from 0 feet MLLWL to Ocean Floor at -40 feet =	(43)(65) =	17.720 psi

$0.425z + 17.000 = 17.720$
$0.425z = 0.72$

$z = 1.69$ **feet**

As before, we can conclude that all the oil from downstream of the shut-in valve located at an elevation of +21 feet at the Beta Onshore Station to an elevation of + 1.69 feet MLLWL will drain from the line if the rupture is allowed to leak long enough and the onshore shut-in valve remains open. Before determining the rate at which the line will drain, we will first calculate the amount of oil released if this segment of line is allowed to drain until hydraulic equilibrium is achieved. In order to approximate this volume, we will again assume that the line has a constant gradient between the Beta Onshore Station and 0 feet MLLWL. As before, the onshore segment of the pipe line is 1.9724 miles (10,414 feet) long. Assuming a constant gradient, the line will decrease one foot in elevation every 495.9 feet. To achieve the 19.31 foot drop in elevation required to reach the hydraulic equilibrium elevation of 1.69 feet MLLWL, it will take 9,576 feet of line. The capacity of this length of line is 2,163 barrels. If allowed to drain until hydraulic equilibrium is reached, this volume would be released at the point of rupture.

Using Poiseuille's equation again, we can calculate the frictional forces in the various line segments on the shore side of the rupture.

The onshore section of line is 16 inch, schedule 30 (0.375 inch wall thickness) and is buried. Because the line is buried the oil temperature in the line is approximately 60 degrees F. Therefore:

$$\Delta P_{friction} \text{ (16 inch, sch. 30, onshore)} = \frac{(0.000668)(19{,}000)(10{,}414)v}{15.25^2}$$

$$= 568.34v$$

The initial offshore segment is 16 inch, schedule 40 (0.500 inch wall thickness) and is buried for a distance of 23,400 feet. The temperature in this segment of line is also 60 degrees F. Therefore:

$$\Delta P_{friction} \text{ (16 inch, sch. 40, buried offshore)} = \frac{(0.000668)(19.000)(23.400)v}{15.00^2}$$

$$= 1{,}319.97v$$

Adding the terms for each segment of the pipe line: $\Delta P_{friction}$ **(total) = 1,888.31v**

To determine the amount of time required for the line to reach hydraulic equilibrium, the total frictional pressure drop term must be added to the general hydraulic equation describing the system at any moment:

$$0.425z = 1.17 + 1{,}888.31v$$

This equation can be approximately solved by calculating solutions for v at constant incremental vertical elevation intervals as shown in Table 6 on the next page. Assuming a constant gradient in elevation, the volume of oil in each incremental elevation drop can be calculated and the time to release that volume of oil calculated based on the value of v determined. While the solution method is somewhat inexact (as it does not account for the frictional resistance resulting from the shear forces acting on the oil as it flows into the water) it does provide a conservative or worst-case analysis.

Extrapolating the data from Table 6, it can be seen that approximately 4.68 gallons of oil (0.11 barrels) would have drained from the shore segment of the pipe line before the onshore shut-in valve is closed. As this represents a negligible reduction in the oil column, we will need to calculate the revised hydraulic equilibrium level to determine what, if any additional oil drainage will occur before the revised hydraulic equilibrium level is reached and how long this will take to occur.

6

RUPTURE AT POINT OF BURIAL
SHORE SIDE SEGMENT

HORIZONTAL DISTANCE OF PIPE DRAINED (FEET)	DISTANCE ABOVE 0 FEET MLLWL (Z – FT)	DEPTH TO POINT OF RUPTURE (Y – FT)	VELOCITY (FT/SEC)	TIME TO DRAIN 30 HORIZ. FEET (SEC)	CUM. DRAIN TIME (HRS)	VOLUME OF PIPE DRAINED (BBLS)	CUM. VOLUME OF PIPE DRAINED (BBLS)
30	21.00	40	0.004107	7304.67	2.03	6.78	6.78
60	20.94	40	0.004093	7329.17	4.07	6.78	13.56
90	20.88	40	0.004080	7353.83	6.11	6.78	20.34
120	20.82	40	0.004066	7378.26	8.16	6.78	27.12
150	20.76	40	0.004052	7403.05	10.21	6.78	33.90
180	20.70	40	0.004039	7428.01	12.28	6.78	40.68
210	20.64	40	0.004025	7453.13	14.35	6.78	47.46
240	20.58	40	0.004012	7478.43	16.42	6.78	54.24
270	20.52	40	0.003998	7503.90	18.51	6.78	61.02
300	20.46	40	0.003984	7529.54	20.60	6.78	67.80
330	20.40	40	0.003971	7555.36	22.70	6.78	74.58
360	20.33	40	0.003957	7581.36	24.81	6.78	81.36
390	20.27	40	0.003943	7607.54	26.92	6.78	88.14
420	20.21	40	0.003930	7633.90	29.04	6.78	94.92
450	20.15	40	0.003916	7660.44	31.17	6.78	101.70
480	20.09	40	0.003903	7687.16	33.30	6.78	108.48
510	20.03	40	0.003889	7714.08	35.44	6.78	115.26
540	19.97	40	0.003875	7741.18	37.60	6.78	122.04
570	19.91	40	0.003862	7768.47	39.75	6.78	128.82
600	19.85	40	0.003848	7795.96	41.92	6.78	135.60
630	19.79	40	0.003835	7823.64	44.09	6.78	142.38
660	19.73	40	0.003821	7851.52	46.27	6.78	149.16
690	19.67	40	0.003807	7879.60	48.46	6.78	155.94
720	19.61	40	0.003794	7907.88	50.66	6.78	162.72
750	19.55	40	0.003780	7936.37	52.86	6.78	169.50
780	19.49	40	0.003766	7965.06	55.08	6.78	176.28
810	19.43	40	0.003753	7993.95	57.30	6.78	183.06
840	19.37	40	0.003739	8023.06	59.52	6.78	189.84
870	19.31	40	0.003726	8052.38	61.76	6.78	196.62
900	19.25	40	0.003712	8081.92	64.01	6.78	203.40
930	19.19	40	0.003698	8111.67	66.26	6.78	210.18
960	19.12	40	0.003685	8141.65	68.52	6.78	216.96
990	19.06	40	0.003671	8171.84	70.79	6.78	223.74
1020	19.00	40	0.003658	8202.27	73.07	6.78	230.52
1050	18.94	40	0.003644	8232.91	75.36	6.78	237.30
1080	18.88	40	0.003630	8263.79	77.65	6.78	244.08
1110	18.82	40	0.003617	8294.90	79.96	6.78	250.86
1140	18.76	40	0.003603	8326.25	82.27	6.78	257.64
1170	18.70	40	0.003589	8357.83	84.59	6.78	264.42
1200	18.64	40	0.003576	8389.66	86.92	6.78	271.20
1230	18.58	40	0.003562	8421.73	89.26	6.78	277.98
1260	18.52	40	0.003549	8454.04	91.61	6.78	284.76
1290	18.46	40	0.003535	8486.60	93.97	6.78	291.54
1320	18.40	40	0.003521	8519.42	96.33	6.78	298.32
1350	18.34	40	0.003508	8552.49	98.71	6.78	305.10
1380	18.28	40	0.003494	8585.81	101.09	6.78	311.88
1410	18.22	40	0.003481	8619.40	103.49	6.78	318.66
1440	18.16	40	0.003467	8653.25	105.89	6.78	325.44
1470	18.10	40	0.003453	8687.37	108.30	6.78	332.22
1500	18.04	40	0.003440	8721.76	110.73	6.78	339.00
1530	17.98	40	0.003426	8756.42	113.16	6.78	345.78
1560	17.91	40	0.003412	8791.36	115.60	6.78	352.56
1590	17.85	40	0.003399	8826.58	118.05	6.78	359.34
1620	17.79	40	0.003385	8862.08	120.51	6.78	366.12
1650	17.73	40	0.003372	8897.87	122.99	6.78	372.90
1680	17.67	40	0.003358	8933.95	125.47	6.78	379.68
1710	17.61	40	0.003344	8970.32	127.96	6.78	386.46
1740	17.55	40	0.003331	9006.99	130.46	6.78	393.24
1770	17.49	40	0.003317	9043.96	132.97	6.78	400.02
1800	17.43	40	0.003304	9081.24	135.50	6.78	406.80
1830	17.37	40	0.003290	9118.82	138.03	6.78	413.58
1860	17.31	40	0.003276	9156.72	140.57	6.78	420.36
1890	17.25	40	0.003263	9194.93	143.13	6.78	427.14
1920	17.19	40	0.003249	9233.46	145.69	6.78	433.92
1950	17.13	40	0.003235	9272.32	148.27	6.78	440.70
1980	17.07	40	0.003222	9311.51	150.85	6.78	447.48
2010	17.01	40	0.003208	9351.02	153.45	6.78	454.26
2040	16.95	40	0.003195	9390.88	156.06	6.78	461.04
2070	16.89	40	0.003181	9431.06	158.68	6.78	467.82
2100	16.83	40	0.003167	9471.62	161.31	6.78	474.60
2130	16.77	40	0.003154	9512.51	163.95	6.78	481.38
2160	16.70	40	0.003140	9553.76	166.61	6.78	488.16
2190	16.64	40	0.003127	9595.36	169.27	6.78	494.94
2220	16.58	40	0.003113	9637.33	171.95	6.78	501.72
2250	16.52	40	0.003099	9679.67	174.64	6.78	508.50
2280	16.46	40	0.003086	9722.38	177.34	6.78	515.28
2310	16.40	40	0.003072	9765.46	180.05	6.78	522.06
2340	16.34	40	0.003058	9808.95	182.78	6.78	528.84
2370	16.28	40	0.003045	9852.81	185.51	6.78	535.62
2400	16.22	40	0.003031	9897.07	188.26	6.78	542.40
2430	16.16	40	0.003018	9941.73	191.02	6.78	549.18
2460	16.10	40	0.003004	9986.79	193.80	6.78	555.96
2490	16.04	40	0.002990	10032.26	196.59	6.78	562.74
2520	15.98	40	0.002977	10078.15	199.38	6.78	569.52
2550	15.92	40	0.002963	10124.46	202.20	6.78	576.30
2580	15.86	40	0.002950	10171.20	205.02	6.78	583.08
2610	15.80	40	0.002936	10218.37	207.86	6.78	589.86
2640	15.74	40	0.002922	10265.98	210.71	6.78	596.64
2670	15.68	40	0.002909	10314.04	213.58	6.78	603.42
2700	15.62	40	0.002895	10362.54	216.46	6.78	610.20
2730	15.56	40	0.002881	10411.51	219.35	6.78	616.98
2760	15.49	40	0.002868	10460.94	222.25	6.78	623.76
2790	15.43	40	0.002854	10510.85	225.17	6.78	630.54
2820	15.37	40	0.002841	10561.23	228.11	6.78	637.32
2850	15.31	40	0.002827	10612.10	231.06	6.78	644.10
2880	15.25	40	0.002813	10663.46	234.02	6.78	650.88
2910	15.19	40	0.002800	10715.31	236.99	6.78	657.66
2940	15.13	40	0.002786	10767.68	239.98	6.78	664.44
2970	15.07	40	0.002772	10820.56	242.99	6.78	671.22
3000	15.01	40	0.002759	10873.96	246.01	6.78	678.00

Hydraulic forces acting at point of rupture to cause oil to escape:

Oil Column in the onshore pipe line segment above 0 feet MLLWL =		0.425z psi
Oil Column in the onshore pipe line segment from 0 feet MLLWL to Ocean Floor at -40 feet =	(0.425)(65) =	17.000 psi

Hydraulic forces acting to oppose oil from escaping from pipe line:

Sea water Column from 0 feet MLLWL to Ocean Floor at -40 feet =	(43)(65) =	17.720 psi
Atmospheric Pressure acting on Sea Water Column =		14.7 psi

$0.425z + 17.000 = 17.720 + 14.7$
$0.425z = 0.72 + 14.7$

$z = 36.28$ feet

This level is more than 15 feet higher than the elevation of the onshore shut-in valve. Therefore, once the onshore shut-in valve is closed, no additional oil drainage from the pipe line will occur.

4.5.3 Total Release After Shut In

Platform Segment:	9.37 barrels
Shore Side Segment:	0.11 barrels
Total Release After Shut In:	9.48 barrels

5.0 SUMMARY OF RELEASE SCENARIOS

Table 7 on the next page gives a summary of the oil volume released for each of the three rupture sites. The data indicates that the amount of oil released is essentially constant with only a very slight increase as the rupture site moves towards shore. This occurs for three primary reasons:

1) Approximately ninety percent of the oil released in each case occurs prior to initiation of any shut-in procedures.

2) The volume of oil in the platform piping downstream of the platform shut-in valve is relatively small (14.36 barrels) compared to the volume released prior to initiation of shut-in procedures (111.4 barrels). Therefore the limited changes in the levels of hydraulic equilibrium do not significantly change the amount of the release.

3) Due to its viscosity, the amount of oil that drains from the onshore pipe line segment prior to shut-in of the onshore valve is limited (approximately 0.1 barrels). Once the onshore valve is closed, there is no additional drainage from the onshore line segment because the revised hydraulic equilibrium level is above the level of the onshore valve.

TABLE 7
OIL SPILL VOLUME SUMMARY

VOLUME RELEASED (BBLS)	RUPTURE SITE		
	BASE OF PLATFORM ELLY	THREE MILE LIMIT	POINT OF BURIAL
PRIOR TO DETECTION	35.00	35.00	35.00
DURING RESPONSE PERIOD PRIOR TO INITIATION OF SHUT-IN PROCEDURES	76.40	76.40	76.40
FROM PLATFORM SEGMENT AFTER SHUT DOWN OF PUMPS AND PRIOR TO CLOSING SHUT-IN VALVE	14.36	0.03	0.02
FROM PLATFORM SEGMENT AFTER CLOSING SHUT-IN VALVE	0.00	9.13	9.35
FROM ONSHORE SEGMENT AFTER SHUT DOWN OF PUMPS AND PRIOR TO CLOSING SHUT-IN VALVE	0.01	0.06	0.11
ᴐM ONSHORE SEGMENT AFTER CLOSING SHUT-IN VALVE	0.00	0.00	0.00
ƒOTAL OIL RELEASED	125.76	120.56	120.77

1999 WESTHOLLOW TECHNOLOGY CENTER STUDY

EQUILON
ENTERPRISES LLC
Shell & Texaco Working Together

02/03/99

Mr. Steve S. Shehorn
Aera Energy LLC
5060 California Avenue
Bakersfield, CA
93309

(Reference appropriate Service Agreements between our companies)

Dear Steve:

Per your recent request to Westhollow Technology Center, we have reviewed the data relative to the worst case spill scenario for the Beta pipeline. Drs. Moye Wicks and Bela James reviewed the historical information, and recalculated the worst case. Based on their assumptions and calculations, they have estimated that the worst case would occur if a break/leak occurred approximately three miles from the platform. In this case, it is estimated that up to 3111 barrels (2985 from this study, plus 126 barrels estimated in the original Shell Civil Engineering report) could be lost. It should be noted that this worst case location is in federal waters (i.e., beyond the 3 mile limit), at a depth of approximately 120 feet, and in the vicinity of the northbound shipping fairway (i.e., coastwise traffic lane) where anchoring would not normally occur.

As the pipeline gets closer to shore, the potential volumes lost due to pipeline leakage would decrease. This is due to the decreasing oil temperature and pipeline slope, and the increasing oil viscosity. The attached report includes the assumptions and calculations used to generate this revised worst case spill estimate for the Beta pipeline.

If you have further questions regarding these estimates, please contact me.

Sincerely,

Jim Ray

James P. Ray, Manager
Environmental Sciences

Cc: F. Cummings
L. Miller
M. Steube
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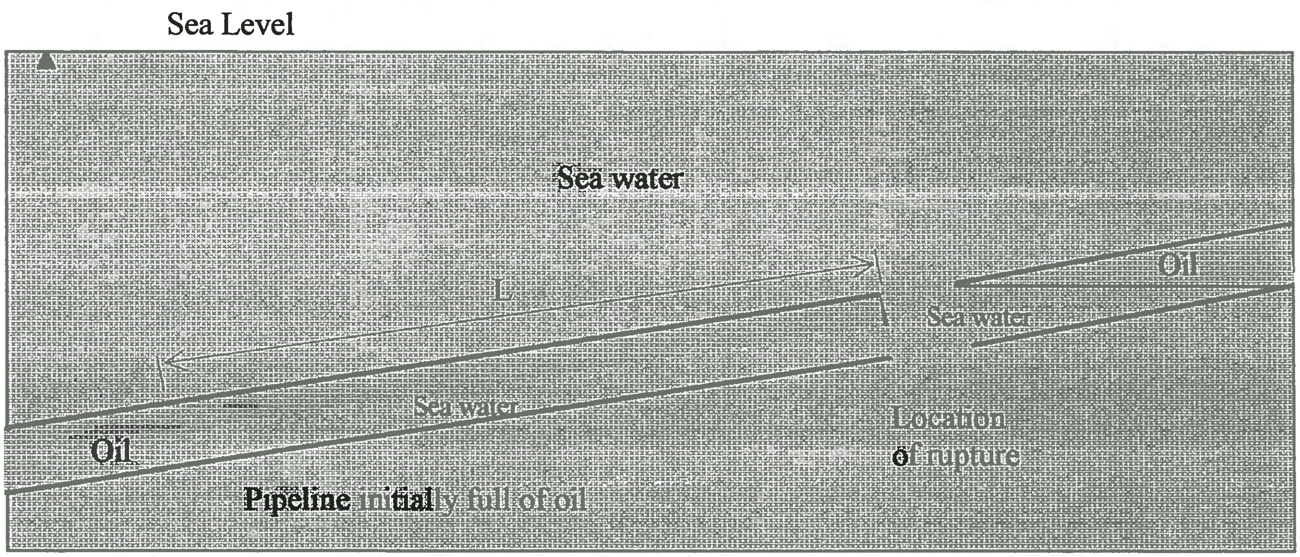
Attachment 1

Summary of Calculated Results for Cases Considered

Background

The Beta pipeline connects Platform Elly to the California coast receiving facilities near Long Beach via a 16" pipeline 17.3 miles in length through San Pedro Bay. About 10.9 miles of the pipeline runs along the ocean floor. 4.4 miles are buried 15 ft below the ocean floor, and the remaining 2 miles are onshore. The platform base rests in 265 ft of water. An analysis was requested of how much oil would leak out of the pipeline in the event of a pipeline rupture. Oil level in the tanks on the platform is at an elevation of some 45 ft above sea level, so when the pumps are stopped and before the shut-off valves are closed, there is a period of time when oil pressure in the line exceeds the local static pressure of seawater. An earlier study[1] made an estimate of the oil volume lost from an underwater leak during this period. The volumes quoted here should be added to those found in the earlier study. I address here other events which will happen, illustrated in the sketch below:



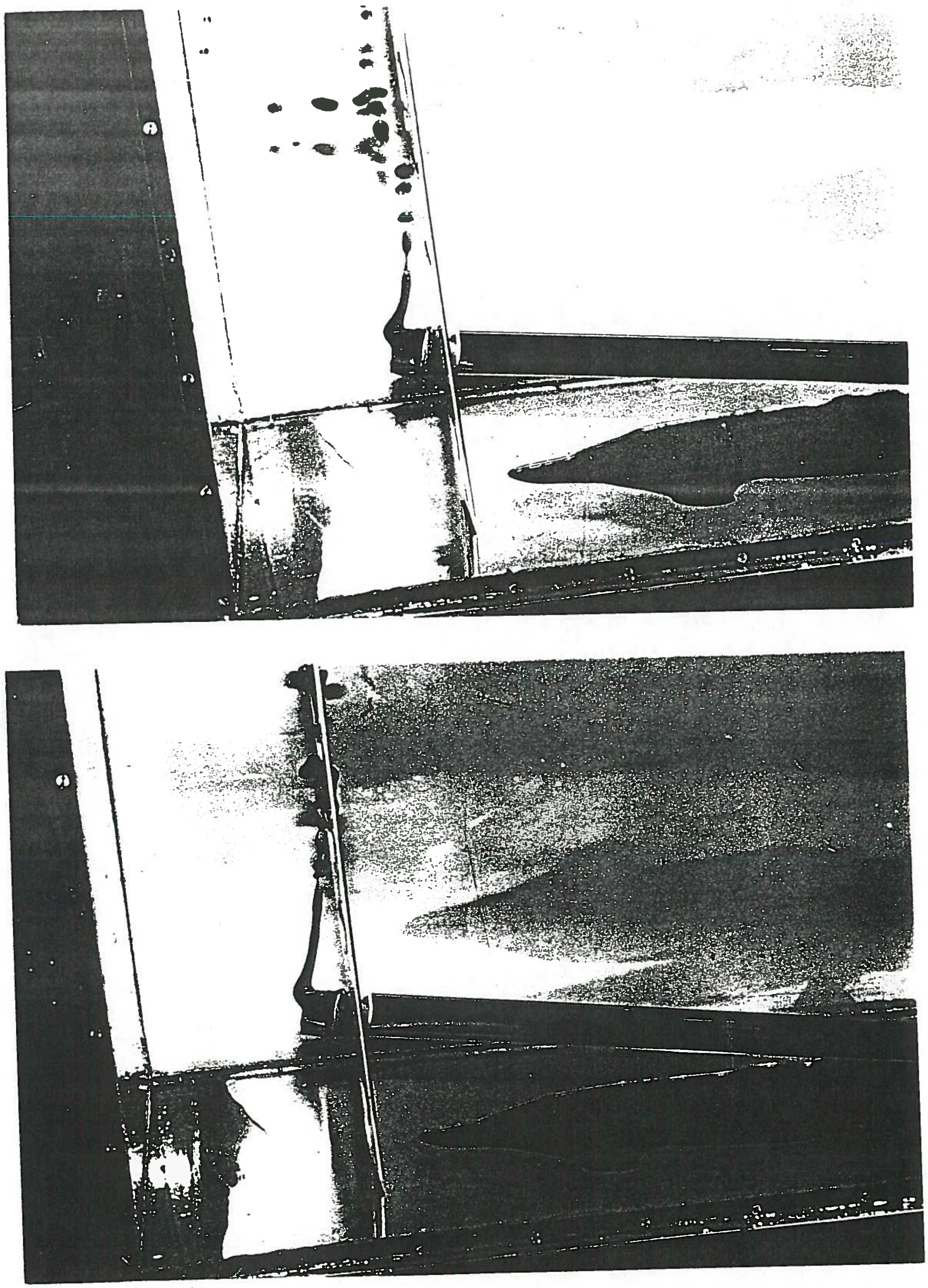
Water begins falling into the pipe, displacing the less dense oil up-slope, into the ocean. Oil in the pipe on the uphill side of the break is not lost, with the exception of a small amount equal to that pushed out of a one diameter slice, as illustrated above. See the sequence of photographs in Figure 1 which were taken in this laboratory to help visualize leakage from an underwater pipeline.

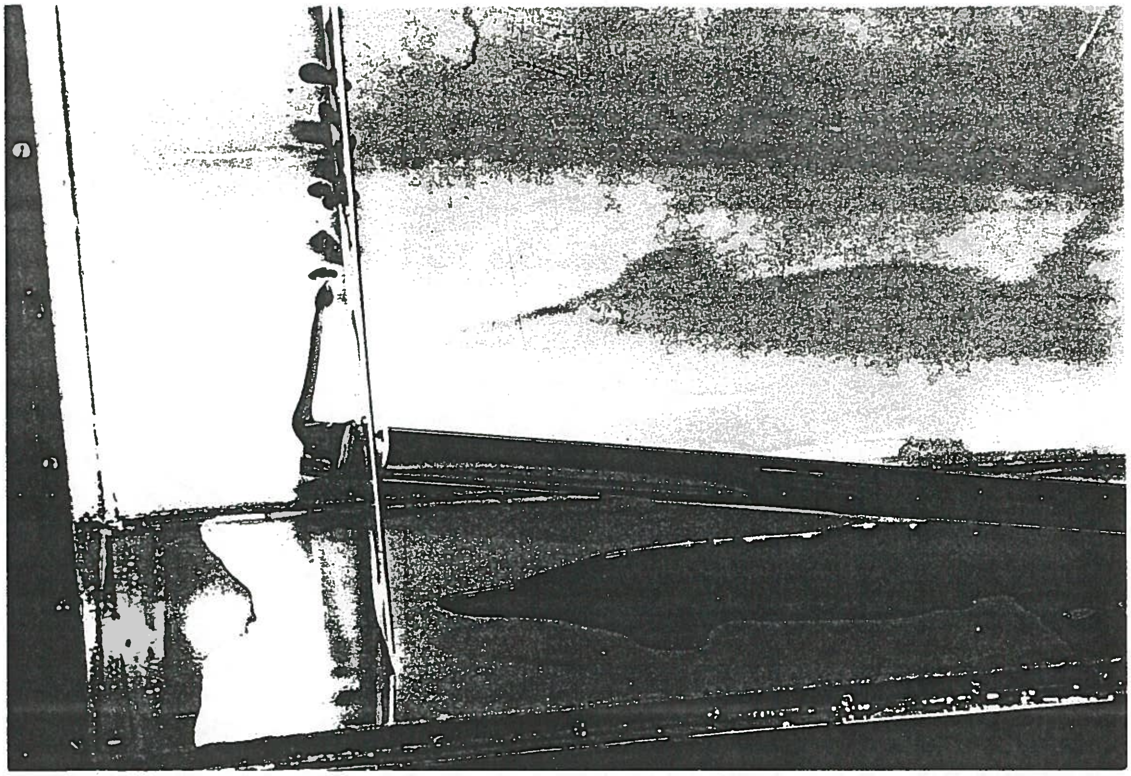
Eventually all of the oil down slope between the break and the location of the first bend, of height equal to one diameter or more, will leak out into the water. The Beta pipeline contains about 1/5 barrel of oil per foot of length, or 1,051 barrels per mile. In the entire line, there are 18,180 barrels of oil. Estimating leakage rate requires assumptions of where the leak occurs and determination of how fast the oil migrates—the latter, in turn, strongly dependent on the oil's viscosity at pipeline temperature and the local slope near the leak.

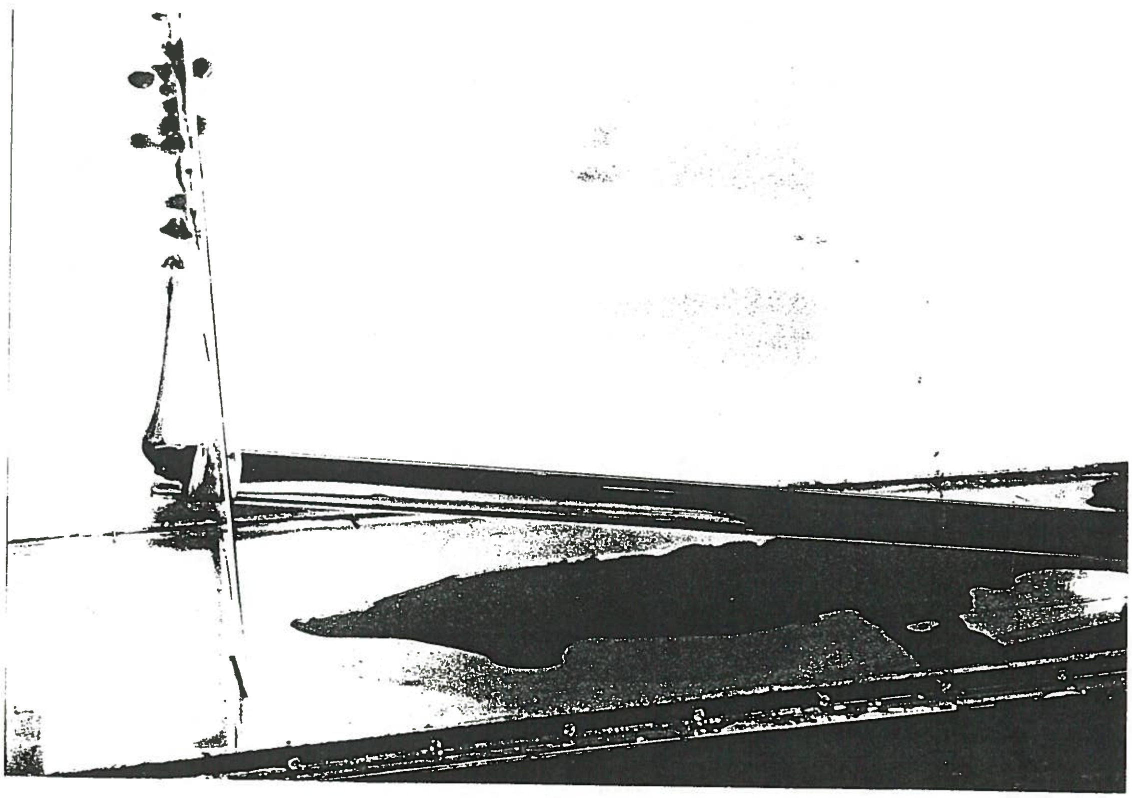
Leak Volume Analysis & Results

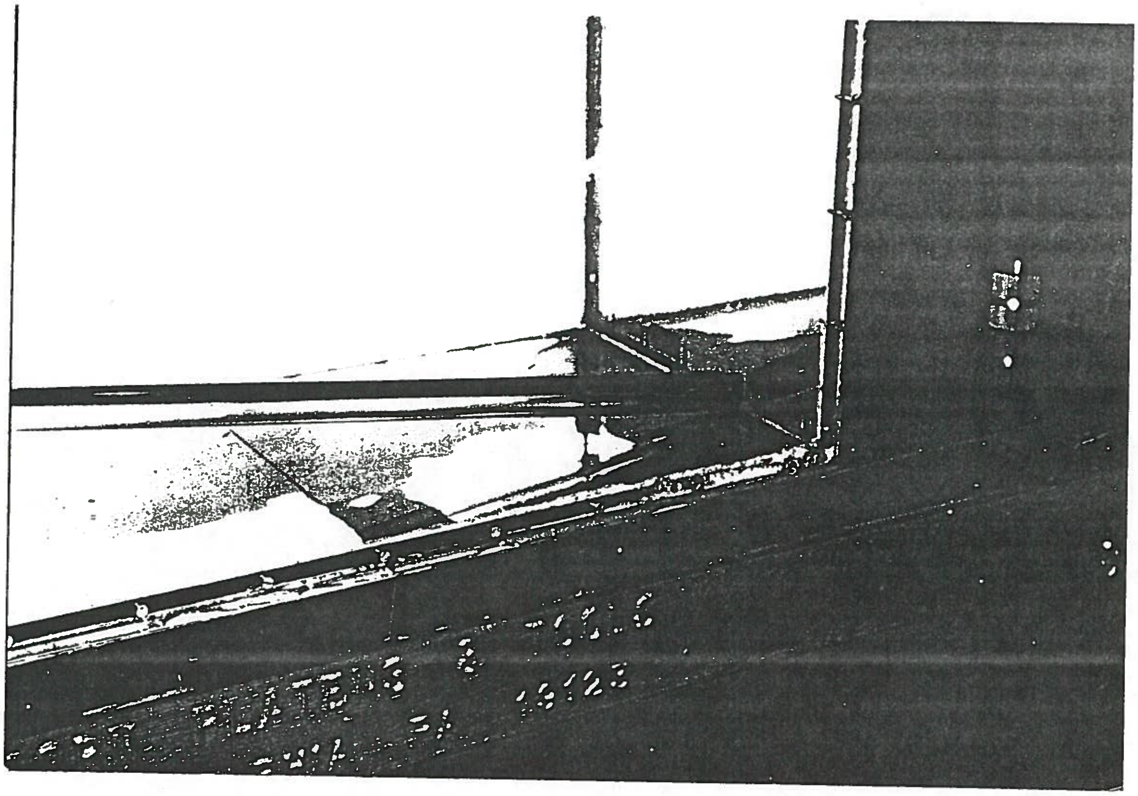
A model was developed to calculate the speed of oil migration and the fraction of the pipe cross-section oil occupies. With these two quantities, the volumetric flow rate of oil can be calculated. Knowing response time, leak volumes are then calculated. This model is presented in Attachment 2.

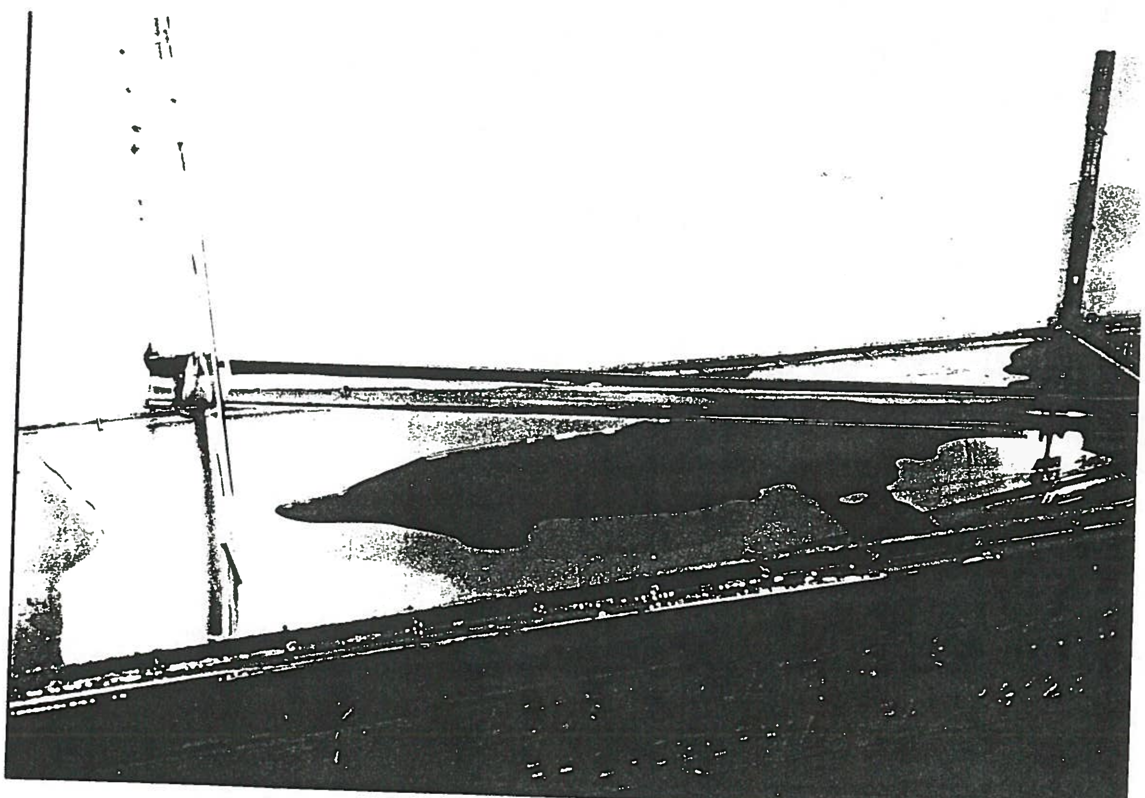
Figure 1
Oil Leak From a Model Submerged Pipeline











The model was used with various premised leak locations and oil temperatures. The results are shown in Table 1. As the table shows, if a leak were to occur anywhere past three miles from the platform, the oil volume leaked will be from 36 to 600 barrels during the 120 hour interval premised for stopping the leak. If the leak is at the base of the platform, the volume leaked will be close to zero, as the oil floats upward on both sides of the leak. If the leak is shore-ward from the platform, the oil on the platform side of the leak will float in the pipe toward the leak; the oil on the shore side of the leak will try to float, but it has no place to escape. Close to the platform, the oil is still hot and has greater mobility. Maximum leakage volume would occur if a leak happened to be at a distance of three miles from the platform: we estimate 2985 barrels would escape during the 120 hour interval in that instance.

Summary of Computed Results

Leak's Distance From "Elly" Ft	Local Oil Temp. Deg F	Oil Viscosity Mu Cp	Pipe Up-slope Degrees	269.1 Bbl = 3000 Ft Time Hours	Total Bbl Leaked : Convection in 120 Hr.
3000	147.9	223.6	1.489	2.77	597
6000	135.7	346.7	0.347	16.75	1194
9000	125.8	511.3	0.1146	63.13	1791
12000	117.2	735.0	0.347	35.42	2388
15000	110.2	1004.9	0.2292	69.78	2985
18000	104.1	1345.7	0.1146		207
21000	98.8	1749.2	0.347	84.18	597
24000	94.4	2200.7	0.2292		218
27000	90.4	2720.3	0		65.1
30000	86.9	3311.2	0.1146		103.3
33000	83.9	3930.5	0.2292		132.9
36000	81.3	4567.3	0.1146		82.1
39000	78.8	5326.5	0.2292		103.8
42000	76.7	6112.5	0		43.8
45000	74.8	6929.5	0.1146		61.2
48000	73.1	7758.6	0		38.3
51000	71.6	8577.2	0		36.4

Table 1
Summary of Computed Results

Attachment 2

Summary of Analysis of Leak Rate From an Underwater Pipeline

Consider the sketch in Attachment 1. Call the average flow velocity in the oil (upper) phase V_U, and that in the water (lower) phase V_L. Consider the water phase inside the pipe and the forces acting on it. The mass of the water phase is m_L, its density is ρ_L, and its cross-sectional flow area is A_L. The sum of the forces acting on the water is equal to its time rate of change of momentum, according to Newton's law of motion:

$$\sum F = \frac{1}{g_C}\frac{d}{dt}(m_L V_L)$$

Water mass inside the pipe is related to its density, cross sectional area (which is constant as discussed below), and length L:

$$m_L = \rho_L A_L L$$

Substitution above shows:

$$\sum F = \frac{\rho_L A_L}{g_C}\frac{d}{dt}(L V_L)$$

The forces acting on the water are due to:

- Pressure difference $(P_1 - P_2)\, A_L$ from the water entry to its distance of penetration L,
- Shear stress resistance $\tau_W P_L\, L$ at the pipe wall, where P_L is the wall perimeter in contact with water,
- Shear stress resistance $\tau_I P_I\, L$ at the interface, where P_I is the chord length of the oil/water interface, and
- Interfacial tension of the oil/water/steel contact line.

The Individual Forces

Pressure difference across the water phase inside the pipe is due to hydrostatic pressure differences, at the low velocities of interest here:

$$(P_1 - P_2) = (\rho_L - \rho_U)\frac{g}{g_C}\left(\frac{h}{Cos\,\theta} + L\,Sin\,\theta\right)$$

where h is the thickness of the lower phase in the pipe, and θ is the pipe's angle of inclination.

Shear stress at the wall is expressed as the product of friction factor f_L and the kinetic energy of the flow:

$$\tau_{WL} = \frac{f_L}{4}\frac{\rho_L V_L^2}{2 g_C}$$

(The 4 in the denominator is associated with the Moody friction factor definition.) In our case, the flows are all in the laminar range where f_L is given by:

$$f_L = \frac{64}{\left(\dfrac{D_{EL} V_L \rho_L}{\mu_L}\right)}$$

which gives the following for shear stress at the wall in the lower phase:

$$\tau_{WL} = \frac{8\mu_L V_L}{g_C D_{EL}}$$

where D_{EL} is the equivalent diameter pipe, defined as that which gives the same wall shear stress at the same flow velocity for the same fluid. D_E is calculated as 4 times the area of flow divided by the wetted perimeter[2]. These values are related to the height of the lower liquid phase and the diameter of the pipe by the following formulas:

$$A_L = R^2\left[ArcCos\left(1-\frac{h}{R}\right)-\left(1-\frac{h}{R}\right)\sqrt{1-\left(1-\frac{h}{R}\right)^2}\right]$$

$$P_L = 2\,R\left[ArcCos\left(1-\frac{h}{R}\right)+\sqrt{1-\left(1-\frac{h}{R}\right)^2}\right]$$

Interfacial shear stress or drag of the upper phase on the lower is given similarly, by:

$$\tau_{IL} = \frac{8\mu_U(V_U+V_L)}{g_C D_{EU}}$$

where the sum of the velocities is used since the two phases are in countercurrent flow.

Interfacial tension force at the lower end of the water phase is the interfacial tension σ multiplied by the interface's radius of curvature, assumed to be the pipe radius R. The interfacial tension force is thus $\sigma * R$.

Conservation of Volume in the Pipe

An additional requirement is that the net volumetric flow of water into the pipe must just balance that of the oil outflow:

$$V_L\,A_L = V_U\,A_U$$

Interfacial height of the lower phase h must be specified in order to solve these equations for velocity V_L at various values of length L. We will assume that, during the interval before the entering water reaches the nearest bend, layer thickness is constant, consistent with visual observations noted in Figure 1. Although no measurements were made in these tests, the layers appeared to divide the flow region nearly equally, with an impression that the lower phase was slightly thicker.

Benjamin[3] analyzed this problem for the case of ideal (frictionless) fluids. The velocity and height of the lower phase from his analysis are given by the formulas:

$$V_L = 0.767\sqrt{\frac{\Delta\rho}{\rho}\,g\,R}$$

$$h = 1.154\;R$$

for slope angles near horizontal. We will use these relations in our solution. The V_L formula, we believe, applies for the very early times of migration before the viscous forces become active; consequently we use this relationship as the initial condition for V_L, i.e., in the first increment of penetration length, and allow the equations and their numerical solution to determine all subsequent values.

Consistent with Benjamin's analysis and experiments of Zukoski[4] with (mostly) gas and liquid flowing counter-currently, we use h given above as constant throughout the entire length of pipe. Physical evidence from our own tests (see Figure 1) showed this to be a good assumption until the lower phase reached the bottom end of the pipe. After this, the upper phase continued to thin as it leaked out from the pipe break, and the lower phase became thicker. For our application, this will not happen in the 120 hour window of interest unless the leak occurs near the platform's base.

Solution for Phase Velocity and Leak Volume

When the above relations are substituted and simplified, the resulting equation is as follows:

$$\frac{d(LV_L)}{dt} = \frac{\rho_L - \rho_U}{\rho_L} g\left(\frac{h}{Cos\,\theta} + L\,Sin\,\theta\right) - \frac{8\mu_L P_L L V_L}{\rho_L D_{EL} A_L} - \frac{8\mu_U P_I\left(\frac{A_L}{A_U}+1\right) L V_L}{\rho_L D_{EU} A_L} - \sigma R$$

This equation can be simplified to:

$$\frac{d(LV_L)}{dt} = A + BL - CLV_L$$

by substituting:

$$A \equiv \frac{\rho_L - \rho_U}{\rho_L}\frac{g\,h}{Cos\,\theta} - \frac{\sigma R g_C}{\rho_L A_L} \qquad B \equiv \frac{\rho_L - \rho_U}{\rho_L} g\,Sin\,\theta$$

$$C \equiv \frac{8}{\rho_L A_L}\left[\frac{\mu_L P_L}{D_{EL}} + \frac{\mu_U P_I\left(\frac{A_L}{A_U}+1\right)}{D_{EU}}\right]$$

The time derivative of LV_L is:

$$\frac{d(LV_L)}{dt} = L\frac{dV_L}{dL}\frac{dL}{dt} + V_L\frac{dL}{dt}$$

$$= LV_L\frac{dV_L}{dL} + V_L^2$$

which, when substituted above gives:

$$LV_L\frac{dV_L}{dL} + V_L^2 = A + BL - CLV_L$$

It is possible to solve this equation numerically for V_L as a function of L using, for example, the Runge-Kutta[5] formulas. In the case at hand this is not necessary, however, since we are not interested in the very early part of the leak where V is changing rapidly with L, but rather in the long-time region where V changes very slowly with L. Consequently, we may drop the derivative term and solve the quadratic directly for V at assigned values of L:

$$V_L^2 + CLV_L - (A + BL) = 0$$

The solution is as follows:

$$V_L = \frac{1}{2}\left[-CL + \sqrt{(CL)^2 + 4(A + BL)}\right]$$

with A, B, and C defined above. This formula was coded into an Excel spreadsheet and the results plotted for various values of fluid properties and pipe size. Typical results are shown in Figure 2 and Table 2. Results showed clearly that the choice of temperature has a profound effect on volume leaked because of the steep dependence of oil viscosity on temperature. It is therefore very important to choose the correct temperature.

Oil Temperature

Oil leaves the platform at a temperature in the neighborhood of 165 degrees F, and arrives to shore facilities at about 66 degrees F, having cooled substantially during its passage through the cold waters of San Pedro Bay. At the point of the leak, oil temperature depends on the cumulative amount of cooling which has taken place. (We need not be concerned with the variability of oil temperature while the leak occurs, since the distance oil moves during the maximum time of 120 hours to repair the leak is relatively short.) We will use the results of a rather thorough analysis by V. R. Kruka[6] of heat loss and resulting temperature profile. His results are reproduced in Table 3 and Figure 3.

Line Slope

The leak might occur anywhere from the platform to shore. Nineteen possible leak points one-thousand yards apart were examined. The temperature at each point was determined from Kruka's study. Corresponding viscosity was read from a careful interpolation of the data table reported in the Shell Civil Engineering study, since these are already in possession of the MMS. Pipe slope was read from line layout and water depth charts belonging to and with the help of Mr. Bela James.

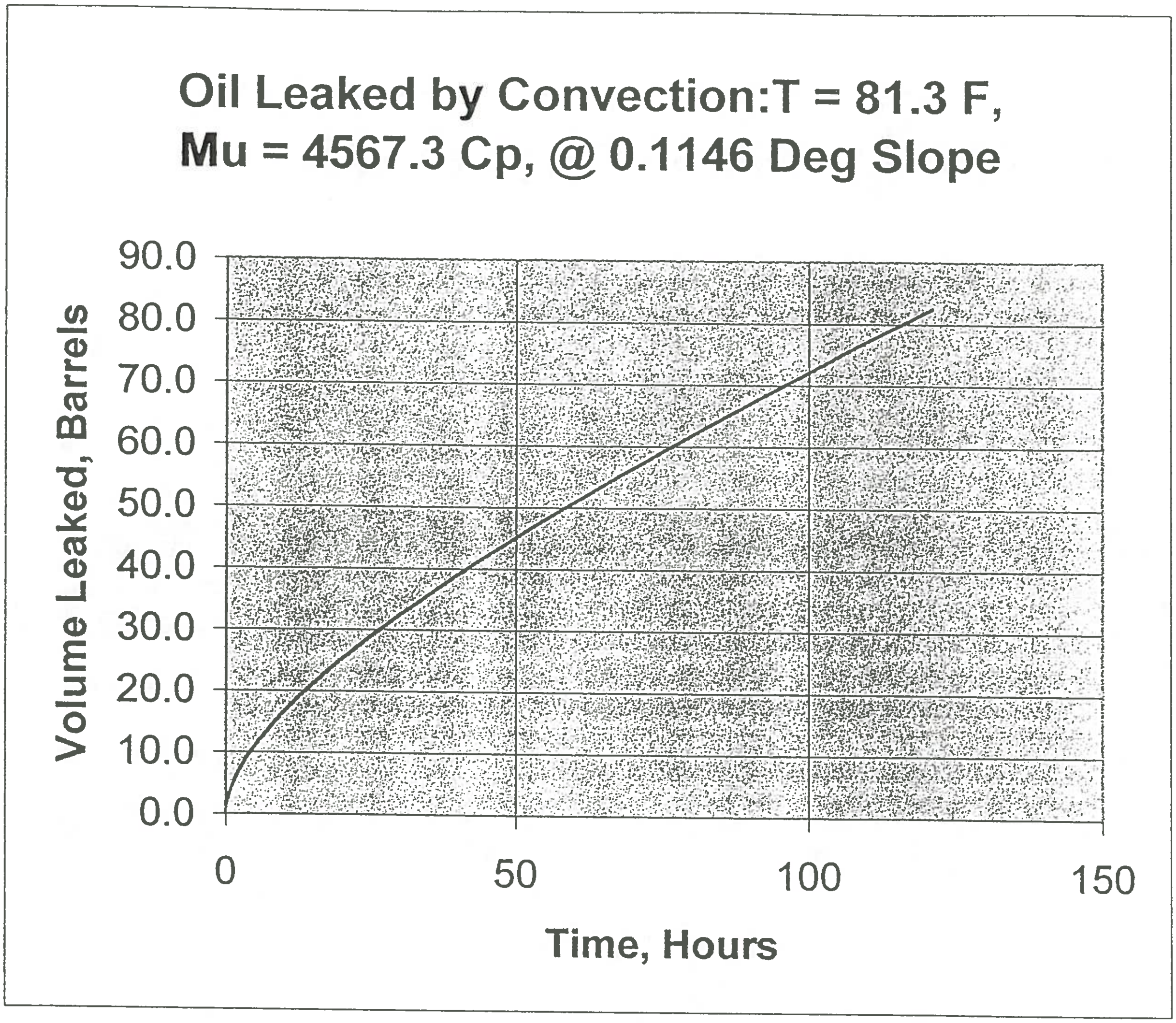


Figure 2
Leakage versus Time at 36,000 Ft from Platform Elly

Table 2

Example of Computed Results at 36,000 Ft from Platform Elly

Inclined Flow Conditions

Constants

Alpha	1.28696	MuU	4567.3 Cp
BetaL	0.000747	K	0.549805
BetaU	2.34001	Const	2.340757
Gamma	0.000902	Theta	0.1146 Degrees
A_11	0.885023		
B_11	0.002574		

X Ft	t Sec	Vinf Ft/Sec	T Minutes	Time Hours	Q Leaked Bbls Oil
0	0		0.0	0	0.0
20	1000	0.0200	16.7	0.28	1.8
40	2896	0.0106	48.3	0.80	3.6
60	5598	0.0074	93.3	1.56	5.4
80	9031	0.0058	150.5	2.51	7.2
100	13129	0.0049	218.8	3.65	9.0
120	17835	0.0043	297.2	4.95	10.8
140	23097	0.0038	385.0	6.42	12.6
160	28873	0.0035	481.2	8.02	14.4
180	35123	0.0032	585.4	9.76	16.1
200	41811	0.0030	696.9	11.61	17.9
220	48908	0.0028	815.1	13.59	19.7
240	56384	0.0027	939.7	15.66	21.5
260	64216	0.0026	1070.3	17.84	23.3
280	72379	0.0025	1206.3	20.11	25.1
300	80854	0.0024	1347.6	22.46	26.9
320	89621	0.0023	1493.7	24.89	28.7
340	98663	0.0022	1644.4	27.41	30.5
360	107966	0.0021	1799.4	29.99	32.3
380	117514	0.0021	1958.6	32.64	34.1
400	127294	0.0020	2121.6	35.36	35.9
420	137295	0.0020	2288.2	38.14	37.7
440	147504	0.0020	2458.4	40.97	39.5
460	157912	0.0019	2631.9	43.86	41.3
480	168509	0.0019	2808.5	46.81	43.1
500	179285	0.0019	2988.1	49.80	44.9
520	190234	0.0018	3170.6	52.84	46.6
540	201346	0.0018	3355.8	55.93	48.4
560	212614	0.0018	3543.6	59.06	50.2
580	224032	0.0018	3733.9	62.23	52.0
600	235594	0.0017	3926.6	65.44	53.8
620	247293	0.0017	4121.6	68.69	55.6
640	259125	0.0017	4318.7	71.98	57.4
660	271082	0.0017	4518.0	75.30	59.2
680	283162	0.0017	4719.4	78.66	61.0
700	295358	0.0016	4922.6	82.04	62.8
720	307667	0.0016	5127.8	85.46	64.6
740	320085	0.0016	5334.7	88.91	66.4
760	332607	0.0016	5543.4	92.39	68.2

780	345230	0.0016	5753.8	95.90	70.0
800	357950	0.0016	5965.8	99.43	71.8
820	370764	0.0016	6179.4	102.99	73.6
840	383669	0.0015	6394.5	106.57	75.4
860	396662	0.0015	6611.0	110.18	77.2
880	409739	0.0015	6829.0	113.82	78.9
900	422899	0.0015	7048.3	117.47	80.7
920	436138	0.0015	7269.0	121.15	82.5

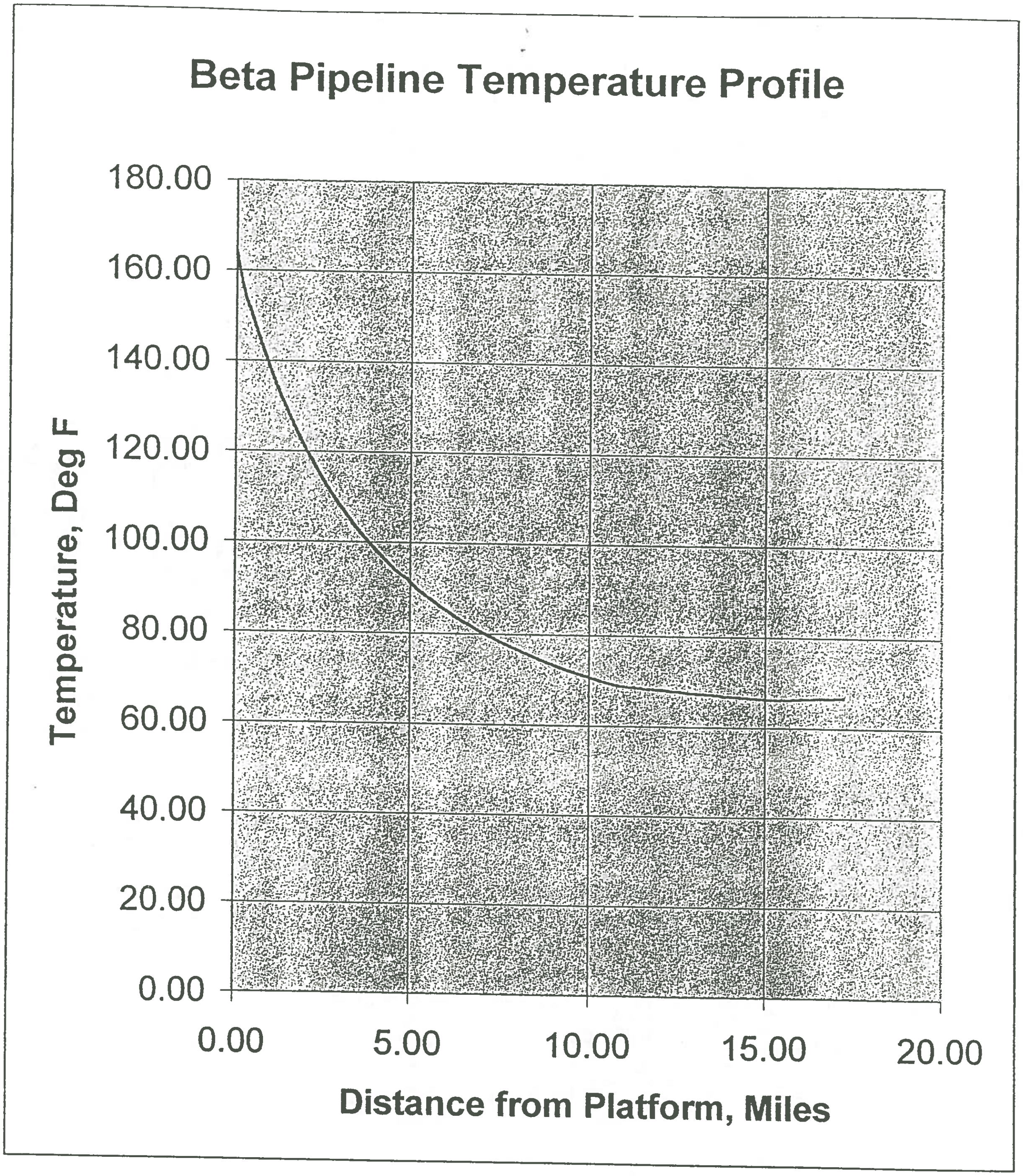


Figure 3
Beta Pipeline Oil Bulk Temperature Profile

Table 3
Beta Pipeline Oil and Wall Temperature Profile

LENGTH (ft)	BULK T (Deg.F)	WALL T (Deg.F)
260	162.23	62.84
520	160.29	60.93
780	158.49	60.19
1040	157.07	68.22
1300	155.70	67.55
1560	154.42	66.49
1820	153.23	65.49
2080	152.12	64.56
2340	150.89	65.78
2600	149.69	65.55
2860	148.51	65.28
3120	147.35	65.03
3380	146.21	64.78
3640	145.09	64.53
3900	143.99	64.30
4160	142.91	64.07
4420	141.84	63.85
4680	140.80	63.63
4940	139.77	63.42
5200	138.76	63.21
5460	137.76	63.01
5720	136.79	62.81
5980	135.82	62.62
6240	134.88	62.43
6500	133.95	62.25
6760	133.03	62.07
7020	132.13	61.89
7280	131.24	61.72
7540	130.37	61.56
7800	129.51	61.39
8060	128.66	61.24
8320	127.83	61.08
8580	127.01	60.93
8840	126.20	60.78
9100	125.40	60.63
9360	124.62	60.49
9620	123.85	60.35
9880	123.09	60.22
10140	122.34	60.08
10400	121.60	59.95
10660	120.87	59.82
10920	120.16	59.70
11180	119.45	59.58
11440	118.76	59.46
11700	118.07	59.34
11960	117.40	59.22
12220	116.73	59.11
12480	116.07	59.00
12740	115.43	58.89
13000	114.79	58.79
13260	114.16	58.68
13520	113.54	58.58
13780	112.93	58.48
14040	112.33	58.38
14300	111.73	58.29
14560	111.15	58.19
14820	110.57	58.10
15080	110.00	58.01
15340	109.43	57.92
15600	108.88	57.83
15860	108.33	57.75
16120	107.79	57.67
16380	107.26	57.58
16640	106.73	57.50
16900	106.21	57.42
17160	105.70	57.34
17420	105.19	57.27
17680	104.70	57.19
17940	104.20	57.12
18200	103.72	57.05
18460	103.24	56.98
18720	102.76	56.91
18980	102.30	56.84
19240	101.84	56.77
19500	101.38	56.70
19760	100.93	56.64
20020	100.49	56.58
20280	100.05	56.51
20540	99.61	56.45
20800	99.19	56.39
21060	98.76	56.33
21320	98.35	56.27
21580	97.93	56.22
21840	97.53	56.16
22100	97.12	56.10
22360	96.73	56.05
22620	96.34	55.99
22880	95.95	55.94
23140	95.56	55.89
23400	95.19	55.84
23660	94.81	55.79
23920	94.44	55.74
24180	94.08	55.69
24440	93.72	55.64
24700	93.36	55.60
24960	93.01	55.55
25220	92.66	55.50
25480	92.32	55.46
25740	91.98	55.41
26000	91.64	55.37
26260	91.31	55.33
26520	90.98	55.29
26780	90.66	55.24
27040	90.34	55.20
27300	90.02	55.16
27560	89.70	55.12
27820	89.39	55.08
28080	89.09	55.05
28340	88.78	55.01
28600	88.49	54.97
28860	88.19	54.93
29120	87.90	54.90
29380	87.61	54.86
29640	87.32	54.83
29900	87.04	54.79
30160	86.76	54.76
30420	86.48	54.73
30680	86.20	54.69
30940	85.93	54.66
31200	85.67	54.63
31460	85.40	54.60
31720	85.14	54.56
31980	84.88	54.53
32240	84.62	54.50
32500	84.37	54.47
32760	84.12	54.44
33020	83.87	54.42
33280	83.62	54.39
33540	83.38	54.36
33800	83.14	54.33
34060	82.90	54.30
34320	82.66	54.28
34580	82.43	54.25
34840	82.20	54.22
35100	81.97	54.20
35360	81.74	54.17
35620	81.52	54.15
35880	81.30	54.12
36140	81.08	54.10
36400	80.86	54.07
36660	80.65	54.05
36920	80.44	54.03
37180	80.23	54.00
37440	80.02	53.98
37700	79.81	53.96
37960	79.61	53.94
38220	79.41	53.91
38480	79.21	53.89
38740	79.01	53.87
39000	78.81	53.85
39260	78.62	53.83
39520	78.43	53.81
39780	78.24	53.79
40040	78.05	53.77
40300	77.86	53.75
40560	77.68	53.73
40820	77.50	53.71
41080	77.32	53.69
41340	77.14	53.67
41600	76.96	53.65
41860	76.78	53.63
42120	76.61	53.62
42380	76.44	53.60
42640	76.27	53.58
42900	76.10	53.56
43160	75.93	53.55
43420	75.77	53.53
43680	75.60	53.51
43940	75.44	53.50
44200	75.28	53.48
44460	75.12	53.46
44720	74.96	53.45
44980	74.81	53.43
45240	74.65	53.42
45500	74.50	53.40
45760	74.35	53.39
46020	74.19	53.37
46280	74.05	53.36
46540	73.90	53.34
46800	73.75	53.33
47060	73.61	53.31
47320	73.46	53.30
47580	73.32	53.28
47840	73.18	53.27
48100	73.04	53.26
48360	72.90	53.24
48620	72.77	53.23
48880	72.63	53.22
49140	72.50	53.20
49400	72.36	53.19

49660	72.23	53.18
49920	72.10	53.17
50180	71.97	53.15
50440	71.84	53.14
50700	71.71	53.13
50960	71.59	53.12
51220	71.46	53.11
51480	71.34	53.09
51740	71.22	53.08
52000	71.09	53.07
52260	70.97	53.06
52520	70.85	53.05
52780	70.74	53.04
53040	70.62	53.03
53300	70.50	53.02
53560	70.39	53.01
53820	70.27	52.99
54080	70.16	52.98
54340	70.05	52.97
54600	69.94	52.96
54860	69.83	52.95
55120	69.72	52.94
55380	69.61	52.93
55640	69.50	52.92
55900	69.39	52.91
56160	69.29	52.91
56420	69.18	52.90
56680	69.08	52.89
56940	68.98	52.88
57200	68.94	61.81
57460	68.90	61.51
57720	68.86	61.50
57980	68.83	61.48
58240	68.79	61.46
58500	68.75	61.44
58760	68.72	61.42
59020	68.68	61.40
59280	68.65	61.38
59540	68.61	61.36
59800	68.57	61.34
60060	68.54	61.32
60320	68.50	61.30
60580	68.47	61.28
60840	68.43	61.26
61100	68.40	61.24
61360	68.36	61.22
61620	68.33	61.20
61880	68.29	61.19
62140	68.26	61.17
62400	68.23	61.15
62660	68.19	61.13
62920	68.16	61.11
63180	68.12	61.09
63440	68.09	61.07
63700	68.06	61.05
63960	68.02	61.04
64220	67.99	61.02
64480	67.96	61.00
64740	67.92	60.98
65000	67.89	60.96
65260	67.86	60.95
65520	67.82	60.93
65780	67.79	60.91
66040	67.76	60.89
66300	67.73	60.88
66560	67.70	60.86
66820	67.66	60.84
67080	67.63	60.82
67340	67.60	60.81
67600	67.57	60.79
67860	67.54	60.77
68120	67.51	60.75
68380	67.47	60.74
68640	67.44	60.72
68900	67.41	60.70
69160	67.38	60.69
69420	67.35	60.67
69680	67.32	60.65
69940	67.29	60.64
70200	67.26	60.62
70460	67.23	60.60
70720	67.20	60.59
70980	67.17	60.57
71240	67.14	60.56
71500	67.11	60.54
71760	67.08	60.52
72020	67.05	60.51
72280	67.02	60.49
72540	66.99	60.48
72800	66.96	60.46
73060	66.93	60.45
73320	66.91	60.43
73580	66.88	60.41
73840	66.85	60.40
74100	66.82	60.38
74360	66.79	60.37
74620	66.76	60.35
74880	66.73	60.34
75140	66.71	60.32
75400	66.68	60.31
75660	66.65	60.29
75920	66.62	60.28
76180	66.60	60.26
76440	66.57	60.25
76700	66.54	60.23
76960	66.51	60.22
77220	66.49	60.21
77480	66.46	60.19
77740	66.43	60.18
78000	66.41	60.16
78260	66.38	60.15
78520	66.35	60.13
78780	66.33	60.12
79040	66.30	60.11
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79560	66.25	60.08
79820	66.22	60.06
80080	66.20	60.05
80340	66.17	60.04
80600	66.14	60.02
80860	66.16	67.93
81120	66.18	67.95
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81640	66.21	67.97
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82160	66.24	67.99
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85280	66.43	68.10
85540	66.44	68.11
85800	66.46	68.12
86060	66.48	68.13
86320	66.49	68.13
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87100	66.54	68.16
87360	66.55	68.17
87620	66.57	68.18
87880	66.58	68.19
88140	66.60	68.20
88400	66.61	68.20
88660	66.63	68.21
88920	66.64	68.22
89180	66.66	68.23
89440	66.67	68.24
89700	66.69	68.25
89960	66.70	68.26
90220	66.71	68.26
90480	66.73	68.27
90740	66.74	68.28
91000	66.76	68.29
91260	66.77	68.30

References

1. Shell Civil Engineering Study, Attachment A, "Engineering Calculations for the Worst Case Spill From the 16-Inch Offshore Beta Pipeline".
2. Taitel, Y. & A. E.Dukler, "A Model for Predicting Flow Regime Transitions in Horizontal & Near-Horizontal Gas-Liquid Flow", A.I.Ch.E. Jour., 22, pp. 47-55 (1976).
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5. Burden, R.L., and J. D. Faires, "Numerical Analysis", 3rd Ed., Prindle, Weber, & Schmidt, Boston, 1985, pp. 225-237.
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2011 INTERACT BETA FIELD OCS CALIFORNIA WORST-CASE DISCHARGE SCENARIO

United States Department of the Interior

BUREAU OF OCEAN ENERGY
MANAGEMENT, REGULATION AND ENFORCEMENT

Pacific OCS Region
770 Paseo Camarillo, 2nd Floor
Camarillo, California 93010-6064

RECEIVED
DEC 2 1 2010
BY:

December 17, 2010

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Steve Liles
Beta Offshore
111 West Ocean Blvd., Suite 1240
Long Beach, CA 90802

Re: Required Information for
Beta Unit
Development & Production Plan

Dear Mr. Liles:

Pursuant to the regulations at 30 CFR 250.284, the Bureau of Offshore Energy Management, Regulation and Enforcement (BOEMRE) periodically reviews activities you conduct under an approved Development and Production Plan (DPP) and may require you to submit updated information on your activities.

We are currently reviewing approved DPP's for operations in the Pacific OCS Region to determine compliance with the requirements of 30 CFR 250.243(h) and 250.250. To facilitate this review, please supply the following information to update your approved DPP and Oil Spill Response Plan (OSRP):

- A blowout scenario as required by 30 CFR 250.243(h). Include the estimated flow rate, total volume, and maximum duration of the potential blowout. Discuss the potential for the well to bridge over, the likelihood for surface intervention to stop the blowout, the availability of a rig to drill a relief well, and rig package constraints. Specify as accurately as possible the time it would take to contract for a rig, move it onsite, and drill a relief well, including the possibility of drilling a relief well from a neighboring platform or an onshore location.
- Describe the measures you propose that would enhance your ability to prevent a blowout, to reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout, including your arrangements for drilling relief wells and any other measures you propose.
- Provide the assumptions and calculations that you used to determine the volume (daily discharge rate) of your worst-case discharge scenario required by 30 CFR 250.250(a)(2)(iv). In calculating a worst-case discharge scenario from a wellbore

during drilling operations, the following definition and assumptions are to be taken into account:

- *Worst-Case Discharge Defined - The daily rate of an uncontrolled flow from one or more producible reservoirs into the open wellbore. The package of reservoirs exposed to an open borehole with the greatest discharge potential will be considered the worst-case discharge scenario. Shallower producible reservoirs isolated by casing and cement will **not** be considered in the uncontrolled flow.*
- Assume all casing strings are successfully run and cemented above the zone that is flowing.
- Assume that the flow is up unobstructed casing and liner. Therefore, no drill pipe is left in the hole to inhibit flow.
- Assume the blowout preventer failed and that flow occurs uninhibited from the wellhead.
- Do not account for reduced flow due to well bridging unless able to prove otherwise.
- Assume full penetration of the target reservoir.

In addition, please identify and describe the predicted values and calculations used to determine the volume (daily discharge rate) of the worst-case discharge blowout scenario. These parameters include:

- Well design (borehole diameter and the length of uncased hole exposed before casing is run).
- Reservoir characteristics encountered during drilling (reservoir lithology, permeability, drive mechanism, reservoir thicknesses, and drainage area).
- Fluid characteristics, for example, bubble point pressures, oil viscosity, oil compressibility, API gravity, static fluid oil gradient, B_{oi} (oil formation volume factor), R_{si} (gas solubility in oil usually measured as scf/STB), and gas specific gravity.
- Pressure, volume, and temperature (PVT) data for each reservoir.
- Any analog reservoir(s) considered in making those assumptions if data from the field is not available, including your justification for selecting the analog reservoir(s).
- Geologic Information:
  - Structure Maps (Enclosure 1) for each potential hydrocarbon reservoir to be encountered
  - Individual hydrocarbon bearing zone top and base
  - Maximum drainage area (cite analog)
  - Range of permeability (could use analog MDT mobility ratio values from pressure tests)
  - Range of height of net hydrocarbon bearing zone (cite analog)
  - Reservoir drive mechanism (cite analog)
  - Cross-section depicting all anticipated hydrocarbons bearing zones
- All supporting calculations and models used to determine the daily discharge rate from an uncontrolled blowout.

- Any additional information about other zones in the area believed to have higher worst-case discharge potential than one presented as the worst-case discharge.

Enclosed is a diagram (Enclosure 2) that describes the wellbore and clarifies the worst-case discharge blowout parameters. Also enclosed is an Excel spreadsheet (Enclosure 3) that should be used to describe the geology and reservoir characteristics for the worst-case discharge blowout scenario. The BOEMRE will need this data to verify your calculated worst-case discharge.

In preparing this information, you may reference information and data discussed in your approved OSRP that was prepared according to the requirements of 30 CFR 254 subpart B. In accordance with 30 CFR 254.30(e), BOEMRE's Regional Supervisor may require an operator to revise its OSRP if significant deficiencies in the OSRP are indicated by (1) periodic reviews of the Oil Spill Removal Organization capabilities, (2) information obtained during drills or actual spill responses, or (3) other relevant information obtained by the Regional Supervisor, including, for example, changes in an operator's worst-case discharge calculation scenario.

Please refer to 30 CFR 250.206 for submitting proprietary, public information, and electronic copies. The information should be submitted as soon as reasonably possible, but no later than January 31, 2011. If you have any questions, please contact Ms. Cathy Hoffman at (805) 389-7575.

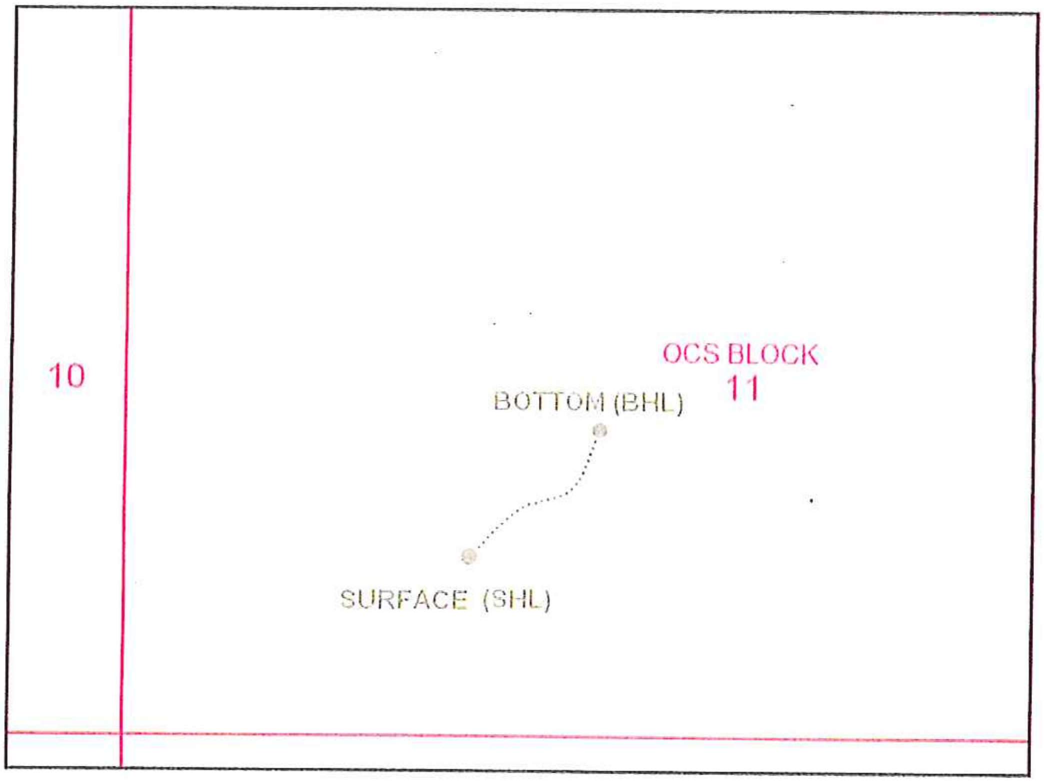
Sincerely,

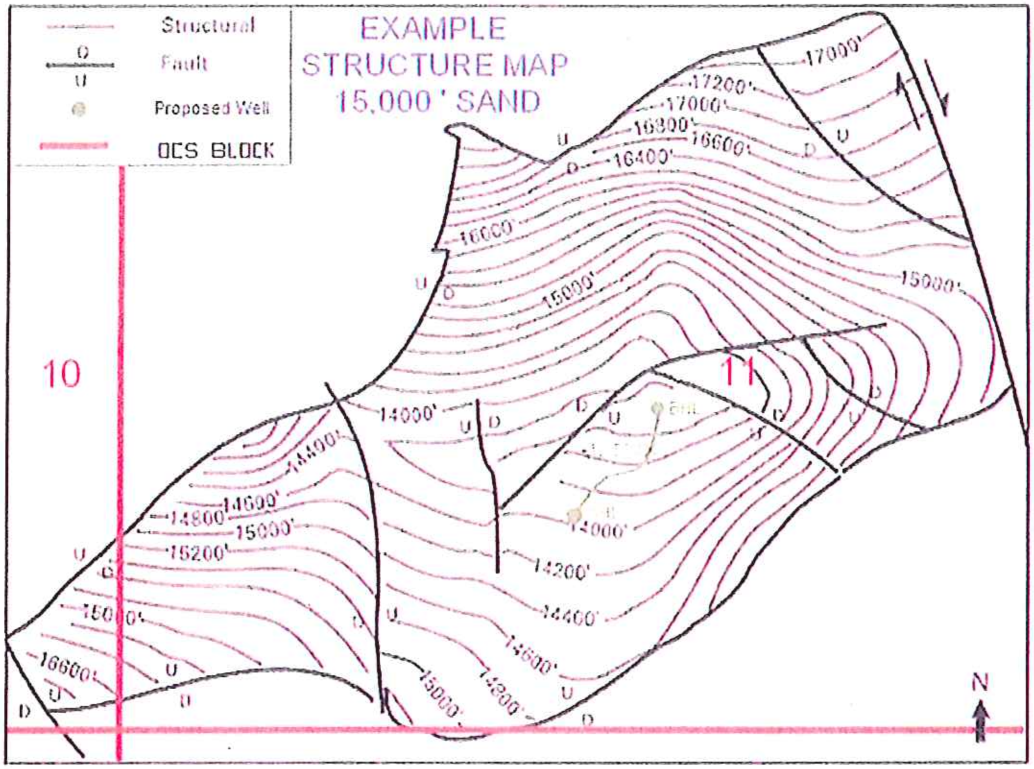
Rishi Tyagi
Regional Supervisor
Office of Field Operations

Enclosure (3)

bcc: File: 1703-02a(1) Beta Unit DPP Correspondence (w/encls.)
Chron
OEMM PAC Managers/Supervisors (electronic copy) (w/ encls.)
OMM PAC OSES (electronic copy) (w/ encls.)
OFO/OSE:CMHoffman/pfr:mydocs:msoffice:word:hoffmanfiles:2010:
Oil Spill Info for DPP-Beta Unit Beta Offshore12-17-10Final .doc

EXAMPLE WELL LOCATION PLAT




Structural
Fault
Proposed Well
OCS BLOCK
EXAMPLE
STRUCTURE MAP
15,000 ' SAND
10
11
N
17000'
17200'
17000'
16800'
16600'
16400'
16000'
15000'
15000'
14000'
14400'
14600'
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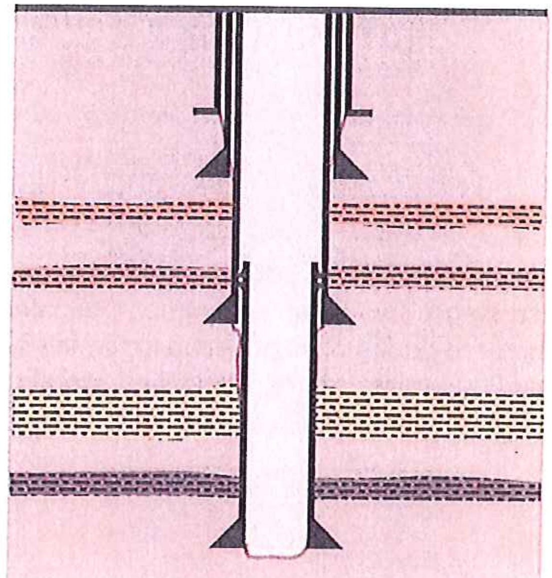
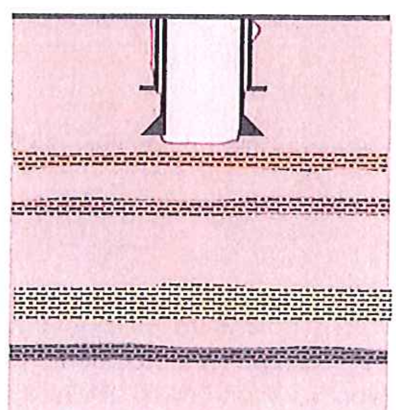
14200'
14400'
14600'
15000'
14200'

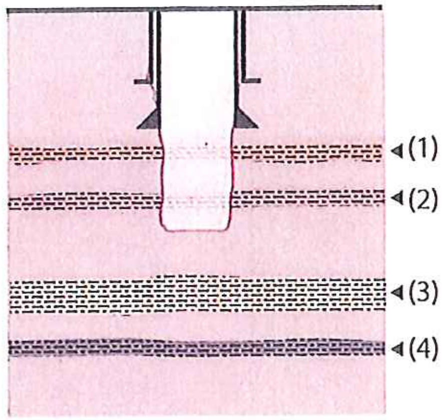


Calculate worst case discharge at each casing interval where potential hydrocarbon reservoir are exposed.

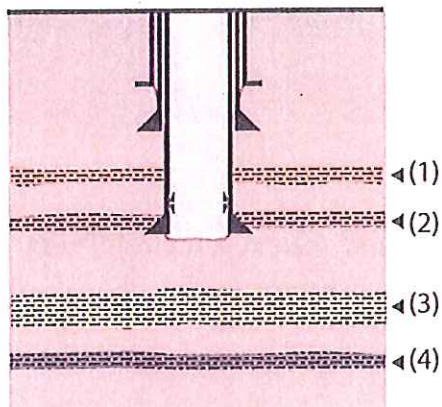
Example:



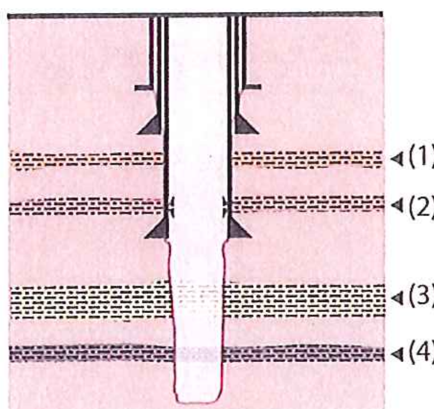
1. First stage: No hydrocarbon bearing intervals encountered; no discharge calculation required.



2\. Second stage: Two potential hydrocarbon interval are encountered during drilling; because the intervals are exposed before the casing is installed, worst case discharge is calculated for the two intervals (1) and (2).



2a. Second stage casing is installed sealing the two intervals.



3\. Third stage: The hole is drilled to final depth encountering the target reservoir and additional hydrocarbon bearing intervals. Worst case discharge is calculated again for all of the exposed intervals (3 and 4) before the final casing/liner is installed.

4\. The greater of the two calculations becomes the WCD for the well

Worst Case Discharge Summary Sheet

General Information	

Wellbore Data

Water depth at proposed well location (feet)	

Interval Number	Hole Size	Casing Size	Weight	Grade	Setting Depth	
					MD	TVD

Directional Survey Data

MD	Inclination	Azimuth	TVD	X Location	Y Location	Comments
						Indicate here what datum and projection the coordinates are reported in. IE: Nad 27 Lambert VI or Nad 27 UTM

***Please add any additional columns as necessary to fit the data**

Geologic Data

Identify Open Hole Interval Used in WCD calculation			Top MD		Base MD	
Hydrocarbon Bearing Zone (HBZ) Name	TOP MD and TVD	Base MD and TVD	Height (Interface in Wellbore)	HBZ Thickness (True Vertical Thickness)	Drainage Area (acres)	Used in WCD Calculation (Y or N)

Reservoir Data

Reservoir Name		
Characteristic	Characteristic Value	Analog Used
Initial Pressure (psia)		
Initial Temperature (F)		
Permeability (md)		
Drainage Area (acres)		
MD Thickness of Reservoir (ft)		
Drive Mechanism		

Fluid Data

Reservoir Name		
Characteristic	Characteristic Value	Analog Used
	Oil	
Bubble Point Pressure (psia)		
Bo (bbl/STB)		
Oil Viscosity (cp)		
Oil Compressibility (z)		
Oil API Gravity (API)		
Static Oil Fluid Gradient		
Rs (scf/STB)		
	Gas	
Gas Specific Gravity (API)		
API Gravity of Condensate (API)		
Yield (bbl/MMCF)		
Static Gas Fluid Gradient		
D-Turbulence Flow Factor		
Gas Viscosity (cp)		

Beta Field
OCS California
Worst-Case Discharge Scenario

Prepared for:

Beta Offshore

Prepared By:

InterAct
an ACTEON company

April 2011

4567 Telephone Road, Suite 203
Ventura, California 93003
www.interactprojects.com

InterAct

Beta Field OCS California
Worst-Case Discharge Scenario

Beta Offshore
April 2011

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Beta Field OCS California
Worst-Case Discharge Scenario

SUMMARY

This report was prepared as a result of the Bureau of Ocean Energy Management, Regulation and Enforcement's request to Beta Offshore to supply information pertaining to the theoretical potential of a Worst Case Discharge (WCD) due to a blowout from the Beta Offshore operated Beta Field wells, along with potential intervention operations in the event of a blowout.

The main findings of this report are:

- In the event of a blowout within the Beta Offshore-operated Beta Field, the Worst-Case Discharge (WCD) potential of a well is estimated to be 45 bopd and 105 bwpd.

- For a planned Beta Offshore drilling program, a well blowout on Platform Ellen could be relieved by drilling a relief well utilizing the existing drilling equipment from Platform Eureka and vice versa. Existing relief well drilling capabilities would limit a relief well drilled from Platform Ellen to approximately 3,200' past Platform Eureka. In the event of a blowout on Platform Eureka past the 3,200' corridor, the Platform Ellen drilling rig package could be temporarily upgraded with rental equipment of a top drive unit and 1,300-1,600 horsepower mud pump, which can be installed on the rig within a relief well 7 day rig-up period.

- Premised on 7 days to begin drilling a relief well and 20 days for the relief well to reach TD and complete shut off / plugging operations, it is estimated approximately 1,215 bbl. of oil and 2,835 bbl. of water would be released from the "Pseudo" Well A-38 blowout well during the 60 day blowout period.

1. OVERVIEW

This report is prepared in response to the Bureau of Ocean Energy and Management, Regulation and Enforcement's (BOEMRE) letter of December 17, 2010 to Mr. Steve Liles, Beta Offshore (see Attachment 1). BOEMRE has requested that Beta Offshore supply information in order to update Beta's approved Development and Production Plan (DPP) and Oil Spill Response Plan (OSRP). The following information was requested by the BOEMRE:

- *A blowout scenario as required by 30 CFR 250.213(g) and 250.243(h). Provide a Scenario for the potential blowout of the proposed well in your plan or document that you expect will have the highest volume of liquid hydrocarbons. Include the estimated flow rate, total volume, and maximum duration of the potential blowout. Discuss the potential for the well to bridge over, the likelihood for surface intervention to stop the blowout, the availability of a rig to drill a relief well, and rig package constraints. Specify as accurately as possible the time it would take to contract for a rig, move it onsite, and drill a relief well, including the possibility of drilling a relief well from a neighboring platform or an onshore location.*

- *Describe the measures you propose that would enhance your ability to prevent a blowout, to reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout, including your arrangements for drilling relief wells, and any other measures you propose.*

- *Any additional information about other zones in the area believed to have higher worst-case discharge potential than one presented as the worst-case discharge.*

This report presents the above-requested information for the Beta Field. Section 2 describes the Beta Field; Section 3 discusses the worst-case scenario and information about potential other discharge zones, along with the premises and supporting documentation. Section 4 presents blowout cessation measures, including relief well drilling; and Section 5 describes blowout prevention measures to be implemented by Beta Offshore during drilling in the Beta Field.

2. FIELD DESCRIPTION

The Beta Field is located offshore southern California in the Gulf of Santa Catalina as shown in Figure 1 below.

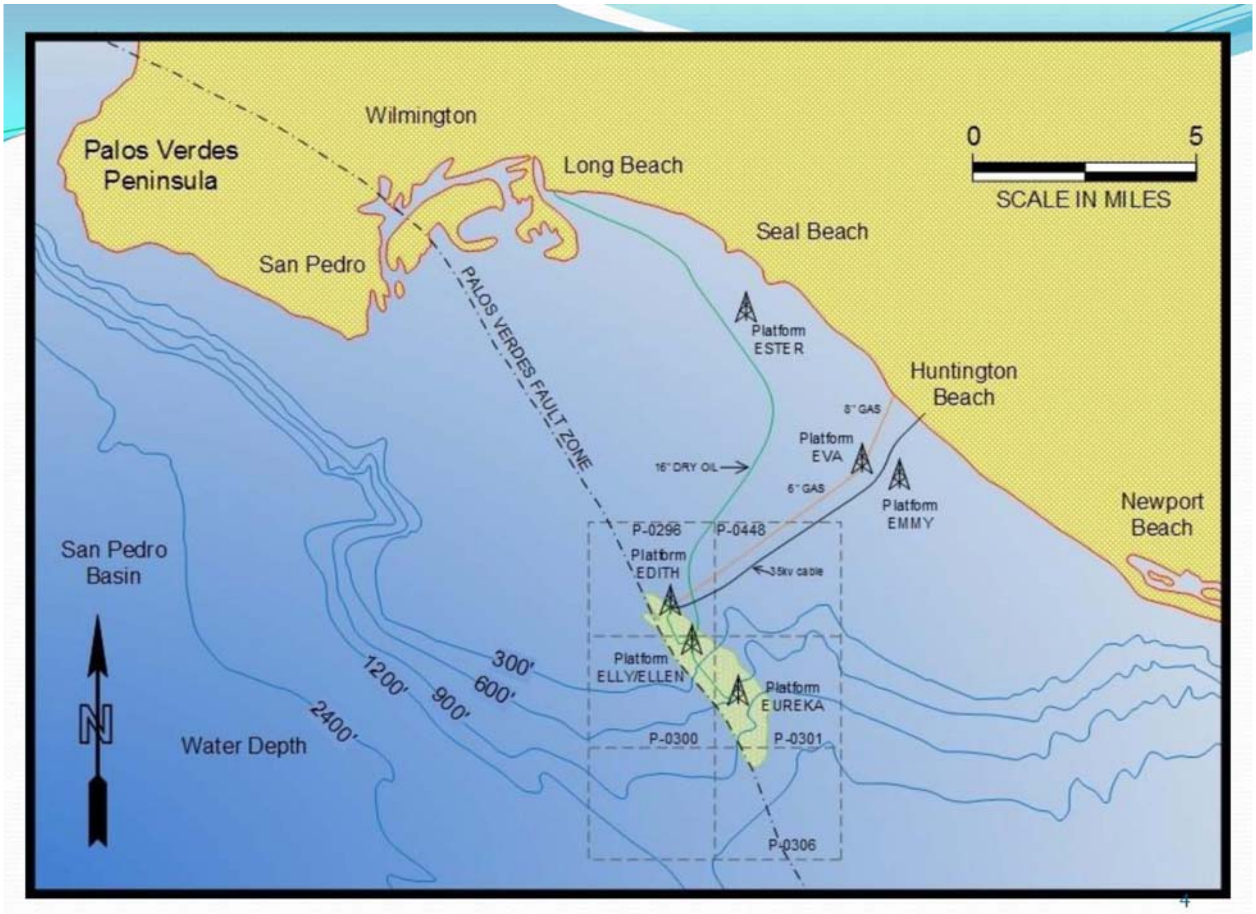


Figure 1 – Beta Field Location

Beta Offshore is the operator of the Beta Field. Beta Offshore operates producing platforms Ellen and Eureka and processing platform Elly. DCOR is a sub-operator in the Beta Field and operates Platform Edith and lease P-0296. For the purposes of this report, Beta Field will pertain only to the wells and facilities operated by Beta Offshore.

The field is approximately 5 miles long and 1 mile wide. Reserves recovered to date are approximately 83 million barrels of oil. The field produces from six (A-F) major Miocene sand packages, which are unconsolidated, normally pressured and range from a depth of 2,700’ to 4,700’. The oil is heavy with crude gravities ranging from 8 to 22 degrees API, with a current average produced gravity near 14.5. The reservoir drive mechanism is depletion drive, which has been supplemented by an early initiation of water flooding. As a result of low API gravities, high viscosity crude, and normally pressured reservoir, the wells were put on electric submersible pumps upon initial completion.

Platforms Ellen and Elly are set in approximately 250’ of water, while platform Eureka is in approximately 700’ of water. Platforms Ellen and Eureka each have a drilling rig and all the drilling components on the platforms. Platform Ellen has slots for 80 wells, while platform Eureka has slots for 60 wells. Each of the platforms is equipped with curved conductors in order to facilitate drilling near the edge of the field with hole angles up to 75 degrees as is illustrated in Figure 2 below.

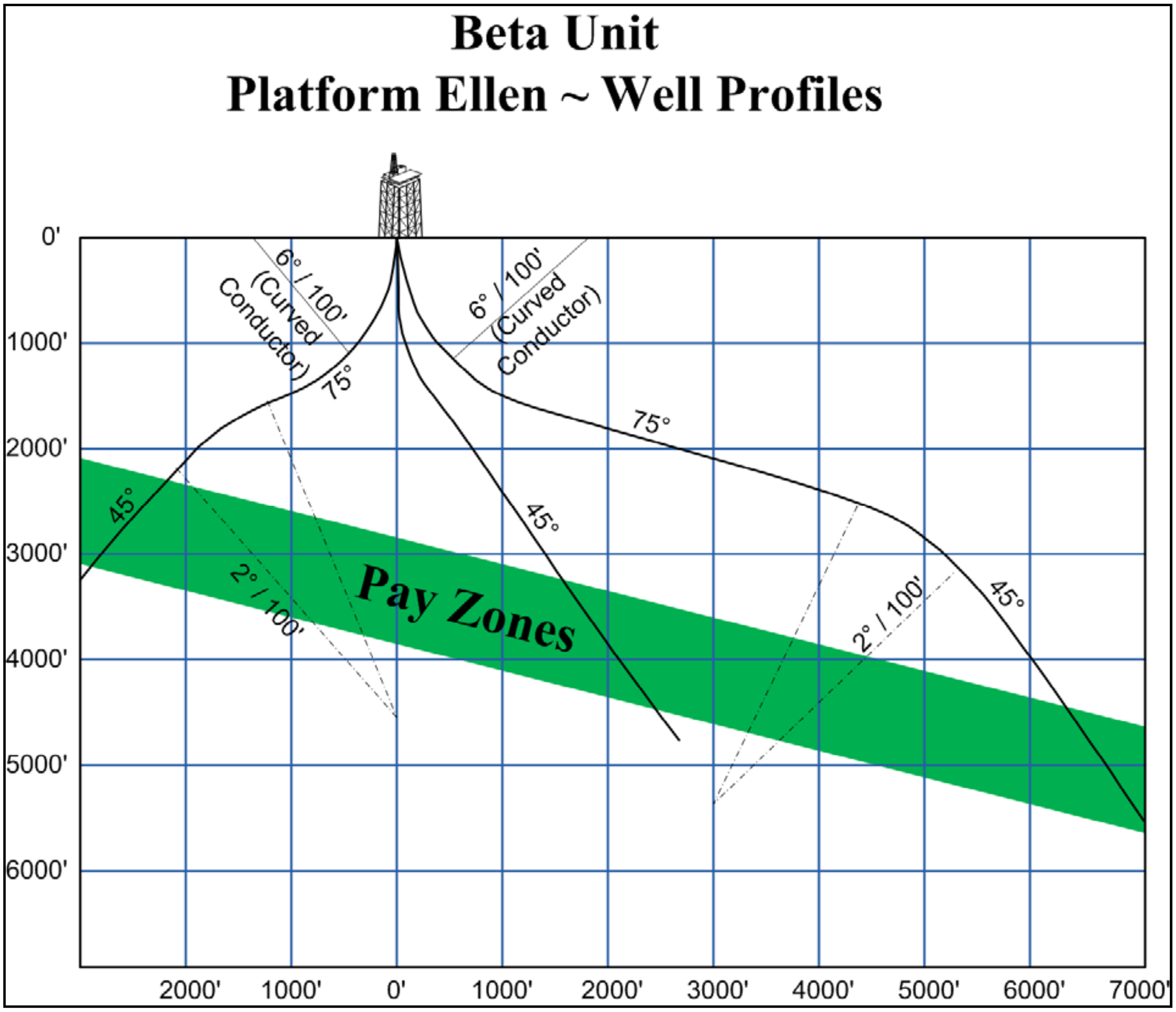


Figure 2 – Platform Ellen Well Profiles

3. WORST-CASE DISCHARGE

3.1 MAIN PREMISES

The Beta Field is a mature producing field in which the horizons to be drilled within the field have been well defined and outlined. Approximately 113 wells have been drilled from Platforms Ellen and Eureka. All future drilling activity will be infill development wells, located in between the 113 existing wells. It is further anticipated that for the near term planned development drilling program, the first development wells will be drilled from Platform Ellen toward Platform Eureka in the vicinity of well A-38 as shown in Attachment 2.

For the purpose of this Worst-Case Discharge analysis, a pseudo-well model, “Pseudo Well A-38” was constructed to represent a prototypical future development well. The directional program, casing setting depths, and formation tops from the actual well, A-38, were utilized with the exception that an additional 185’ net pay was added into the pseudo model for the A & B sands as the actual A & B sands are faulted out. The area around A-38 was chosen for this Worst-Case Discharge, because it is located in the most prolific area of the Beta Field.

3.2 RESERVOIR & FLUID ASSUMPTIONS

Reservoir and fluid characteristics are derived from Beta field engineering reports. Reservoir pressure utilized in the model is premised on a normally pressured reservoir with a gradient of 0.44psi/ft at the mid-point of the pay interval. A full listing of the input data and premises is given in Attachment 2.

3.3 GEOLOGICAL INFORMATION

The productive reservoir consists of an assemblage of sands, shales, and silts deposited through a submarine fan channel system, 10 million years ago in the late Miocene time. The thicker shales divide the accumulation into six different zones lettered A through F between 2,700 and 4,700 feet subsea as shown below in Figure 3.

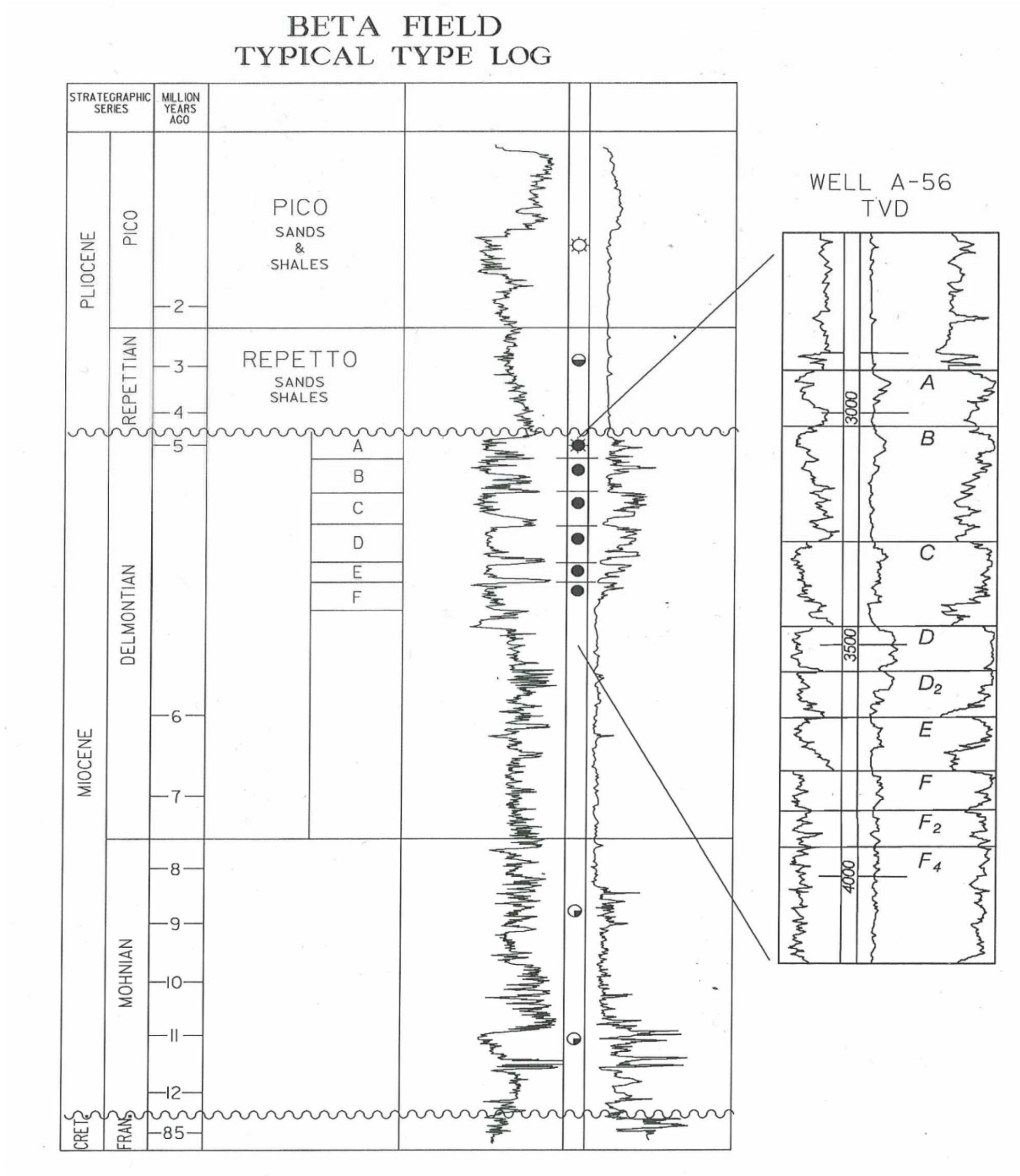


Figure 3 – Beta Field Typical Field Log

The Beta accumulation is located at a structurally high position along the east side of the Palos Verdes Fault. The accumulation extends along the Palos Verdes Fault approximately five miles. The Beta Fault divides the reservoir into numerous fault blocks. Water levels are different in each zone and show some variation from the north to south end of the structure.

Produced oil and sidewall samples during exploration show a decrease in API gravity within individual sands from the structural crest to the water levels. Average zonal gravities increase from the A sand to the top of the D sand and decrease from the top of the D sand downward.

An East-West cross section along with indicative well paths from Platform Ellen is shown in Figure 4 below. A structure map of the "D" sand, one of the main producing zones in the field, is shown in Attachment 3 for reference.

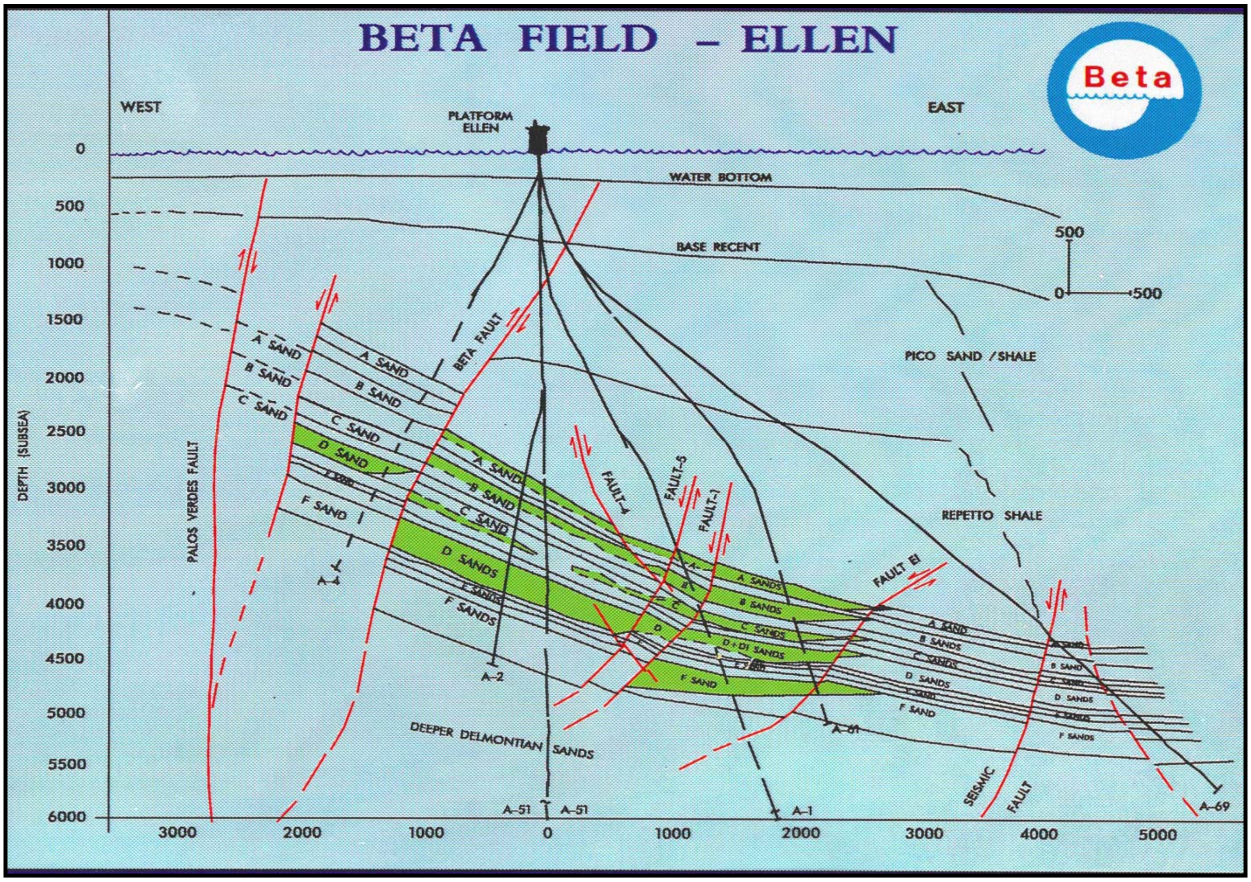


Figure 4 – Platform Ellen East-West Cross Section

3.4 WELL CONFIGURATION ASSUMPTIONS

A typical casing program for a Beta Offshore well is to have 24" structural string located from surface to approximately 200' below the mud line, and 13 3/8" surface casing landed between 1,800' and 3,000' measured depths, depending upon well bore trajectory. Although not as common, an 18 5/8" contingency conductor string may have been run between the structural string and the surface casing in some cases. The production string is generally a 9 5/8" casing cemented from well total depth (TD) back up to surface. The production string is then perforated and a completion string, generally a 5 ½" slotted liner, is hung from a few hundred feet above the top perforated interval down to TD.

Figure 5 below shows the actual casing setting depths for Well A-38, which were used in the Nodal Analysis for the Pseudo Well A-38 Worst-Case Discharge volume calculations.

A blowout in the Miocene sand pay interval could occur either before running the casing when the full hydrocarbon interval is exposed to the well bore, or anytime after the 9 5/8" casing has been run and perforated, including after the 5 1/2" liner is hung and gravel packed. In either case, the same amount of net feet of pay will be contributing to the WCD volumes, the only difference being the skin factors of the open hole vs. the completed perforated interval. For the purpose of this analysis, the highest flow rates were calculated when using the open *hole completion type* scenario in the nodal analysis program.

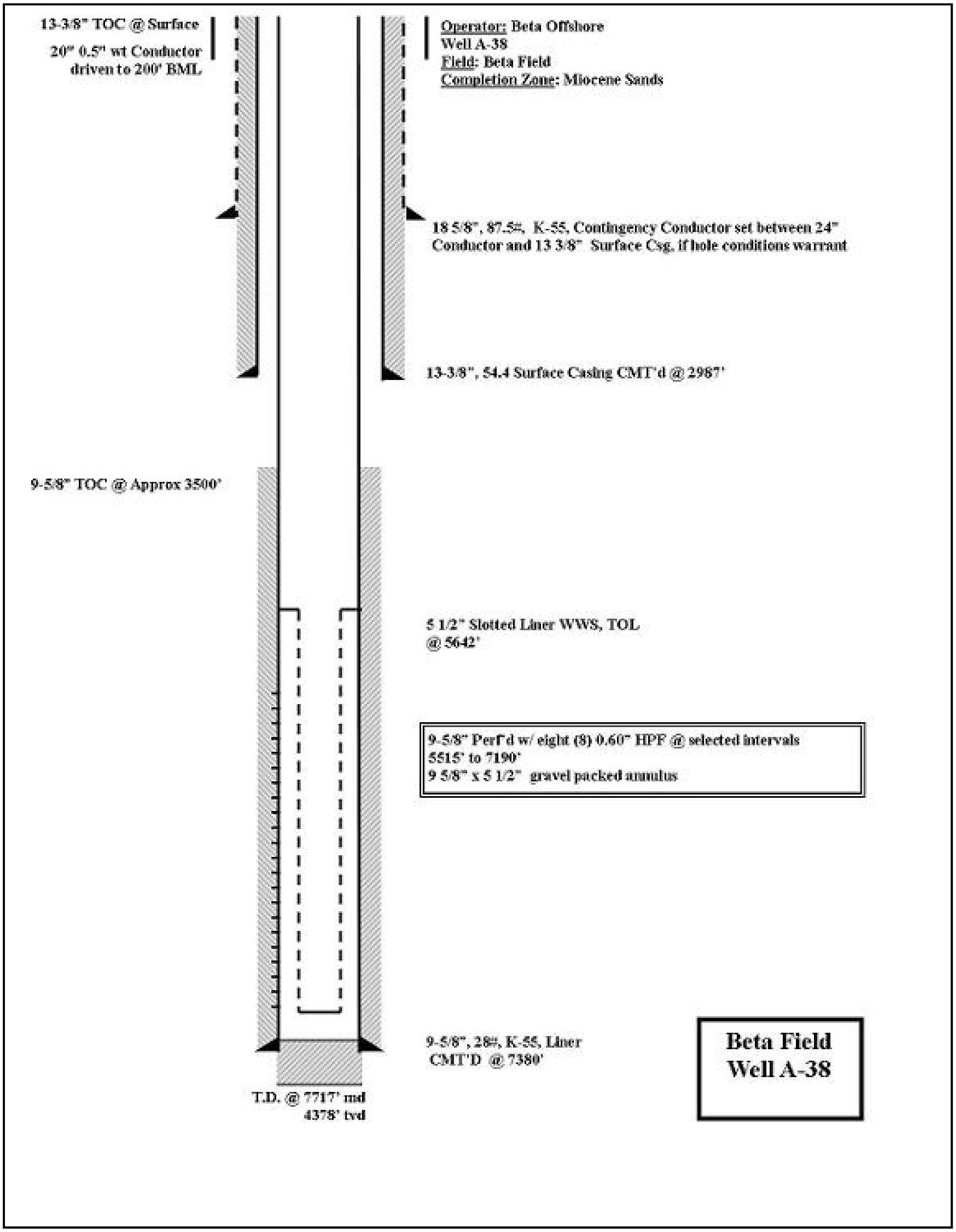


Figure 5 – Well A-38 Casing Setting Depths

3.5 WORST-CASE DISCHARGE NODAL ANALYSIS

A nodal analysis using the program "PERFORM" by IHS was run in order to determine the unrestricted flow potential of a pseudo well A-38. As previously explained, Pseudo Well A-38 is constructed to represent any future development that would be drilled from Platforms Ellen and Eureka. The System Graph from the nodal analysis shown below in Figure 6 displays the main input parameters into the nodal analysis, along with the predicted outflow rate.

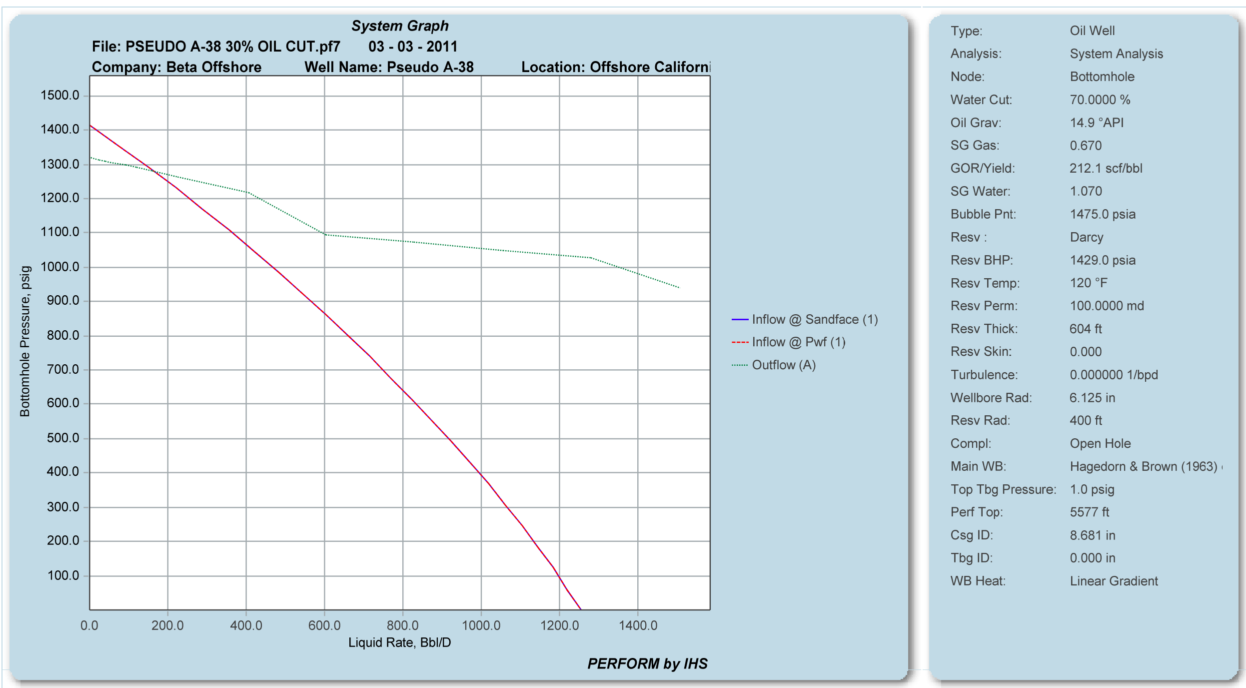


Figure 6 – Nodal Analysis System Graph

Pseudo Well A-38 is predicted to be capable of having a worst-case discharge volume of 45 bopd and 105 bwpd.

The predicted initial outflow rate for Pseudo Well A-38 is 45 bopd and 105 bwpd. A Worst Case Discharge volume of approximately 1,215 barrels of oil and 2,835 barrels of water over a 27 day period was calculated based on the following assumptions:

1. Pseudo Well A-38 would initially have a 20% annual decline rate
2. 7 days to prepare and plan a relief well
3. 20 days to drill, intersect, and complete the shut off / plugging operations on the blowout well.

3.6 OTHER POTENTIAL DISCHARGE ZONE

The P7 gas sand is located at a depth of about 1,700' TVD as shown on the structure contour map (see Figure 7 below) and is approximately half-way between Platforms Ellen and Eureka (see Figure 8 below). The sand has approximately 35 feet net pay and is limited to an aerial extent of 45 acres. Gas in place is estimated to be approximately 350 MMCF**.**

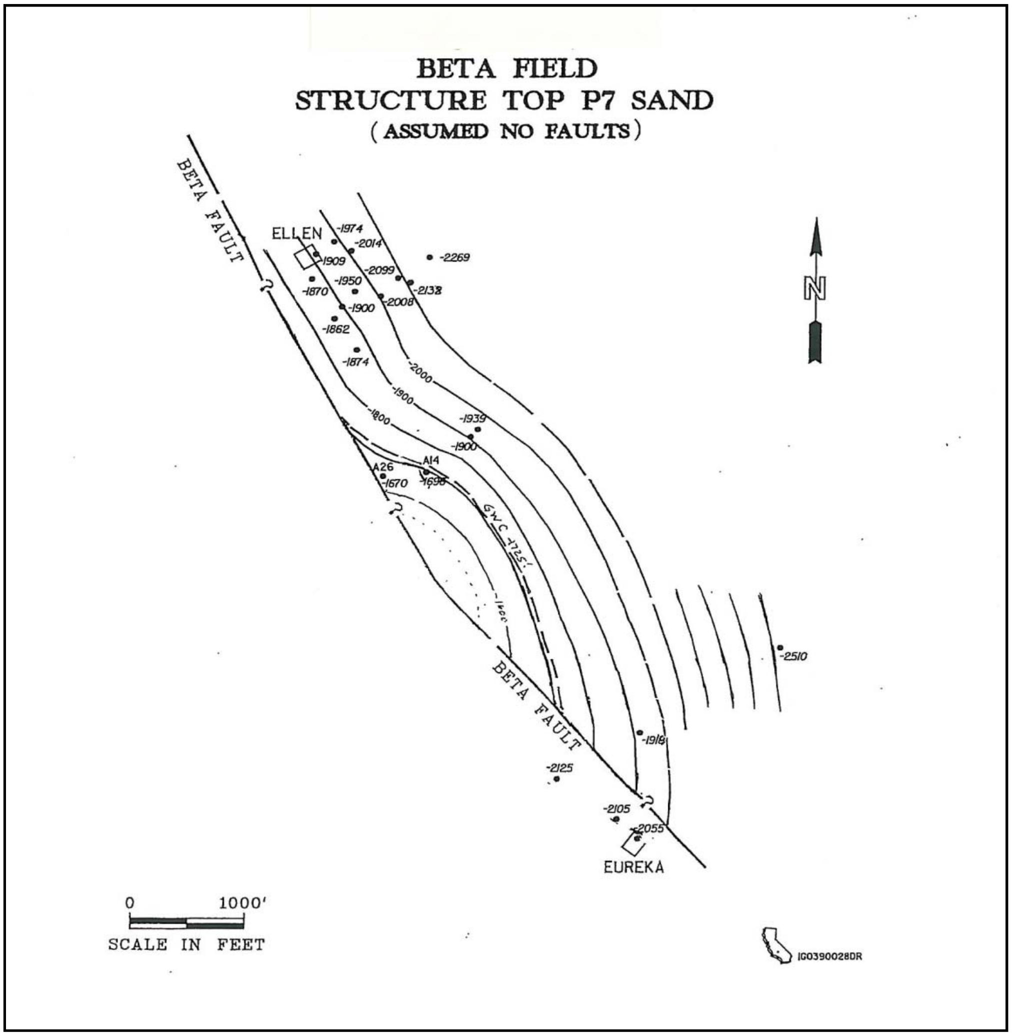


Figure 7 – Beta Field Top P7 Gas Sand

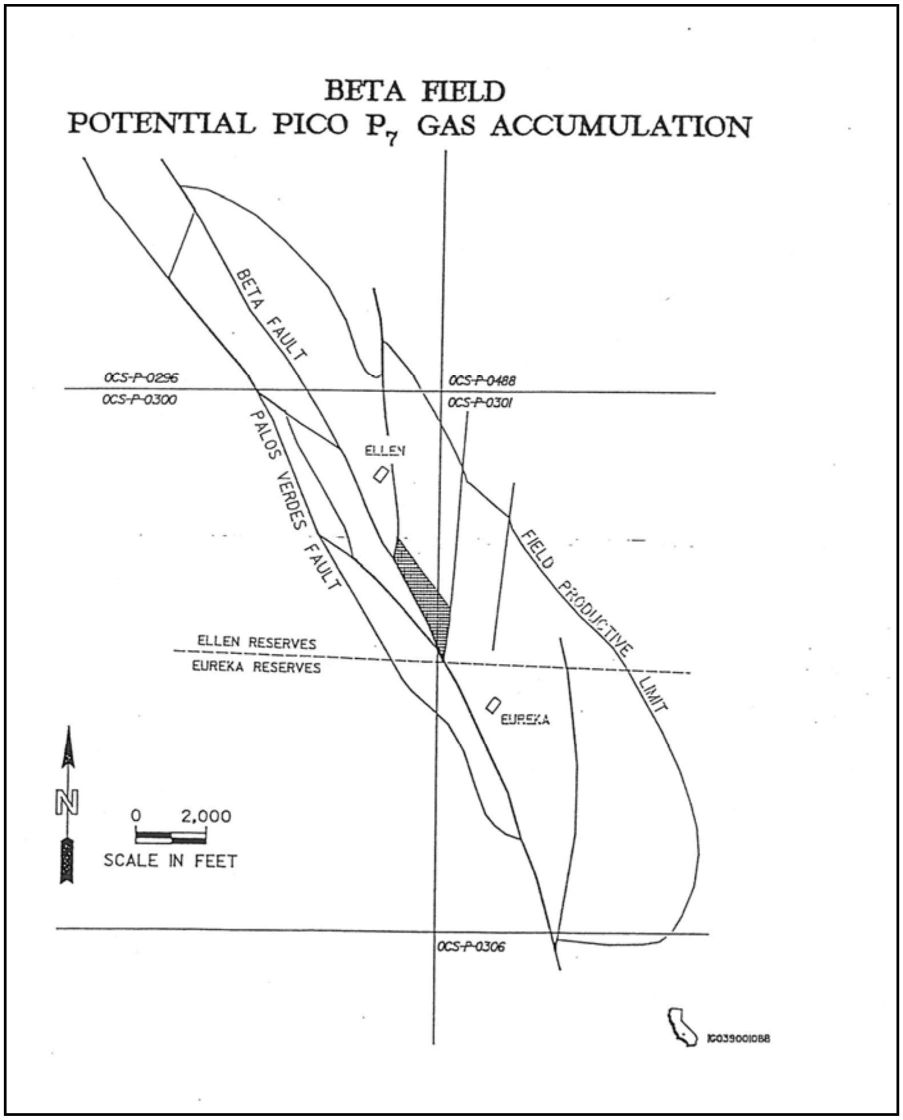


Figure 8 – Beta Field Potential P7 Gas Accumulation

A summary of the P7 gas sand nodal analysis, as shown below in Figure 9, indicates the P7 zone could be capable of an initial Worst-Case Discharge rate of approximately 16.5 MMCFD. However, with the limited volume of the reservoir, a blowout well would rapidly deplete in approximately 30 days or less. With the shallow depth and unconsolidated sands in the P7 zone, a sand bridge is likelier to form and choke down or choke off the flow. On the basis of the limited areal extent and reservoir volumes, the P7 gas sand will not be considered as the Worst-Case Discharge zone.

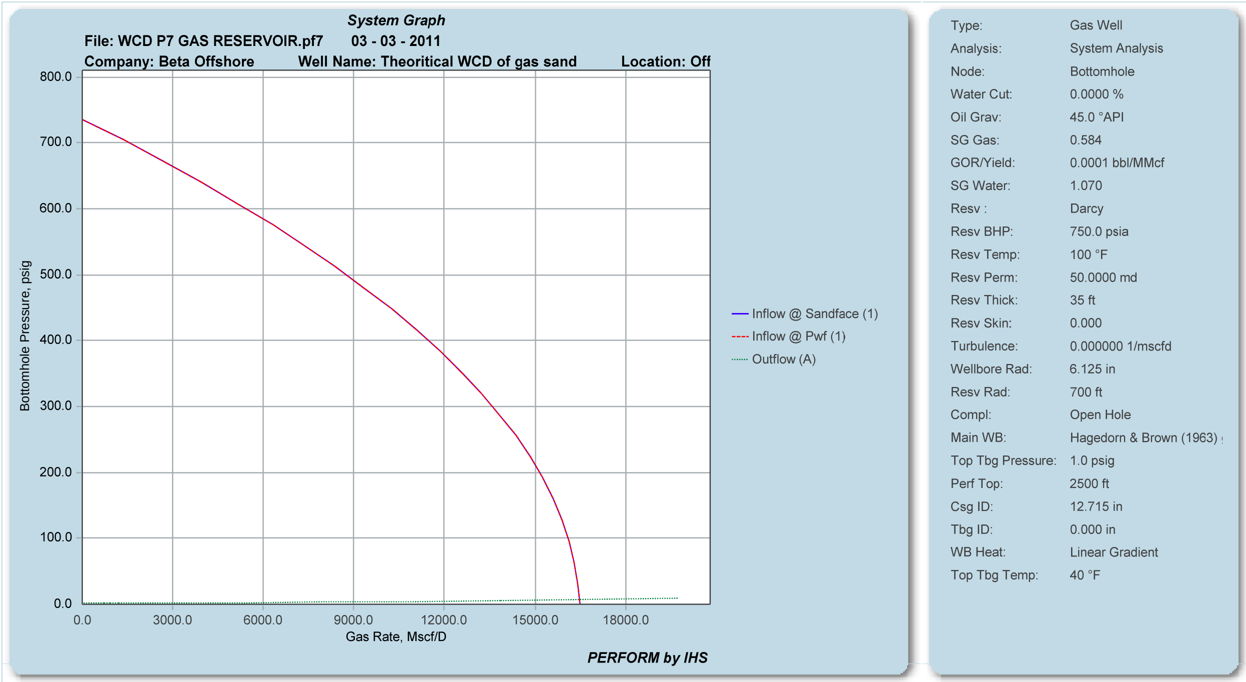


Figure 9 – Summary of P7 Gas Sand Nodal Analysis

4. BLOWOUT CESSATION

A blowout in oil- and gas-well drilling operations may be defined as a loss of control over formation pressure which causes an unrestrained flow of mud, oil, gas, or water at the surface. Consequently, these accidents can be accompanied by potential injury to personnel, loss of hole or equipment, or other appreciable damage. In order to prevent a blowout, a number of cautionary drilling practices will be followed (see Section 5 below). If a blowout does occur, the blowout prevention equipment (BOPE) will control the blowout. In some cases where this equipment has failed, wells have “bridged,” ceasing the flow from the well bore. Well control experts can also be brought into cap and control the well.

4.1 SURFACE INTERVENTION

Normally, a column of overbalanced drilling fluid with pressure gradients greater than that of the reservoir is used to maintain a barrier such that fluids and gases in the reservoirs do not flow into the wellbore. Routine drilling practices are designed to detect any influx of fluids into and out of the well bore. Oil and gas may enter into the well bore if higher-than-anticipated reservoir pressures are encountered. Fluids may also be lost to the reservoir if the encountered reservoir pressures are much lower than anticipated.

The BOPE is designed to contain the maximum anticipated reservoir pressure. The BOPE consists of several separate pieces of equipment. The diverter is the upper most piece of equipment. The diverter directs the returning fluids containing gas from the well bore to a separator, commonly called a gas buster. The gas buster separates gas from liquid and the gas can be vented or flared. The diverter is usually used if a small volume of low pressure gas gets mixed with the drilling fluid.

Below the diverter is the annular preventer. The annular preventer is designed to seal around the drill pipe, drill collars or seal the well bore if there is no drill string in the hole. Just below the annular preventer are the shear rams and the pipe rams. The shear rams are designed to close off the well bore if there is no drill string in the well bore, but the shear rams are also capable of shearing the drill pipe and closing off the well bore if necessary. The pipe rams are designed to seal around the drill pipe, leaving the drill pipe intact, but closing off the annulus.

Below the rams is a “kill” line. This “kill” line goes to a manifold from which returning fluid can be directed to a separator. This arrangement of valves, piping and sealing devices allows the control of reservoir pressure and the influx of reservoir hydrocarbons with little or no drilling fluid in the well bore, but still allows drilling fluid or lost circulation material to be forced into the well bore.

Common reasons for an influx of oil or gas into the drilling fluid include encountering a reservoir pressure higher than anticipated, losing drilling fluid to formation and failure to maintain the proper fluid level in the well bore, or not maintaining the appropriate mud weight. If one of these events occurs, drilling ceases and the well bore is closed off or “shut in”, using the BOPE. If the fluid density is inadequate, a more dense fluid will be forced into the well bore to reestablish pressure control of the reservoir with the hydrostatic column of the drilling fluid. If the drilling fluid column was not properly maintained, then any hydrocarbons in the drilling fluid can be removed from the drilling fluid and the well bore completely filled with drilling fluid. If a formation is unable to hold the column of fluid, lost circulation material can be forced into the “weak” formation in order for that formation to hold the column of drilling fluid. Once the hydrostatic pressure is reestablished by filling the well bore with the appropriate drilling fluid, active drilling can resume.

4.2 WELL BRIDGING

Well bridging is the phenomenon that occurs when severe pressure differentials are imposed at the well/reservoir interface and the formation around the wellbore collapses and seals the flow path.

A statistical study (Society of Petroleum Engineers No. 53974) of Gulf Coast blowouts between 1960 and 1996 indicates that of the 187 OCS blowouts studied, for approximately 39% (73) of the wells, bridging was the well-killing mechanism. Considering the unconsolidated nature of the reservoir sands, well bridging could be a mechanism that would end a blowout in the Beta Field.

4.3 RELIEF WELL DRILLING

If a well blows out and fails to bridge off or rapidly deplete, and surface intervention efforts are not possible or successful, then the drilling of a relief well should be considered as a viable mechanism to stop a well blowout.

4.3.1 Platform Relief Well Between Platforms

The reservoir geometry, well spacing, platform locations and drilling rig capabilities of the Beta Field are such that for the presently planned drilling program, a well blow out on Platform Ellen could be dealt with by drilling a relief well from Platform Eureka and vice versa.

Figure 10 below is a plat showing the maximum horizontal distances between the two platforms and, for each platform, the maximum horizontal distance of the furthest down-dip well. As can be seen on Figure 10, Platforms Ellen and Eureka are 7375' feet apart. Beta Offshore's near term development drilling program anticipates the majority of wells will be drilled between the two platforms. However, some wells may be drilled to the exterior side of either platform. A location in the vicinity of Well C-31 is the furthest distance from the platforms that a well would be drilled.
A review of the Beta Field drilling rig capabilities indicates that the maximum horizontal distance that can be achieved for a relief well scenario to the top of the pay interval of 3,750 TVD is approximately 10,500' (measured depth of 12,000). This means, in effect, a relief well from Platform Eureka could achieve the 9865' horizontal throw required to drill a relief well drill to the furthest off flank well from Platform Ellen. Conversely, with the current drilling equipment in place, a relief well from Platform Ellen would be able to achieve approximately 10,500' of the 13,720' throw need for the C-31 furthest off-flank well.

In order to increase the extended reach capabilities for Platform Ellen relief well drilling from 10,500' up to the maximum anticipated throw of 13,700', temporary upgrades of a top drive to facilitate downhole rotary steerable equipment, as well as the installation of a 3rd mud pump in the range of 1,300-1,600 horsepower would be necessary to the Platform Ellen drilling equipment. This additional equipment can be obtained on a temporary rental basis and is normally available from equipment rental companies in the United States. The time frame for procurement and installation of this temporary equipment is estimated to be within the 7 days allocated for planning and preparing a relief well as described in Section 3.5.

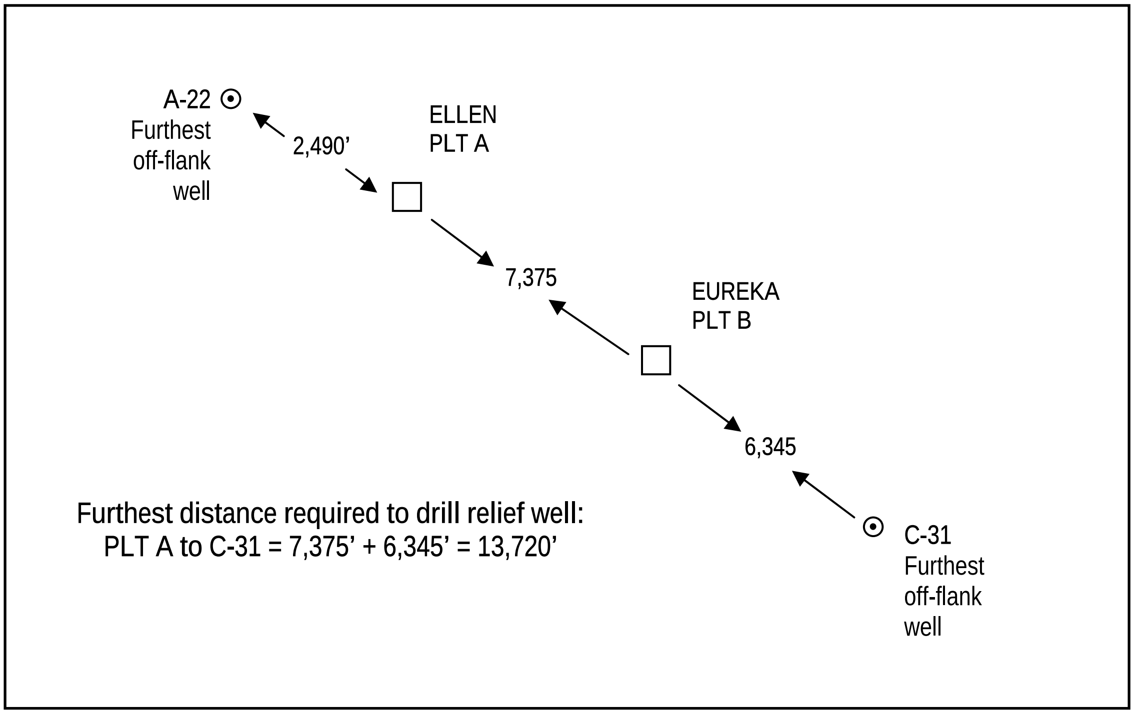


Figure 10 – Beta Field Estimation of Relief Well Drilling Length Requirement

Below is a listing of the drilling equipment currently located on each of the platforms.

Drilling Packages Currently Located on both Platforms Ellen & Eureka	
Derrick	Continental Emsco, 147', 30'x30' base, 1,400,000 lb.
Draw works	Continental Emsco 524,900 lb capacity, D-3 Type II, w/2GE Motors
Block	Continental Emsco RA-44-5 350 tons
Mud Pumps	2 each Continental Emsco F-800, 6x9 Triples, w/GE 752 motors
Generators	3 each Cat D-398 V12, 4 stroke, 12 cylinder, 600 KW
Blow Out Preventer	13 5/8" 5,000 psi, Class IV

4.3.2 Mobilizing an Offshore Drilling Unit

A relief well scenario in which a mobile offshore drilling unit (MODU) would be utilized is not as preferable as drilling a relief well from the adjacent platform primarily because there is currently no MODU located offshore California, nor are there likely to be any in the future. It is possible, but highly unlikely, that a rig drilling in Alaska could be made available in California. In all probability, a MODU would need to be mobilized from an area of the world with a high level of drilling activity. Mobilization times can range from approximately 60 days (South America) to 120 days (North Sea or Gulf of Mexico).

5. BLOWOUT PREVENTION

The combination of blowout conscious management, properly maintained and inspected blowout equipment, proper drilling fluid and well educated and trained drilling crews are all vital components of a good blowout prevention program.

All drilling personnel attend regularly scheduled well control school. The Operator conducts oral, written and/or hands on well control drills at least once a quarter. The Operator takes pride in its safety record and ensures that well control is an integral part of the ongoing safety awareness.

5.1 DRILLING PRACTICES

The drilling practices outlined below will be followed while drilling wells in the Beta Field to prevent any influx of oil or gas into the well bore or to detect any influx of oil or gas into the well bore due to unanticipated reservoir pressures, mechanical failures or human error:

- Conduct safety meeting on a regular basis to inform all personnel what is anticipated, possible hazards that may exist (including well blowout), and safety protocols to be followed.

- Pressure and function test of the BOPE upon initial installation of the well and scheduled intervals during the drilling operations.

- Conduct blowout drills on a regular basis.

- Visual inspection of the BOPE at scheduled intervals for indication of leaks or possible mechanical failures.

- Monitoring the circulating pressure of the drilling fluid. A decrease or increase in the circulating pressure may be an indicator of an influx of oil or gas into the well bore.

- Monitoring the flow rate of the drilling fluid into and out of the well bore. If more fluid is coming out of the well bore than going into the well bore this may indicate the drilling fluid has had an influx of gas. The gas will expand coming up the well bore causing the fluid discharge rate from the well bore to increase.

- Checking the density of the drilling fluid. A lighter density may indicate an influx of either oil or gas, since the density of oil and gas is normally less than that of most drilling fluids.

- Visually inspecting the drilling fluid. Oil will float on most drilling fluids and usually has a distinctive color. Gas bubbles may also be detected.

- Monitor for return flow, when circulation of the drilling fluid ceases, for example when another joint of drill pipe is added to the string, the well bore is monitored for any return flow. As stated before, gas will expand as the gas comes up the well bore, causing the fluid to flow.

- Monitor the gas detector which is located in the flow line of the drilling fluid.

- When pulling the drill pipe out of the well bore to replace a drill bit, the amount of fluid needed to replace the volume of the drill pipe pull out of the well bore is carefully monitored in order to maintain the necessary hydrostatic pressure.

- The bit is lifted off the bottom, or run back to bottom of the hole at a controlled rate in order to prevent any surge or swab pressure, which could cause oil or gas to enter the well bore.

Below are the Shut In Procedures that are posted on the Beta Platform rig floor

Shut In Procedures (While Drilling):

1. Stop the rotary and sound the alarm
2. Pick up the string until the tool joint clears the rotary table
3. Stop the pumps
4. Check for flow
5. Close in annular preventer

   (Note: Unless ram preventers are closed)

6. Open HCR Valve
7. Close the choke
8. Confirm flow has stopped
9. Read and Record
   a. Shut in drill pipe pressure (SIDPP)
   b. Shut in casing pressure (SICP)
   c. Gains in mud pits (volume increase /decrease)
   d. Time

Shut in Procedures (While Tripping)

1. Set the pipe in the slips
2. Sound the alarm
3. Install Full Open Safety Valve (FOSV)
4. Close FOSV
5. Open HCR Valve
6. Close BOP
7. Close the choke
8. Confirm that the flow has stopped
9. Install Kelly and open FOSV
10. Read and Record: SIDPP, SICP, Gain in mud pits, time

Prior to every pull, all crew members must pass the tripping drill. By conducting tripping drills consistently, rig hands will understand their role in case a blowout occurs, minimizing the damage that would be caused from a blowout.

ATTACHMENTS

Attachment 1: December 17, 2010 BOEMRE Letter to Beta Offshore

Attachment 2: BOEMRE WCD Summary Sheet

Attachment 3: Structure Map of D Sand

Attachment 4: Nodal Analysis Detailed Output of Miocene Pay Sands Worst-Case Discharge

Attachment 1: December 17, 2010 BOEMRE Letter to Beta Offshore

United States Department of the Interior

BUREAU OF OCEAN ENERGY
MANAGEMENT, REGULATION AND ENFORCEMENT

Pacific OCS Region
770 Paseo Camarillo, 2nd Floor
Camarillo, California 93010-6064

BY:

December 17, 2010

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Steve Liles
Beta Offshore
111 West Ocean Blvd., Suite 1240
Long Beach, CA 90802

Re: Required Information for
Beta Unit
Development & Production Plan

Dear Mr. Liles:

Pursuant to the regulations at 30 CFR 250.284, the Bureau of Offshore Energy Management, Regulation and Enforcement (BOEMRE) periodically reviews activities you conduct under an approved Development and Production Plan (DPP) and may require you to submit updated information on your activities.

We are currently reviewing approved DPP's for operations in the Pacific OCS Region to determine compliance with the requirements of 30 CFR 250.243(h) and 250.250. To facilitate this review, please supply the following information to update your approved DPP and Oil Spill Response Plan (OSRP):

- A blowout scenario as required by 30 CFR 250.243(h). Include the estimated flow rate, total volume, and maximum duration of the potential blowout. Discuss the potential for the well to bridge over, the likelihood for surface intervention to stop the blowout, the availability of a rig to drill a relief well, and rig package constraints. Specify as accurately as possible the time it would take to contract for a rig, move it onsite, and drill a relief well, including the possibility of drilling a relief well from a neighboring platform or an onshore location.
- Describe the measures you propose that would enhance your ability to prevent a blowout, to reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout, including your arrangements for drilling relief wells and any other measures you propose.
- Provide the assumptions and calculations that you used to determine the volume (daily discharge rate) of your worst-case discharge scenario required by 30 CFR 250.250(a)(2)(iv). In calculating a worst-case discharge scenario from a wellbore

during drilling operations, the following definition and assumptions are to be taken into account:

- *Worst-Case Discharge Defined - The daily rate of an uncontrolled flow from one or more producible reservoirs into the open wellbore. The package of reservoirs exposed to an open borehole with the greatest discharge potential will be considered the worst case discharge scenario. Shallower producible reservoirs isolated by casing and cement will not be considered in the uncontrolled flow.*
- Assume all casing strings are successfully run and cemented above the zone that is flowing.
- Assume that the flow is up unobstructed casing and liner. Therefore, no drill pipe is left in the hole to inhibit flow.
- Assume the blowout preventer failed and that flow occurs uninhibited from the wellhead.
- Do not account for reduced flow due to well bridging unless able to prove otherwise.
- Assume full penetration of the target reservoir.

In addition, please identify and describe the predicted values and calculations used to determine the volume (daily discharge rate) of the worst-case discharge blowout scenario. These parameters include:

- Well design (borehole diameter and the length of uncased hole exposed before casing is run).
- Reservoir characteristics encountered during drilling (reservoir lithology, permeability, drive mechanism, reservoir thicknesses, and drainage area).
- Fluid characteristics, for example, bubble point pressures, oil viscosity, oil compressibility, API gravity, static fluid oil gradient, B_{oi} (oil formation volume factor), R_{si} (gas solubility in oil usually measured as scf/STB), and gas specific gravity.
- Pressure, volume, and temperature (PVT) data for each reservoir.
- Any analog reservoir(s) considered in making those assumptions if data from the field is not available, including your justification for selecting the analog reservoir(s).
- Geologic Information:
  - Structure Maps (Enclosure I) for each potential hydrocarbon reservoir to be encountered
  - Individual hydrocarbon bearing zone top and base
  - Maximum drainage area (cite analog)
  - Range of permeability (could use analog MDT mobility ratio values from pressure tests)
  - Range of height of net hydrocarbon bearing zone (cite analog)
  - Reservoir drive mechanism (cite analog)
  - Cross-section depicting all anticipated hydrocarbons bearing zones
- All supporting calculations and models used to determine the daily discharge rate from an uncontrolled blowout.

- Any additional information about other zones in the area believed to have higher worst-case discharge potential than one presented as the worst-case discharge.

Enclosed is a diagram (Enclosure 2) that describes the wellbore and clarifies the worst-case discharge blowout parameters. Also enclosed is an Excel spreadsheet (Enclosure 3) that should be used to describe the geology and reservoir characteristics for the worst-case discharge blowout scenario. The BOEMRE will need this data to verify your calculated worst-case discharge.

In preparing this information, you may reference information and data discussed in your approved OSRP that was prepared according to the requirements of 30 CFR 254 subpart B. In accordance with 30 CFR 254.30(e), BOEMRE's Regional Supervisor may require an operator to revise its OSRP if significant deficiencies in the OSRP are indicated by (1) periodic reviews of the Oil Spill Removal Organization capabilities, (2) information obtained during drills or actual spill responses, or (3) other relevant information obtained by the Regional Supervisor, including, for example, changes in an operator's worst-case discharge calculation scenario.

Please refer to 30 CFR 250.206 for submitting proprietary, public information, and electronic copies. The information should be submitted as soon as reasonably possible, but no later than January 31, 2011. If you have any questions, please contact Ms. Cathy Hoffman at (805) 389-7575.

Sincerely,

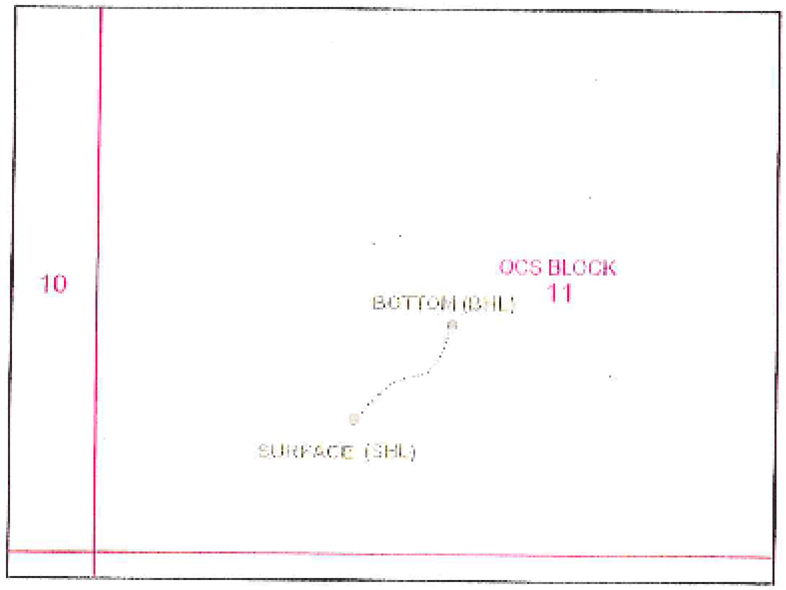
Rishi Tyagi
Regional Supervisor
Office of Field Operations

Enclosure (3)

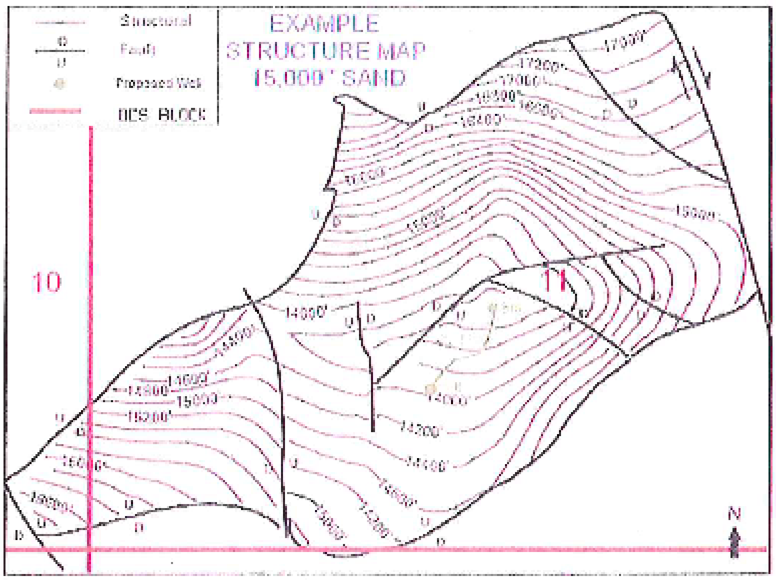
bcc: File: 1703-02a(1) Beta Unit DPP Correspondence (w/encls.)
Chron
OEMM PAC Managers/Supervisors (electronic copy) (w/ encls.)
OMM PAC OSES (electronic copy) (w/ encls.)
OFO/OSE:CMHoffman/pfr:mydocs:msoffice:word:hoffmanfiles:2010:
Oil Spill Info for DPP-Beta Unit Beta Offshore12-17-10Final.doc

Enclosure 1 (page 1 of 2)

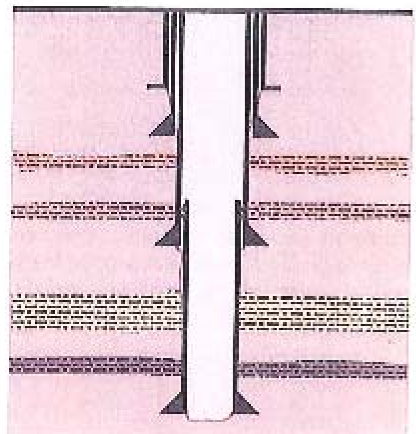
EXAMPLE WELL LOCATION PLAT



Enclosure 1 (page 2 of 2)

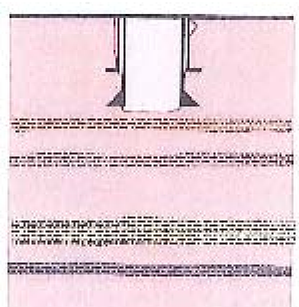


Enclosure 2 (page 1 of 2)



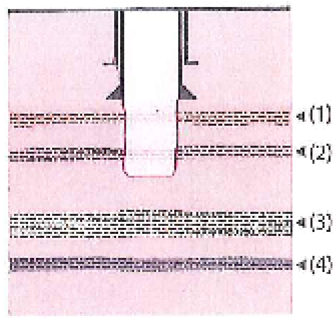
Calculate worst case discharge at each casing interval where potential hydrocarbon reservoir are exposed.

Example:

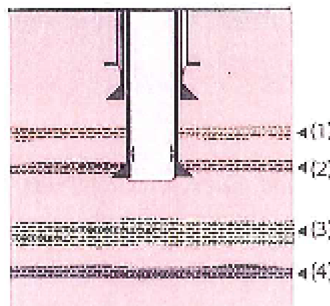


1. First stage: No hydrocarbon bearing intervals encountered; no discharge calculation required.

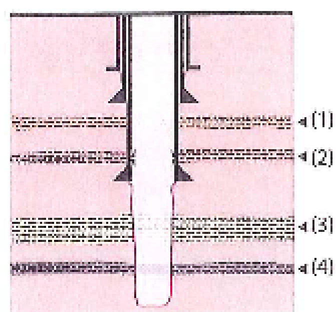
Enclosure 2 (page 2 of 2)



2. Second stage: Two potential hydrocarbon interval are encountered during drilling; because the intervals are exposed before the casing is installed, worst case discharge is calculated for the two intervals (1) and (2).



2a. Second stage casing is installed sealing the two intervals.



3. Third stage: The hole is drilled to final depth encountering the target reservoir and additional hydrocarbon bearing intervals. Worst case discharge is calculated again for all of the exposed intervals (3 and 4) before the final casing/liner is installed.

4. The greater of the two calculations becomes the WCD for the well

Enclosure 3 (page 1 of 2)

Worst Case Discharge Summary Sheet

General Information	

Wellbore Data

Water depth at proposed well location (feet)	

Interval Number	Hole Size	Casing Size	Weight	Grade	Setting Depth MD	Setting Depth TVD

Directional Survey Data

MD	Inclination	Azimuth	TVD	X Location	Y Location	Comments
						Indicate here what datum and projection the coordinates are reported in. IE: Nad 27 Lambert VI or Nad 27 UTM

*Please add any additional columns as necessary to fit the data

Enclosure 3 (page 2 of 2)

Geologic Data

Identify Open Hole Interval Used in WCD calculation			Top MD		Base MD	
Hydrocarbon Bearing Zone (HBZ) Name	TOP MD and TVD	Base MD and TVD	Height (Interface in Wellbore)	HBZ Thickness (True Vertical Thickness)	Drainage Area (acres)	Used in WCD Calculation (Y or N)

Reservoir Data

Reservoir Name		
Characteristic	Characteristic Value	Analog Used
Initial Pressure (psia)		
Initial Temperature (F)		
Permeability (md)		
Drainage Area (acres)		
MD Thickness of Reservoir (ft)		
Drive Mechanism		

Fluid Data

Reservoir Name		
Characteristic	Characteristic Value	Analog Used
	Oil	
Bubble Point Pressure (psia)		
Bo (bbl/STB)		
Oil Viscosity (cp)		
Oil Compressibility (z)		
Oil API Gravity (API)		
Static Oil Fluid Gradient		
Rs (scf/STB)		
	Gas	
Gas Specific Gravity (API)		
API Gravity of Condensate (API)		
Yield (bbl/MMCF)		
Static Gas Fluid Gradient		
D-Turbulence Flow Factor		
Gas Viscosity (cp)		

Attachment 2: BOEMRE WCD Summary Sheet

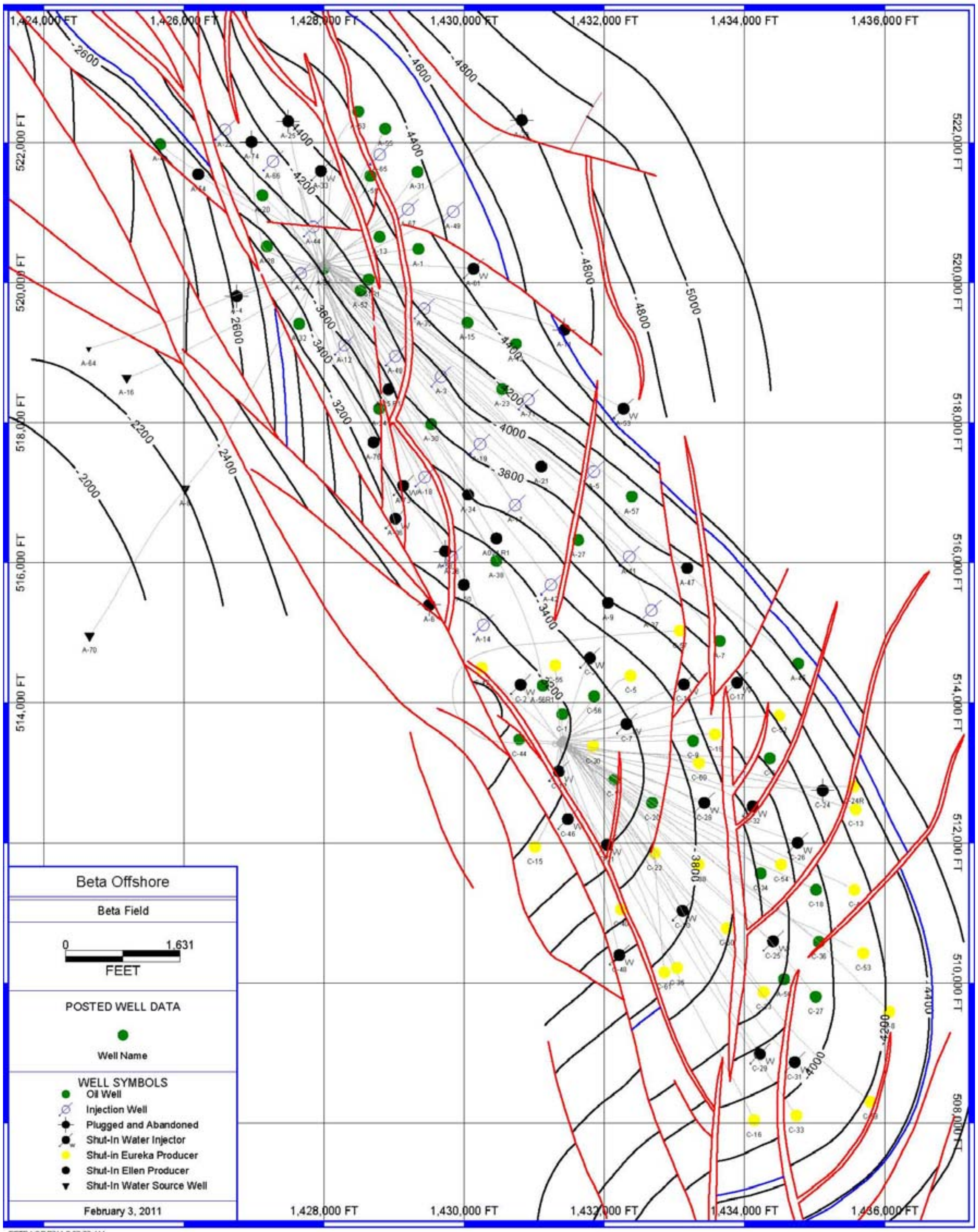
WORST-CASE DISCHARGE SUMMARY SHEET						
General Information - Beta Field Offshore California Pseudo Well A-38						
Wellbore Data						
Water depth at proposed well location (feet)					256'	
Interval Number	Hole Size	Casing Size	Weight	Grade	Setting Depth	
					MD	TVD
1	driven	24"	113		200' BML	200' BML
2	15 1/2"	13 3/8"	54.4	K-55	2987	2371
3	12 1/4"	9 5/8"	36 - 40	K-55	7380	4210
Directional Survey Data						
MD	Inclination	Azimuth	TVD	*EW Loc	*NS Loc	Comments
0	0	0	0	0	0	
100	0.25	152	100	0.03	-0.05	
350	16	155	347.05	13.76	-28.97	
811	37.75	149	756.67	117.14	-207.99	
1284	62	146	1055.09	319.64	-508.39	
1758	67.25	148	1249.17	549.99	-874.22	
2232	67.25	148	1432.47	785.48	-1242.47	
2516	67	149	1544.01	921.94	-1465.16	
2706	65	151	1621.29	1007.42	-1616.21	
3103	64.75	154	1790.04	1170.58	-1936.34	
3647	65.25	149	2020.92	1400.86	-2371.55	
4274	69	151	2265.01	1687.32	-2872.85	
4745	65.75	146	2444.99	1913.47	-3244.09	
5026	55.75	146	2580.07	2048.68	-3449.53	
5407	44.75	148	2826.23	2207.76	-3692.01	
5933	43.25	149	3204.29	2398.68	-4003.88	
6404	43.5	155	3544.36	2558.11	-4287.94	
6969	44.5	163	3944.26	2696.89	-4661.73	
7476	44.25	166	4306.29	2787.22	-5004.93	
7717	44.5	167	4478.46	2826.22	-5169	

WORST-CASE DISCHARGE SUMMARY SHEET						
Geologic Data						
The below intervals in the A-E sand were used in the WCD calculation			Top MD		Base MD	
			5616		7190	
Hydrocarbon Bearing Zone (HBZ) Name	TOP MD and TVD	Base MD and TVD	Height (Interface in Wellbore)	HBZ Thickness (True Vertical Thickness)	Drainage Area (acres)	Used in WCD Calculation (Y or N)
A	5616	5716				
	-2947	-3047	105	83	15	Y
B	5716	5976				
	-3047	-3235	80	63	15	Y
C	5976	6250				
	-3235	-3433	77	61	15	Y
D	6250	6565				
	-3433	-3569	157	124	15	Y
E	6565	6748				
	-3659	-3788	51	40	15	Y
	6748	7190				
	-3788	-4102	190	150	15	Y

Reservoir Data		
Reservoir Name	Miocene Sands	
Characteristic	Characteristic Value	Analog Used
Initial Pressure (psia)	1507	0.44 grad @ mid perfs
Initial Temperature (F)	140	Beta Field data
Permeability (md)	50	Beta Field data
Drainage Area (acres)	15	Beta Field data
MD Thickness of Reservoir (ft)	1574 (7190-5616)	A-38
Drive Mechanism	Depletion / Water Inj	Beta Field performance

Fluid Data		
Reservoir Name	Miocene Sands	
Characteristic	Characteristic Value	Analog Used
Oil		
Bubble Point Pressure (psia)	1475	Beta field data
Bo (bbl/STB)	1.09	Beta field data
Oil Viscosity (cp)	344 @ 120F	Beta field data
Oil Compressibility (z)	0.0000055	Beta field data
Oil API Gravity (API)	14.9	Beta field data
Static Oil Fluid Gradient	0.967	Beta field data
Rs (scf/STB)	164	Beta field data
Gas		
Gas Specific Gravity (API)	0.67	Beta field data
API Gravity of Condensate (API)	45	Beta field data
Yield (bbl/MMCF)		Beta field data
Static Gas Fluid Gradient		Beta field data
D-Turbulence Flow Factor	6.04E-06	Beta field data
Gas Viscosity (cp)	0.015	Beta field data

Attachment 3: Structure Map of D Sand



PETRA 2/3/2011 9:22:23 AM

Attachment 4: Nodal Analysis Detailed Output of Miocene Pay Sands Worst-Case Discharge

IHS
PERFORM, Version 7.52
Well: Pseudo A-38

3/25/2011 14:46
PSEUDO A-38 30% OIL CUT.pf7
Page 1

WORST CASE DISCHARGE DATA REPORT

(For compliance with the U.S Department of Interior's BOEMRE division requirements)**

General Project Information

Logo Placeholder
This placeholder bitmap is 199 pixels wide by 179 high. Replace it with an image of your choice which is the apropriate size for this space.

Company Name	Beta Offshore
Location	Offshore California
Reservoir	Miocene Sands
Field	Beta Field
Analyst	
Comments	representative of future drilling well
Analysis Type	System Analysis
Well Type	Oil Well
Node Location	Bottomhole
Flow Direction	Production
Rate Display Type	Liquid
Plan Number	
OCS Area	
OCS Block	P-0300 and P-0301
Lease Number	

**** This report does not contain all of the information required by BOEMRE. Additional data / documents □must be provided to complete your Worst Case Discharge (WCD) report. Please go to WWW.BOEMRE.GOV for detailed information.**

Reg. User: -

SUMMARY SHEET - WELLBORE DATA

Water Depth at Proposed Well Location 0.0 (ft)

Casing Data

Interval	Hole Size in	Casing Size in	Weight lb/ft	Top ft	Bottom ft	Grade
1	9.625	8.681	47.00	0	7717	

Directional Survey Data

MD ft	TVD ft	Angle Deg
150	150	23.538
811	756	42.655
1000	895	59.580
1474	1135	66.502
1943	1322	67.094
2611	1582	64.991
3103	1790	65.632
4087	2196	68.440
4585	2379	61.412
5120	2635	45.583
5933	3204	43.791
6404	3544	44.772
7221	4124	44.462
7717	4478	0.000

SUMMARY SHEET - RESERVOIR DATA

Sand Name A,B,C,D,E,F

Characteristic	Value
Reservoir Pressure	1429.0 (psia)
Reservoir Temp	120 (°F)
Avg Reservoir Perm	100.0000 (md)
Reservoir drainage area.	N/A
Reservoir Thickness	604 (ft)

SUMMARY SHEET - FLUID DATA

Characteristic	Value
OIL DATA	--------------------------------
Bubble Point Pressure	1475.0 (psia)
Liquid FVF	1.044
Oil Viscosity	54.71814 (cP)
Total Compressibility	N/A
Oil Gravity	14.9 (°API)
Solution GOR	212.1 (scf/bbl)
Gas Specific Gravity	0.670 (air = 1)
GAS DATA	--------------------------------
Oil Gravity	14.9 (°API)
Gas Specific Gravity	0.670 (air = 1)
Gas/Liq Ratio	63.6 (scf/bbl)
Density	N/A
Turb. Factor	0.000000 (1/bpd)
Gas Viscosity	54.71814 (cP)

NODAL ANALYSIS - INPUT DATA

Fluid Data

Gas/Liq Ratio	63.6	scf/bbl
Water Cut	70.0000	%
Oil Gravity	14.9	°API
Gas Specific Gravity	0.670	
Water Specific Gravity	1.070	
Water Salinity	92710	ppm
Bubble Point Pressure	1475.0	psia
Solution GOR	212.1	scf/bbl
Carbon Dioxide	0.0000	%
Hydrogen Sulfide	0.0000	%
Nitrogen	0.0000	%

Completion Data

Completion Type: Open Hole/Not Calculated

Reservoir Data

Reservoir IPR Type: Darcy

Valid for both gas and oil wells with radial flow. Enter a value only if the skin has actually been measured. Be sure not to include turbulent or physical skin more than once. This skin takes into account completion effects. In such case, from next dialog, select Open hole as completion type.

Reservoir Pressure	1429.0	psia	Reservoir Skin	0.000	
Reservoir Temp	120	°F	Turb. Factor	0.000000	1/bpd
Avg Reservoir Perm	100.0000	md	Wellbore Radius	6.125	in
Reservoir Thickness	604	ft	Reservoir Radius	400	ft

PVT Correlations

Dead Oil Viscosity	Ghetto & Villa (heavy oil)
Saturated Viscosity	Ghetto & Villa (heavy oil)
Undersaturated Viscosity	Ghetto & Villa (heavy oil)
Gas Viscosity	Lee
Water Viscosity	Matthews & Russell
Oil Density	Katz
Bubble Point Pressure & Solution GOR	Lasater
Oil Compressibility	Ghetto & Villa (heavy oil)
Oil-Formation Volume Factor	Vazquez & Beggs
Z Factor	Dranchuk & Purvis

Separator conditions used for Vazquez & Beggs or Kartoatmodjo correlations:

Separator Pressure	100.0	psig
Separator Temperature	100	°F

PVT Lab Data: Oil Visc

Wellbore Data

Wellbore Correlation — Hagedorn & Brown (1963) oil **

AUTHOR RECOMMENDATIONS Developed experimentally using a 1500-ft test well with 1-in., 1.25-in., and 1.5-in. tubing. The correlation is used extensively throughout the industry and is recommended for wells with minimal flow regime effects and generally with GLR < 10,000 scf/bbl. The Griffith and Wallis correlation can be used for improved performance in bubble flow regimes.

Griffith & Wallis bubble flow equation used

Flow Type at Surface		Tubular
Top of Tubing Pressure	1.0	psig
MD at Top of Perfs	5577	ft

Casing Data

Top ft	Bottom ft	OD in	ID in	Roughness in
0	7717	9.625	8.681	0.0006500

Tubing Data

Depth ft	OD in	ID in	Roughness in

Default Burst Pressures Used**

Tubing Burst Pressure	10000.0	psi
Casing Burst Pressure	10000.0	psi
Riser Burst Pressure	10000.0	psi
Pipe Burst Pressure	10000.0	psi

Default Roughness Used**

Tubing (Default)	0.0006500	in
Casing (Borehole (for wells without casing / tubing))	0.0006500	in
Flowline (Default)	0.0006500	in

**** Please consult your pipe vendors to get correct values for burst pressures and roughness.**
You can change default values from the Input Defaults dialog on the Options menu.

NODAL ANALYSIS - OUTPUT DATA

WORST CASE DISCHARGE RATE

Solution Point Flow Rate	163	Bbl/D
Solution Point Pressure	1279.8	psig
Completion Pressure Drop at Solution Point	0.0	psi

MD ft	TVD ft	Pressure psig	Temperature °F	Gas Velocity ft/sec	Liq. Velocity ft/sec	Mix. Velocity ft/sec	Holdup	No-slip Holdup
0	0	1.0	40.00	0.264	0.026	0.290	0.685	0.089
150	150	47.3	44.06	0.265	0.026	0.291	0.684	0.089
450	425	161.5	51.51	0.065	0.026	0.091	0.922	0.285
750	700	283.0	58.95	0.015	0.026	0.041	0.982	0.638
811	756	307.8	60.47	0.011	0.026	0.037	0.987	0.702
1000	895	369.5	64.23	0.010	0.026	0.036	0.988	0.724
1300	1047	437.0	68.34	0.008	0.026	0.034	0.991	0.769
1474	1135	476.3	70.73	0.006	0.026	0.032	0.993	0.809
1774	1255	529.5	73.97	0.005	0.026	0.032	0.993	0.828
1943	1322	559.5	75.79	0.005	0.026	0.031	0.994	0.851
2243	1439	611.4	78.95	0.004	0.026	0.030	0.995	0.862
2543	1556	663.4	82.11	0.004	0.026	0.030	0.996	0.879
2611	1582	675.1	82.83	0.003	0.026	0.029	0.996	0.895
2911	1709	731.5	86.27	0.003	0.026	0.029	0.996	0.897
3103	1790	767.5	88.46	0.003	0.026	0.029	0.997	0.912
3403	1914	822.5	91.81	0.002	0.026	0.029	0.997	0.919
3703	2038	877.4	95.17	0.002	0.026	0.028	0.998	0.930
4003	2161	932.2	98.52	0.002	0.027	0.028	0.998	0.939
4087	2196	947.5	99.45	0.001	0.027	0.028	0.998	0.947
4387	2306	996.3	102.44	0.001	0.027	0.028	0.998	0.949
4585	2379	1028.5	104.41	0.001	0.027	0.028	0.998	0.955
4885	2523	1091.9	108.30	0.001	0.027	0.028	0.999	0.959
5120	2635	1141.5	111.34	0.001	0.027	0.028	0.999	0.966
5420	2845	1234.1	117.03	0.001	0.027	0.028	0.999	0.970
5577	2955	1282.4	120.00	0.001	0.027	0.027	0.999	0.979

Wellbore Data

Gas Rate Mscf/D	Oil Rate Bbl/D	Water Rate Bbl/D	Inlet Pressure psig	Outlet Pressure psig
10.40	49	114	1282.4	1.0

INFLOW DATA

Case 1 (Base)

Liquid Rate Bbl/D	Sandface Pressure psig	Completion Pressure Drop psi	Bottomhole Pressure psig	Bottomhole Temp °F	Liq FVF	Viscosity cP
0	1414.3	0.0	1414.3	120	1.044	54.71814
76	1352.9	0.0	1352.9	120	1.043	56.83137
150	1291.4	0.0	1291.4	120	1.041	58.91629
221	1229.9	0.0	1229.9	120	1.040	60.90433
290	1168.4	0.0	1168.4	120	1.039	62.83798
356	1106.9	0.0	1106.9	120	1.037	64.81831
421	1045.4	0.0	1045.4	120	1.036	66.84038
484	983.9	0.0	983.9	120	1.035	68.77854
545	922.4	0.0	922.4	120	1.034	70.75178
604	860.9	0.0	860.9	120	1.033	72.90602
661	799.4	0.0	799.4	120	1.031	75.22506
717	737.9	0.0	737.9	120	1.030	77.75647
770	676.4	0.0	676.4	120	1.029	80.32795
823	614.9	0.0	614.9	120	1.028	82.90330
874	553.4	0.0	553.4	120	1.026	85.47585
924	491.9	0.0	491.9	120	1.025	88.06866
973	430.5	0.0	430.5	120	1.024	90.61266
1019	369.0	0.0	369.0	120	1.022	93.17095
1063	307.5	0.0	307.5	120	1.021	95.76557
1105	246.0	0.0	246.0	120	1.020	98.12876
1146	184.5	0.0	184.5	120	1.019	100.21679
1184	123.0	0.0	123.0	120	1.018	101.96286
1221	61.5	0.0	61.5	120	1.017	103.15795
1257	0.0	0.0	0.0	120	1.016	104.40446

AOF at Sandface = 1257 Bbl/D

OUTFLOW DATA

Case 1 (Base)

Liquid Rate Bbl/D	Wellhead Pressure psig	Bottomhole Pressure psig	Wellhead Temperature °F
5	1.0	1318.4	40
26	1.0	1313.3	40
39	1.0	1310.3	40
54	1.0	1306.9	40
71	1.0	1302.8	40
93	1.0	1297.6	40
120	1.0	1290.8	40
159	1.0	1280.9	40
226	1.0	1263.2	40
407	1.0	1217.3	40
603	1.0	1093.6	40
830	1.0	1071.9	40
1056	1.0	1050.4	40
1282	1.0	1028.7	40
1508	1.0	938.1	40

Calculated PVT Data (Base Reservoir)

Press psia	Soln GOR scf/bbl	Soln GWR scf/bbl	Oil FVF	Gas FVF cf/scf	Wtr FVF
1429.0	203.7	5.0	1.114	0.009502	1.011
1400.0	198.6	5.0	1.111	0.009726	1.011
1300.0	182.0	4.7	1.104	0.010584	1.012
1200.0	167.3	4.5	1.098	0.011595	1.012
1100.0	153.2	4.2	1.091	0.012800	1.012
1000.0	139.8	4.0	1.085	0.014255	1.012
900.0	126.6	3.7	1.079	0.016044	1.012
800.0	112.1	3.4	1.073	0.018290	1.012
700.0	96.6	3.1	1.066	0.021188	1.012
600.0	81.4	2.8	1.059	0.025060	1.012
500.0	66.3	2.5	1.053	0.030492	1.012
400.0	51.3	2.2	1.046	0.038649	1.013
300.0	35.6	1.9	1.039	0.052255	1.013
200.0	21.1	1.6	1.033	0.079481	1.013
100.0	9.4	1.3	1.028	0.161180	1.013
15.0	0.0	0.0	1.023	1.113215	1.013

Calculated PVT Data (Base Reservoir)

Press psia	Visc Oil cP	Density Oil lb/cf	Oil Comp 1/psia	Visc Gas cP	Density Gas lb/cf	Z
1429.0	169.26200	56.966	4.0000e-006	0.01457	5.364	0.831
1400.0	172.62231	57.018	4.0000e-006	0.01448	5.240	0.833
1300.0	184.08698	57.187	4.0000e-006	0.01417	4.815	0.842
1200.0	194.86315	57.335	4.0000e-006	0.01388	4.396	0.852
1100.0	205.83065	57.479	4.0000e-006	0.01361	3.982	0.862
1000.0	216.81469	57.616	4.0000e-006	0.01335	3.575	0.872
900.0	228.13512	57.752	4.0000e-006	0.01312	3.177	0.884
800.0	241.15386	57.905	4.0000e-006	0.01290	2.787	0.895
700.0	255.59214	58.072	4.0000e-006	0.01270	2.405	0.908
600.0	270.23704	58.238	4.0000e-006	0.01251	2.034	0.920
500.0	285.09221	58.405	4.0000e-006	0.01235	1.671	0.933
400.0	299.87442	58.573	4.0000e-006	0.01220	1.319	0.946
300.0	314.89030	58.751	4.0000e-006	0.01207	0.975	0.959
200.0	327.91920	58.917	4.0000e-006	0.01195	0.641	0.973
100.0	337.43212	59.048	5.0000e-006	0.01186	0.316	0.986
15.0	344.00000	59.153	1.6000e-005	0.01181	0.046	0.998

APPENDIX K

REGULATORY CROSS REFERENCE

DOT/PHMSA 49 CFR Part 194 Cross Reference K-2

California OSPR
14 CCR § 817.02 Marine Facility Plan Content K-7

BSEE 30 CFR Part 254 Cross Reference K-34

DOT/PHMSA 49 CFR Part 194 *CROSS REFERENCE*		
§ 194.105	**BRIEF DESCRIPTION**	**SECTION**
(a)	…determine the worst case discharge…provide methodology, including calculations, used to arrive at the volume	App. H
(b)	The worst case discharge is the largest volume, in barrels, of the following…	---
(b)(1)	…maximum release time in hours, plus the maximum shutdown response time in hours, multiplied by the maximum flow rate expressed in barrels per hour, plus the largest line drainage volume after the shutdown of the line section(s)…	App. H
(b)(2)	The largest foreseeable discharge for the line section(s) within a response zone, expressed in barrels, based on the maximum historic discharge, if one exists, adjusted for any subsequent corrective or preventative action taken.	App. H
(b)(3)	If the response zone contains one or more breakout tanks, the capacity of the single largest tank or battery of tanks within a single secondary containment system, adjusted for the capacity or size of the secondary containment system, expressed in barrels.	App. H
(b)(4)	Operators may claim prevention credits for breakout tank secondary containment and other specific spill prevention measures as follows…	---
§ 194.107	**BRIEF DESCRIPTION**	**SECTION**
(a)	Each response plan must plan for resources for responding to the maximum extent practicable to a worst case discharge, and to a substantial threat of such a discharge.	App. D, App. E
(b)	Each operator must certify in the response plan that it reviewed the NCP and each applicable ACP and that its response plan is consistent with the NCP and each applicable ACP as follows:	§ 3
(b)(1)	As a minimum to be consistent with the NCP as a facility response plan must;	---
(b)(1)(i)	Demonstrate an operator's clear understanding of the function of the Federal response structure…..	§ 8
(b)(1)(ii)	Establish provision to ensure the protection of safety at the response site; and	§ 12
(b)(1)(iii)	Identify the procedures to obtain any required Federal and State permissions for using alternative response strategies such as in-situ burning and dispersants as provided for in the applicable ACPs; and	§ 18, § 19, § 20
(b)(2)	As a minimum, to be consistent with the applicable ACP, the plan must:	---
(b)(2)(i)	Address the removal of a worst case discharge and the mitigation or prevention of a substantial threat of a worst case discharge.	§ 13, § 15
(b)(2)(ii)	Identify environmentally and economically sensitive areas	§ 11
(b)(2)(iii)	Describe the responsibilities of the operator and of Federal, State and local agencies in removing a discharge and in mitigating or preventing a substantial threat of a discharge; and	§ 15

DOT/PHMSA 49 CFR Part 194 *CROSS REFERENCE*		
§ 194.107	**BRIEF DESCRIPTION**	**SECTION**
(b)(2)(iv)	Establish the procedures for obtaining an expedited decision on use of dispersants or other chemicals.	§ 20
(c)	Each response plan must include:	---
(c)(1)	A core plan consisting of …	---
(c)(1)(i)	An information summary as required in §194.113	§ 3.j.
(c)(1)(ii)	Immediate notification procedures	§ 1
(c)(1)(iii)	Spill detection and mitigation procedures,	§ 6
(c)(1)(iv)	The name, address, and telephone number of the oil spill response organization, if appropriate	§ 6, § 22
(c)(1)(v)	Response activities and response resources	§ 11, § 12
(c)(1)(vi)	Names and telephone numbers of Federal, State and local agencies which the operator expects to have pollution control responsibilities or support	§ 1
(c)(1)(vii)	Training procedures.	App. B
(c)(1)(viii)	Equipment testing	App. E
(c)(1)(ix)	Drill program – an operator will satisfy the requirement for a drill program by following the National Preparedness for Response Exercise Program (PREP) guidelines. An operator choosing not to follow the PREP guidelines must have a drill program that is equivalent to PREP. The operator must describe the drill program in the response plan and OPS will determine if the program is equivalent to PREP.	App. C
(c)(1)(x)	Plan review and update procedures;	§ 3.f.
(c)(2)	An appendix for each response zone that includes the information required in paragraph (c)(1)(i)-(x) of this section and the worst case discharge calculations that are specific to that response zone. An operator submitting a response plan for a single response zone does not need to have a core plan and a response zone appendix. The operator of a single response zone onshore pipelines shall have a single summary in the plan that contains the required information in § 194.113.7; and	§ 3.j.
(c)(3)	A description of the operator's response management system including the functional areas of finance, logistics, operations, planning and command. The plan must demonstrate that the operator's response management system uses common terminology and has a manageable span of control, a clearly defined chain of command, and sufficient trained personnel to fill each position.	§ 4
§ 194.111	**BRIEF DESCRIPTION**	**SECTION**
(a)	Each operator shall maintain relevant portions of its response plan at the operator's headquarters and at other locations from which response activities may be conducted, for example, in field offices, supervisor's vehicles, or spill response trailers.	§ 2
(b)	Each operator shall provide a copy of the response plan to each qualified individual.	§ 2

DOT/PHMSA 49 CFR Part 194 *CROSS REFERENCE*		
§ 194.113	**BRIEF DESCRIPTION**	**SECTION**
(a)	The information summary for the core plan, required by § 194.107 must include:	---
(a)(1)	The name and address of the operator.	§ 3.j.
(a)(2)	For each response zone which contains one or more line sections that meet the criteria for determining significant and substantial harm as described in § 194.103, a listing and description of the response zones, including county(s) and state(s)	§ 3.i.
(b)	The information summary for the response zone appendix, required in § 194.107, must include:	---
(b)(1)	The information summary for the core plan.	§ 3.j.
(b)(2)	The name or titles and 24-hour telephone numbers of the qualified individual(s) and at least one alternate qualified individual(s).	§ 3.j.
(b)(3)	The description of the response zone, including county(s) and state(s), for those zones in which a worst case discharge could cause substantial harm to the environment.	§ 3.j.
(b)(4)	A list of line sections for each pipeline contained in the response zone, identified by milepost or survey station number, or other operator designation.	§ 3.j.
(b)(5)	The basis for the operator's determination of significant and substantial harm.	§ 3.i.
(b)(6)	The type of oil and volume of the worst case discharge.	§ 3.j.
§ 194.115	**BRIEF DESCRIPTION**	**SECTION**
(a)	Each operator shall identify and ensure, by contract or other approved means, the resources necessary to remove, to the maximum extent practicable, a worst case discharge and to mitigate or prevent a substantial threat of a worst case discharge.	App. D
(b)	An operator shall identify in the response plan the response resources which are available to respond within the time specified (Tier 1 – 6 hrs., Tier 2 – 30 hrs., Tier 3 – 54 hrs.), after discovery of a worst case discharge, or to mitigate the substantial threat of such a discharge.	App. D
§ 194.117	**BRIEF DESCRIPTION**	**SECTION**
(a)	Each operator shall conduct training to ensure that:	---
(a)(1)	All personnel know--	App. B
(a)(1)(i)	Their responsibilities under the response plan	App. B
(a)(1)(ii)	The name and address of, and the procedures for contacting, the operator on a 24-hour basis.	App. B
(a)(1)(iii)	The name of, and procedures for contacting, the qualified individual on a 24-hour basis.	App. B
(a)(2)	Reporting personnel know--	App. B
(a)(2)(i)	The content of the information summary of the response plan.	App. B
(a)(2)(ii)	The toll-free telephone number of the National Response Center.	App. B
(a)(2)(iii)	The notification process	App. B
(a)(3)	Personnel engaged in response activities know--	App. B

DOT/PHMSA 49 CFR Part 194 CROSS REFERENCE		
§ 194.117	**BRIEF DESCRIPTION**	**SECTION**
(a)(3)(i)	The characteristics and hazards of the oil discharged.	App. B
(a)(3)(ii)	The conditions that are likely to worsen emergencies, including the consequences of facility malfunctions or failures, and the appropriate corrective actions.	App. B
(a)(3)(iii)	The steps necessary to control any accidental discharge of oil and to minimize the potential for fire, explosion, toxicity, environmental damage.	App. B
(a)(3)(iv)	The proper firefighting procedures and use of equipment, fire suits, and breathing apparatus.	App. B
(b)	Each operator shall maintain a training record for each individual that has been trained as required by this section. These records must be maintained in the following manner as long as the individual is assigned duties under the response plan.	App. B
(b)(1)	Records for operator personnel must be maintained at the operator's headquarters.	App. B
(b)(2)	Records for personnel engaged in response, other than operator personnel, shall be maintained as determined by the operator.	App. B
(c)	Nothing in this section relieves an operator from the responsibility to ensure that all response personnel are trained to meet the OSHA standards for emergency response operations in 29 CFR 190.120…	App. B
§ 194.119	**BRIEF DESCRIPTION**	**SECTION**
(a)	Each owner shall submit two copies…	§ 2
(b)	…PHMSA will notify the operator of any alleged deficiencies…	---
(c)	The operator…may petition PHMSA for reconsideration within 30 days.	---
(d)	…PHMSA will approve the Response Plan…	---
(e)	…The operator may submit a certification to PHMSA… that the operator has obtained, through contract or other approved means, the necessary private personnel and equipment to record, to the maximum extent practicable, to a worst case discharge…	§ 3.h.
(f)	…PHMSA may require an operator to provide a copy of the response plan to the OSC…	---
§ 194.121	**BRIEF DESCRIPTION**	**SECTION**
(a)	Each operator shall update the response plan to address new or different operating conditions or information. In addition, each operator shall review its response plan in full at least every 5 years from the date of the last submission or the last approved as follows:	---
(a)(1)	For substantial harm plans, an operator shall resubmit its response plan to OPS every 5 years from the last submission date.	---
(a)(2)	For significant and substantial harm plans, an operator shall resubmit every 5 years from the last approved date.	§ 3

DOT/PHMSA 49 CFR Part 194 *CROSS REFERENCE*		
§ 194.121	**BRIEF DESCRIPTION**	**SECTION**
(b)	If a new or different operating condition or information would substantially affect the implementation of a response plan, the operator must immediately modify the response plan to address such a change and, with 30 days of making such a change, submit the change to PHMSA. Examples of changes in operating conditions that would cause a significant change to an operator's response plan are:	---
(b)(1)	An extension of the existing pipeline or construction of a new pipeline in a response zone not covered by the previously approved plan;	§ 3
(b)(2)	Relocation or replacement of the pipeline in a way that substantially affects the information included in the response plan, such as a change to the worst case discharge volume;	§ 3
(b)(3)	The type of oil transported, if the type affects the required response resources, such as a change from crude oil to gasoline;	§ 3
(b)(4)	The name of the oil spill removal organization;	§ 3
(b)(5)	Emergency response procedures;	§ 3
(b)(6)	The qualified individual	§ 3
(b)(7)	A change in the N CP or an ACP that has significant impact on the equipment appropriate for response activities; and	§ 3
(b)(8)	Any other information relating to circumstances that may affect full implementation of the plan.	§ 3
(c)	If PHMSA determines that a change to a response plan does not meet the requirements of this part, PHMSA will notify the operator of any alleged deficiencies, and provide the operator an opportunity to respond, including an opportunity for an informal conference, to any proposed plan revisions and an opportunity to correct any deficiencies.	---
(d)	An operator who disagrees with a determination that proposed revisions to a plan are deficient may petition PHMSA for reconsideration, within 30 days from the date of receipt of PHMSA's notice. After considering all relevant material presented in writing or at the conference, PHMSA will notify the operator of its final decision. The operator must comply with the final decision within 30 days of issuance unless PHMSA allows additional time.	---

California OSPR 14 CCR § 817.02 Marine Facility Plan Content		
§ 817.02	**Description**	**Section**
(a)	**Introductory Material**	
(a)(1)	Each plan shall provide the following information:	
(a)(1)(A)	name and address of the marine facility, and mailing address if different. The name and address of the facility shall be referenced in the plan title or on a title page at the front of the plan;	§ 3 Facility Information
(a)(1)(B)	name, address, phone number, fax number and e-mail address, if available, of the owner and/or operator of the marine facility;	§ 3 Facility Information
(a)(1)(C)	name, address and phone number, fax number and e-mail address, if available, of the person to whom correspondence should be sent;	§ 3 Facility Information
(a)(1)(D)	a certification statement signed under penalty of perjury by an executive within the plan holder's management who is authorized to fully implement the oil spill contingency plan, who shall review the plan for accuracy, feasibility, and executability. If this executive does not have training, knowledge and experience in the area of oil spill prevention and response, the certification statement must also be signed by another individual within the plan holder's management structure who has the requisite training, knowledge, and experience. The certification shall be submitted according to the following format; "I certify, to the best of my knowledge and belief, under penalty of perjury under the laws of the State of California, that the information contained in this contingency plan is true and correct and that the plan is both feasible and executable." ______________________________(signature), (title), (date);	§ 3 Feasibility and Executability Statement
(a)(1)(E)	The California Certificate of Financial Responsibility (COFR) number for the marine facility shall be included in the front of the plan. If the COFR is not available when the plan is submitted because the marine facility is not yet operational, the COFR number must be provided as soon as it becomes available. The COFR number must be provided before the plan can be approved.	§ 3 Facility Information
(a)(2)	Each plan shall identify a Qualified Individual, as defined in Chapter 1, Section 790 of this subdivision, and any alternates that may be necessary for the purpose of implementing the plan. If the plan holder contracts for this service, documentation that the Qualified Individual or company, and any identified alternates, acknowledge this capacity shall be included in the plan. If an alternate or alternates are identified in the plan, then the plan shall also describe the process by which responsibility will be transferred from the Qualified Individual to an alternate. During spill response activities, notification of such a transfer must be made to the State Incident Commander at the time it occurs.	§ 3 Facility Information
(a)(3)	Each plan shall provide the name, address, telephone number and facsimile number of an agent for service of process designated to receive legal documents on behalf of the plan holder. If the plan holder contracts for this service, documentation that the agent for service of process acknowledges this capacity shall be included in the plan. Such agent shall be located in California.	§ 3 Facility Information

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(a)(4)	Each plan shall identify a Spill Management Team (as defined in Section 815.05(p) of this subchapter). If the plan holder contracts for this service, documentation that the Spill Management Team acknowledges this capacity shall be included in the plan.	§ 3, App D
(a)(5)	Each plan shall contain a copy of the contract or other approved means (as defined in Section 815.05(b) of this subchapter) verifying that any oil spill response organization(s) that are named in the plan will provide the requisite equipment and personnel in the event of an oil spill. This requirement can be met by a copy of the basic written agreement with an abstract of the recovery and/or cleanup capacities covered by the contract. Plan holders shall only contract with an OSRO(s) that has received a Rating by OSPR (as specified in Section 819 of this subchapter) for the booming, on-water recovery and storage, and shoreline protection services required.	App D
(b)	**Marine Facility Description**	
(b)(1)	Each plan shall describe the marine facility's design and operations with specific attention to those areas from which an oil spill could occur. This description shall include, at a minimum, the following information:	
(b)(1)(A)	a piping and instrumentation diagram, and a tank diagram including the location of pumps, valves, vents and lines; the number, and oil storage capacity of each structure covered under the plan and its age, design, construction and general condition; the range of oil products normally stored in each structure; the presence or absence of containment structures and equipment; and the location of mooring areas, oil transfer locations, control stations, safety equipment, drip pans and the drainage for drip pans;	§ 22
(b)(1)(B)	a description of the types, physical properties, health and safety hazards, maximum storage or handling capacity and current normal daily throughput of oil handled. A material safety data sheet (MSDS) or equivalent will meet some of these requirements and can be maintained separately at the facility providing the plan identifies its location;	App L
(b)(1)(C)	a description of the normal procedures for transferring oil from or to a pipeline, tanker, barge or other vessel, or storage tank, and the amount, frequency and duration of oil transfers;	§ 22
(b)(1)(D)	the marine facility's normal hours of operation; and	§ 3 Facility Information
(b)(1)(E)	for an exploration or production facility, a complete description of those sections of the oil or gas lease field, gathering lines, storage tanks and processing facilities, under the control of the owner/operator, a spill from which could reasonably be expected to impact the marine waters of California.	§ 3 Facility Information
(b)(2)	Each plan shall describe the marine facility site and surrounding area, including, where appropriate, the following information (note: where maps/diagrams are required they may be submitted on electronic media, in Portable Document Format (PDF)):	

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(b)(2)(A)	a map and description of site topography, including the drainage and diversion plans for the marine facility, such as sewers, storm drains, catchment, containment or diversion systems or basins, oil/water separators, and all watercourses into which surface runoff from the facility drains;	App A
(b)(2)(B)	vicinity maps showing any vehicular or rail access to the marine facility, pipelines to and from the facility, nearby residential, commercial or other populous areas, and access to private land necessary to respond to a spill;	App A
(b)(2)(C)	seasonal hydrographic and climatic conditions including wind speed and direction, air and water temperature, local tides, prevailing currents, and any local visibility problems;	App I
(b)(2)(D)	physical geographic features, including ocean depths and local bathymetry; beach types and other geological conditions, including type of soil and terrain; operational conditions such as physical or navigation hazards, traffic patterns, permanent buoys, moorings and underwater structures or other site-specific factors; and any other physical feature or peculiarity of local waters that call for special precautionary measures that may affect spill response;	App I
(b)(2)(E)	logistical resources within the geographic area covered by the plan, including facilities for fire services, medical services, and accommodations for spill response personnel; and	App F
(b)(2)(F)	shoreline access area, including piers, docks, boat launches and equipment and personnel staging areas.	§ 11, § 14, App H
(c)	**Prevention Measures** Each plan shall address prevention measures in order to reduce the possibility of an oil spill occurring as a result of the operation of the marine facility. The prevention measures must eliminate or mitigate all the hazards identified in the Risk and Hazard Analysis.	
(c)(1)	Risk and Hazard Analysis	
(c)(1)(A)	Each marine facility shall conduct a Risk and Hazard Analysis to identify the hazards associated with the operation of the facility, including: operator error, the use of the facility by various types of vessels, equipment failure, and external events likely to cause an oil spill. The owner/operator may use one or more of the hazard evaluation methods identified by the American Institute of Chemical Engineers, or an equivalent method, including, but not limited to: 1. What-if analysis; 2. Checklist analysis; 3. Preliminary hazard analysis; 4. Hazard and operability study; 5. Failure mode and effect analysis; or 6. Fault tree analysis.	App N

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(c)(1)(B)	The chosen hazard evaluation method must be conducted in accordance with the guidelines established by the American Institute of Chemical Engineers as published in the "Guidelines for Hazard Evaluation Procedures", second edition, copyright 1992, prepared for The Center For Chemical Process Safety. 1. The plan must include information regarding the expertise of the working group that develops the analysis. 2. The plan must include information that demonstrates to the Administrator that the analysis is appropriate to the marine facility and adequate according to the published procedures referenced in (B) above. 3. An owner/operator may be found in violation of this section if the Risk and Hazard Analysis does not adequately address the risks posed by the marine facility. 4. The Administrator may require that an analysis be updated if there are significant changes made to the marine facility. A significant change, as used in this paragraph, is one that would have an impact on the outcome of the Risk and Hazard Analysis. 5. Additional information regarding the analysis method used or the working group that conducted the analysis shall be made available to the Administrator upon request.	App N
(c)(1)(C)	Each plan shall include a summary of the results of the risk and hazard analysis. The summary shall include the following: 1. the hazard analysis method used, and a statement that the analysis is specific to the marine facility. If the analysis relies on a risk assessment at a similar facility, the summary shall specify how the two facilities are comparable; 2. an inventory of the hazards identified, including the hazards that resulted in the historical spills; 3. an analysis of the potential oil discharges, including the size, frequency, cause, duration and location of all significant spills from the marine facility as a result of each major type of hazard identified; 4. the control measures that will be used to mitigate or eliminate the hazards identified. The plan shall include timeframes for implementing any control measures that cannot be functional immediately; and 5. a prediction of the potential oil spills that might still be expected to occur after any mitigating controls have been implemented.	App N
(c)(1)(D)	All supporting documentation used to develop the Risk and Hazard Analysis summary shall be made available to the Administrator upon request.	----

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(c)(2)	**Off-Site Consequence Analysis –** *Annex J.2, J.3 – Elements not addressed separately in the cross reference.* For the significant hazards identified in the Risk and Hazard Analysis required under this section, the marine facility shall conduct a trajectory analysis to determine the Off-Site Consequences of an oil spill. This analysis shall assume pessimistic water and air dispersion and other adverse environmental conditions such that the worst possible dispersion of the oil into the air or onto the water will be considered. This analysis is intended to be used as the basis for determining the areas and shoreline types for which response strategies must be developed. Some of the information required in this subsection may be drawn from the appropriate Area Contingency Plans, completed by the U.S. Coast Guard, State Agencies, and Local Governments pursuant to the Oil Pollution Act of 1990. (Note: where maps/diagrams are required they may be submitted on electronic media, in Portable Document Format (PDF)). The analysis, which shall be summarized in the plan, shall include at least the following:	
(c)(2)(A)	a trajectory, or series of trajectories (for pipelines, etc.), to determine the potential direction, rate of flow and time of travel of the reasonable worst case oil spill from the facility to marine waters and to the shorelines, including shallow-water environments, that may be impacted. For purposes of this requirement, a trajectory or trajectories (projected for a minimum of 72 hours) that determine the outer perimeter of a spill, based on regional extremes of climate, tides, currents and wind with consideration to seasonal differences, shall be sufficient;	App H
(c)(2)(B)	for each probable shoreline that may be impacted, a discussion of the general toxicity effects and persistence of the discharge based on type of product; the effect of seasonal conditions on sensitivity of these areas; and an identification of which areas will be given priority attention if a spill occurs.	§ 11
(c)(3)	**Resources at Risk from Oil Spills** Based on the trajectory of the spilled oil as determined in the Off-Site Consequence Analysis, each plan shall identify the environmentally, economically and culturally sensitive sites that may be impacted. Each plan shall identify and provide a map of the locations of these areas. Some of the information required in this subsection may be drawn from the appropriate Area Contingency Plans, completed by the U.S. Coast Guard, State Agencies, and Local Governments pursuant to the Oil Pollution Act of 1990. (Note: where maps/diagrams are required they may be submitted on electronic media, in Portable Document Format (PDF)).	

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(c)(3)(A)	The map of environmentally sensitive sites shall include: 1. shoreline types and associated marine resources; 2. the presence of migratory and resident marine bird and mammal migration routes, and breeding, nursery, stopover, haul-out, and population concentration areas by season; 3. the presence of aquatic resources including marine fish, invertebrates, and plants including important spawning, migratory, nursery and foraging areas; 4. the presence of natural terrestrial animal and plant resources in marine-associated environments; 5. the presence of state or federally-listed rare, threatened or endangered species; 6. the presence of commercial and recreational fisheries including aquaculture sites, kelp leases and other harvest areas.	§ 11
(c)(3)(B)	The map of the locations of economically and culturally sensitive sites shall include: 1. public beaches, parks, marinas, boat ramps and diving areas; 2. industrial and drinking water intakes, power plants, salt pond intakes, and other similarly situated underwater structures; 3. off-shore oil and gas leases and associated drilling/production platforms; 4. known historical and archaeological sites. If a plan holder has access to any confidential archaeological information, it must be submitted as a separate item and will be handled as confidential information as outlined in Subsection 816.01(d) ; 5. areas of cultural or economic significance to Native Americans; and 6. the major waterways and vessel traffic patterns that are likely to be impacted.	§ 11

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(c)(4)	**Required Prevention Measures** Each marine facility shall take all prevention measures to reduce or mitigate the potential hazards identified in the Risk and Hazard Analysis, and the potential impact those hazards pose to the resources at risk. Each plan shall include the following:	
(c)(4)(A)	schedules, methods and procedures for testing, maintaining and inspecting pipelines and other structures within or appurtenant to the marine facility that contain or handle oil which may impact marine waters if a failure occurs. Any information developed in compliance with Title 30 CFR, Part 250.153; Title 33 CFR, Part 154; Title 49 CFR, Part 195; and/or Title 5, Division 1, Part 1, Chapter 5.5, Sections 51010 through 51019.1 of the Government Code may be substituted for all or part of any comparable prevention measures required by this subsection.	§ 22
(c)(4)(B)	methods to reduce spills during transfer and storage operations, including overfill prevention measures and immediate spill containment provisions. Any information developed in compliance with Title 2, CCR, Division 3, Chapter 1, Article 5, Sections 2300-2407; Title 30 CFR, Part 250.154; and/or Title 33 CFR, Parts 154 and 156 may be substituted for all or part of any comparable prevention measures required by this subsection.	§ 22
(c)(4)(C)	procedures to assure clear communication among all the parties involved during transfer operations. Any information developed in compliance with Title 2, CCR, Division 3, Chapter 1, Article 5; Title 14, CCR, Division 1, Subdivision 4, Chapter 3, Subchapter 6; and/or Title 33 CFR, Parts 154 and 156 may be substituted for all or part of any comparable prevention measures required by this subsection;	§ 22
(c)(4)(D)	protection measures for areas within the marine facility that are subject to flooding;	N/A
(c)(4)(E)	the plan holder shall provide additional relevant information to the Administrator upon request.	---
(d)	**Containment Booming and On-water Recovery** Each plan holder must have a contract or other approved means for containment booming and on-water recovery response resources up to their Response Planning Volume for all potential oil spills from the marine facility. To determine the amount of response resources for containment booming and on-water recovery, each plan holder must calculate a Response Planning Volume as outlined below:	
(d)(1)	Reasonable Worst Case Spill To calculate the Response Planning Volume, it is first necessary to determine the reasonable worst case spill for each marine facility, as follows:	

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(d)	**Containment Booming and On-water Recovery (Continued)**	
(d)(1)(A)	For marine facilities (except on-shore pipelines (not subject to Chapter 6.67 (commencing with Section 25270) or Chapter 6.7 (commencing with Section 25280) of Division 20, Health and Safety Code) which are addressed in Subsection (B), offshore platforms which are addressed in Subsections (C) and (D), and offshore pipelines which are addressed in Subsection (E): 1. the loss of the entire capacity of all in-line, break-out and portable storage tank(s), not subject to Chapter 6.67 (commencing with Section 25270) or Chapter 6.7 (commencing with Section 25280) of Division 20, Health and Safety Code, needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, taking into account the existence of volume limiting factors including, but not limited to, line pressure, gravity, and the availability and location of the emergency shut-off controls; plus 2. the amount of additional spillage that could reasonably be expected to enter California marine waters during emergency shut-off, transfer or pumping operations if a hose(s) or pipeline(s) ruptures or becomes disconnected, or if some other incident occurs which could cause or increase the size of an oil spill. The spillage shall be calculated as follows: the maximum time to discover the release from the pipe or hose in hours, plus the maximum time to shut down flow from the pipe or hose in hours (based on historic discharge data or the best estimate in absence of historic discharge data for the marine facility) multiplied by the maximum flow rate expressed in barrels per hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line-fill drainage volume expressed in barrels. 3. The Administrator has the discretion to accept that a marine facility can operate only a limited number of the total pipelines at a time. In those circumstances, the reasonable worst case spill volume shall include the drainage volume from the piping normally not in use, in addition to the volume determined in (1) and (2), above.	N/A

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(d)(1)(B)	For on-shore pipelines not subject to Chapter 6.67 (commencing with Section 25270) or Chapter 6.7 (commencing with Section 25280) of Division 20, Health and Safety Code, the largest volume in barrels, of the following: 1. The pipeline's maximum release time in hours (i.e., the time between pipeline rupture and discovery), plus the maximum shut-down response time in hours (based on historic discharge data or in the absence of such historic data, the operator's best estimate), multiplied by the maximum flow rate expressed in barrels per hour (based on the maximum daily capacity of the pipeline), plus the largest line drainage volume after shutdown of the line section(s) in the response zone expressed in barrels. (As used in this subsection: line section means a continuous run of pipe that is contained between adjacent pressure pump stations, between a pressure pump station and a terminal or break-out tank, between a pressures pump station and a block valve, or between adjacent block valves; response zone means a geographic area either along a length of pipeline or including multiple pipelines, containing one or more adjacent line sections, for which the operator must plan for the deployment of, and provide spill response capabilities. The size of the zone is determined by the operator after considering available capabilities, resources, and geographic characteristics); or 2. The largest foreseeable discharge for the line section(s) within a response zone, expressed in barrels, based on the maximum historic discharge, if one exists, adjusted for any subsequent corrective or preventive action taken; or 3. If the response zone contains one or more break-out tanks, the capacity of the single largest tank or battery of tanks within a single secondary containment system, adjusted for the capacity or size of the secondary containment system, expressed in barrels.	N/A

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(d)	**Containment Booming and On-water Recovery (Continued)**	
(d)(1)(C)	For offshore platforms (except those drilling a new well which are addressed in Subsection (D)): 1. total tank storage and flow line capacity; plus 2. that portion of the total line-fill capacity which could be lost during a spill, taking into account the availability and location of the emergency shut-off controls and the effect of hydrostatic pressure; plus 3. the amount of additional spillage that could reasonably be expected to enter marine waters during emergency shut-off, transfer or pumping operations if a hose or pipeline ruptures or becomes disconnected, or some other incident occurs which could cause or increase the size of an oil spill. The calculation may take into consideration other safety devices, emergency reaction times and maximum transfer rates; plus 4. the daily production volume for thirty (30) days from an uncontrolled blowout of the highest capacity well associated with the marine facility. In determining the daily discharge rate, the reservoir characteristics, casing/production tubing sizes, and historical production and reservoir pressure data shall be taken into consideration.	N/A
(d)(1)(D)	For offshore platforms with active well drilling: The owner/operator of a platform at which a new well is being drilled must submit a proposed reasonable worst case oil spill calculation for platform operations to the Administrator. The proposed worst case discharge is the daily volume possible for thirty (30) days from an uncontrolled blowout taking into consideration any known reservoir characteristics. The proposed calculation will be reviewed by the Administrator during the plan review and approval process to determine if it adequately addresses the oil spill potential of the new well system.	N/A
(d)(1)(E)	For offshore pipelines, the largest volume in barrels of the following calculation: 1. The pipeline system leak detection time, plus the shutdown response time, multiplied by the highest measured oil flow rate over the preceding 12-month period. For new pipelines, use the predicted oil flow rate. Add to this calculation the total volume of oil that would leak from the pipeline after it is shut in. This volume should be calculated by taking into account the effects of hydrostatic pressure, gravity, frictional wall forces, length of pipeline segment, tie-ins with other pipelines, and other factors.	App H

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)				
§ 817.02	**Description**			**Section**
(d)	**Containment Booming and On-water Recovery (Continued)**			
(d)(1)(F)	The calculations, and such parameters as flow rates, line-fill capacities and emergency shutoff times, that are used to determine a marine facility's reasonable worst case spill shall be submitted as part of the plan. The Administrator may review and test these parameters as part of the drill conducted in accordance with Subsection 816.03(b).			----
(d)(2)	Persistence and Emulsification Factors			
(d)(2)(A)	The reasonable worst case spill volume is then multiplied by a persistence factor relative to the most persistent type of oil that may be spilled by the marine facility. The persistence factors relative to the type of oil spilled, are specified below:			App H
Oil Group	Group 1	Group 2	Group 3	Group 4
Persistence Multiplier	.20	.50	.50	.50
(d)(2)(B)	Emulsification Factors The volume determined from the calculation in Subparagraph (A) is then multiplied by one of the following emulsification factors, again, based on the type of oil.			App H
Oil Group	Group 1	Group 2	Group 3	Group 4
Emulsification Multiplier	1.0	1.8	2.0	1.4

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(d)	**Containment Booming and On-water Recovery (Continued)**	
(d)(2)(C)	Response Planning Volume The total determined by the above calculation is a Response Planning Volume. 1. The Response Planning Volume to be used to determine the amount of Response Equipment and Services that must be under contract or other approved means shall be the greater of the amount determined in Subsection 817.02(d)(1) and (2) , or the Planning Volume for On-water Recovery calculated for the nearshore/inland environment in the marine facility's federal response plan pursuant to 33 CFR Part 154, Appendix C, Section 7. The Planning Volume for On-Water Recovery is the adjusted volume from the federal calculation determined prior to establishing the response tiers utilizing the mobilization factors. 2. All calculations used to determine the Response Planning Volume shall be included in the plan.	App H
(d)(3)	Response Capability Standards The equipment and personnel necessary to address the Response Planning Volume is brought to the scene of the spill over a period of time. The timeframes are dependent upon the risk zone in which the marine facility is located and are specified in the tables in this section. The standards set forth in this section are only planning standards and may not reflect the exigencies of actual spill response. However, these are the standards that must be used to determine the amount of equipment and personnel that must be under contract or other approved means. Response resources in addition to those under contract must be identified, and a call-out procedure in place to access this equipment, if the marine facility has a spill that exceeds the Response Planning Volumes. The owner/operator is ultimately responsible for addressing the entire volume of an actual spill regardless of the planning volume.	
(d)(3)(A)	On-Water Daily Recovery Rates and Containment Boom Amounts 1. The total amount of on-water recovery equipment and services required shall be the lesser of the amount necessary to address the Response Planning Volume determined in Section 817.02(d)(2)(C) or the Daily Recovery Rate established by this Section at 817.02(d)(3)(B) below. 2. The amount of response resources and the timeframes for delivery are specified in Subsection 817.02(d)(3)(B) below. The barrels per day capability figure is the total amount of on-water recovery equipment that must be at the scene of the spill at the hour specified which is measured from the time of notification, as described in this subchapter. All on-water recovery response resources shall be capable of being deployed and operable within one hour of arrival at the scene of the spill or drill but no later than the designated timeframe for each risk zone.	App D, App H

<table>
<tr><th colspan="5">California OSPR
14 CCR § 817.02 Marine Facility Plan Content (Cont'd)</th></tr>
<tr><th>§ 817.02</th><th colspan="3">Description</th><th>Section</th></tr>
<tr><td>(d)(3)(A) (Cont'd)</td><td colspan="3">3. The timeframes for equipment delivery and deployment as specified in this subsection do not take into account the time required to conduct a health and safety assessment of the site as set forth in Subsection 817.02(f)(8), and as required by the California Occupational and Safety Administration. In addition, these timeframes do not account for delays that may occur due to weather or seastate. The actual time necessary to deliver and deploy equipment will be assessed at the time of an incident or a drill and will take into account the prevailing conditions of weather and seastate, as well as the site assessment requirements.</td><td></td></tr>
<tr><td>(d)(3)(B)</td><td colspan="3">Daily Recovery Rate
1. Facilities located in High-Volume Ports</td><td>App D, App H</td></tr>
<tr><td>Delivery Time (HRS)</td><td>6</td><td>24</td><td>36</td><td>60</td></tr>
<tr><td>BBLS/Day Capability</td><td>23,437</td><td>31,250</td><td>46,875</td><td>78,125</td></tr>
<tr><td>(d)(3)(B)(1)(i)</td><td colspan="3">in addition, the facility/transfer points within the High Volume Ports must have 3,125 barrels/day, or 10% of the reasonable worst case spill volume, whichever is less, of on-water recovery capability that can be mobilized and on-scene within two hours of notification;</td><td>App D, App H</td></tr>
<tr><td>(d)(3)(B)(1)(ii)</td><td colspan="3">if a facility/transfer point within a High Volume Port maintains and can immediately deploy containment equipment for a 3,125 barrel spill, or 10% of the reasonable worst case spill volume, whichever is less, the initial on-water recovery capability can be on-scene within three hours rather than two hours.</td><td>N/A</td></tr>
</table>

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(d)	**Containment Booming and On-water Recovery (Continued)**	
(d)(3)(B)(2) and (i) – (iv)	Facilities within Santa Barbara Channel Area,	N/A
(d)(3)(C)	Sufficient containment equipment shall be brought to the scene of the spill to address the daily recovery rates as designated in Section 817.02(d)(3)(B).	---
(d)(3)(D)	The standards set forth in Subsection 817.02(d)(3)(B) were increased by a factor of 25% on July 1, 1997, and again on July 1, 2001. It was determined that this increase was feasible and necessary to meet the best achievable protection of the coast.	---
(d)(3)(E)	The standards set forth in Subsection 817.02(d)(3)(B) will be reviewed by the Administrator to determine if increases to these amounts are feasible and necessary in order to meet the best achievable protection of the coast. The Administrator shall conduct a review and hold a public hearing prior to confirming the new standards to solicit input regarding the necessity of the proposed increase and any credits that may be allowed.	---
(d)(4)	Movement of Response Resources There may be times when it is necessary to move response equipment from one risk zone to another in order to respond to a catastrophic oil spill. However, the Administrator needs to ensure that sufficient response resources are available to address a reasonable risk within each zone. Therefore, when equipment is needed from one risk zone which may impact the plan holder's on-water containment and recovery at the 6 hour level, the plan holder or OSRO shall make a request to the Administrator to temporarily reduce the Response Capability Standards set forth in (d)(3) above, before the equipment can be moved. The Administrator shall only grant such a request after determining that sufficient response resources are available to address a reasonable risk within the zone from where the response equipment is being considered for removal.	----
(d)(5)	On-Water Response Equipment and Services	
(d)(5)(A)	Each plan shall demonstrate that the marine facility owner/operator has under contract or other approved means (as defined in Section 815.05(b) of this subchapter), access to all the necessary response resources to comply with the Response Capability Standards established in Subsection 817.02(d)(3). The amount of response equipment required shall take into account the effective daily recovery capacity (EDRC, as defined in Chapter 1, Section 790 of this subdivision) of the equipment.	App D, App H

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(d)(5)	On-Water Response Equipment and Services *(Continued)*	
(d)(5)(B)	The equipment identified for a specific area must be appropriate for use in that area given the limitations of the geography, bathymetry, water depths, tides, currents and other local environmental conditions. For those areas that require shallow-water response capability (refer to the relevant Area Contingency Plan), the plan shall provide for an adequate number of shallow-draft vessels (as defined in Section 815.05 of this subchapter) and for adequate booming and other shoreline protective resources to be owned or under contract or other approved means and available to provide shoreline protection of all sensitive sites identified in the trajectory analysis conducted as part of the Off-site Consequence Analysis. Additionally, the equipment identified shall also be appropriate for use on the type of oil identified. To the extent that the following information is provided by a Rated OSRO, evidence of a contract or other approved means with a Rated OSRO will suffice:	
(d)(5)(B)1.	The location, inventory and ownership of the equipment to be used to fulfill the response requirements of this subchapter;	App D, App H
(d)(5)(B)2.	A complete inventory of any non-mechanical response equipment and supplies, including the type and toxicity of each chemical agent, with procedures for storage and maintenance;	App D, App H
(d)(5)(B)3.	The type and capacity of storage and transfer equipment matched to the skimming capacity of the recovery systems;	App D, App H
(d)(5)(B)4.	The manufacturer's rated capacities and the operational characteristics for each major item of oil recovery equipment;	App D, App H
(d)(5)(B)5.	the effective daily recovery capacity (as defined in Chapter 1, Section 790 of this subdivision) for each major piece of on-water recovery equipment listed, as well as the effective daily recovery capacity for the skimming systems as a whole. i. A request may be submitted to the Administrator to review the effective daily recovery capacity for a piece of equipment if it can be shown that the equipment has a different capacity than the derating factor allows. ii. The Administrator's decision regarding a change in the effective daily recovery capacity for a piece of equipment will be issued as soon as administratively feasible.	App D, App H
(d)(5)(B)6.	vessels designated for oil recovery operations, including skimmer vessels and vessels designed to tow and deploy boom, and availability of shallow-draft vessels;	App D, App H
(d)(5)(B)7.	vessels of opportunity reasonably available for oil spill recovery operations, including availability of shallow-draft vessels, procedures to equip the vessels, inventory all equipment, and train personnel;	App D, App H
(d)(5)(B)8.	procedures for storage, maintenance, inspection and testing of spill response equipment under the immediate control of the operator;	App D, App H

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(d)(5)	On-Water Response Equipment and Services *(Continued)*	
(d)(5)(B)9.	sufficient equipment to track the movement of discharged oil, including aerial surveillance sufficient to direct skimming operations.	App D, App H
(d)(5)(B)10.	Each plan shall describe the personnel available to respond to an oil spill, including: i. a list by job category including a job description for each type of spill response position needed as indicated in the spill response organization scheme; ii. a match between personnel by job category, and the equipment proposed for use (including equipment appropriate for shallow-water environments), including the plan for mobilization of such personnel; iii. sufficient personnel to maintain a response effort of at least 14 days.	App D, App H
(d)(5)(B)11.	Each plan shall describe procedures for the transport of required equipment, personnel and other resources to the spill site. The description shall include plans for alternative procedures during adverse environmental conditions. Adverse environmental conditions to be considered shall include: i. adverse weather; ii. sea states, tides, winds and currents; iii. presence of debris or other obstacles; and iv. any other known environmental conditions that could restrict response efforts.	App D, App H
(d)(5)(C)	A list of the marine facility's spill management personnel (and company name if applicable) and their spill response qualifications including a discussion of spill response training and experience, regulatory awareness and compliance, and supervision.	§ 4, App B
(d)(5)(D)	Any equipment and personnel identified in the plan must be available for response. Any necessary maintenance for the equipment, vacation periods for response personnel, or other eventuality must be taken into account in relying upon these resources. 1. The equipment owner must notify the Administrator when major equipment is removed from service for a period of 24 hours or more for maintenance or repair. Major equipment is that which, if removed, would affect timely implementation of the plan. Notification must be made prior to removing equipment for regularly scheduled maintenance, and within 24 hours of removing equipment for unscheduled repairs. 2. The equipment owner must demonstrate that backup equipment is available during the time that the primary response equipment is out of service. Backup equipment may be provided from the owner's own inventory, or may be made available from another responder. 3. A plan shall remain valid during the time that equipment has been removed from service for maintenance or repair.	App D

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(d)(5)	On-Water Response Equipment and Services *(Continued)*	
(d)(5)(E)	Group 5 Oils Marine facilities that handle Group 5 oils must contract with one or more Rated OSRO(s) to address the marine facility's Response Planning Volume. Such equipment shall include, but is not limited to the following: 1. sonar, sampling equipment, or other methods for locating the oil on the bottom or suspended in the water column; 2. containment boom, sorbent boom, silt curtains, or other methods to reduce spreading on the bottom; 3. dredges, pumps, or other equipment necessary to recover oil from the bottom; 4. equipment necessary to assess the impact of such discharges; and 5. any other appropriate equipment necessary to respond to a discharge involving a Group 5 oil.	*N/A*
(d)(5)(F)	The plan holder may propose the use of non-mechanical methods for response operations which may include dispersants, in-situ burning, coagulants, bioremediants, or other chemical agents. The use of any non-mechanical method for response must be done in accordance with provisions of the California Oil Spill Contingency Plan, the National Contingency Plan, the applicable federal Area Contingency Plan and all applicable State laws and regulations. If a non-mechanical method of response is proposed, the plan shall include: 1. methods of deployment or application; 2. for use of a chemical agent, a description of the specific mechanisms in place to assess the environmental consequences of the chemical agent. This shall include the mechanism for continuous monitoring of environmental effects for the first three days after initial application, and periodic monitoring thereafter until the agent is inert or no longer operative; 3. identification of all permits, approvals or authorizations needed to allow the use of chemical agents or non-mechanical methods, and the timeline for obtaining them; 4. a plan for protecting resources at risk, areas of public concern and the public from any adverse effects of the non-mechanical method used; 5. the projected efficacy of each type of non-mechanical method proposed for use taking into account the type of spilled material and the projected environmental conditions of the potential spill site; and 6. upon request, the plan holder shall provide any test results known to the plan holder which assess the environmental impacts of applying these methods in the marine environment.	§ 18, § 19, § 20

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)				
§ 817.02	**Description**			**Section**
(d)(5)(G)	The plan shall describe methods for tracking the movement of the discharged oil; and			
(d)(5)(H)	The plan shall list the location of the weather stations to be used for observations of winds, currents and other data at the time of a spill that may assist in making real-time projections of spill movement.			§ 9
(e)	**Shoreline Protection** Each plan must provide for shoreline protection of all potential spills from the marine facility.			
(e)(1)	Shoreline Response Planning Volume Each plan shall demonstrate that the marine facility has access to all necessary equipment and services to address the response strategies appropriate to each shoreline that could potentially be impacted by a spill from the facility. To determine the amount of equipment and services necessary a Response Planning Volume must be calculated as outlined below:			
(e)(1)(A)	Multiply the reasonable worst case spill for the marine facility, as calculated in Subsection 817.02(d)(1), by the appropriate persistence factor from the chart below for the most persistent type of oil that may be spilled:			App H
Oil Group	Group 1	Group 2	Group 3	Group 4
Persistence Multiplier	.20	.50	.50	.50
(e)(1)(B)	Emulsification Factors The volume determined from the calculation above is then multiplied by one of the following emulsification factors, again, based on the type of oil:			App H
Oil Group	Group 1	Group 2	Group 3	Group 4
Emulsification Multiplier	1.0	1.8	2.0	1.4

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(e)	**Shoreline Protection (Continued)**	
(e)(1)(C)	Total Shoreline Equipment Required The total determined by this calculation is a Response Planning Volume.	
(e)(1)(C)1.	The Response Planning Volume to be used to determine the amount of Response Equipment and Services that must be under contract shall be the greater of the amount determined in Subsection 817.02(e)(1), or the adjusted Planning Volume for onshore recovery calculated for the nearshore/inland environment in the facility's federal response plan pursuant to 33 CFR Part 154., Appendix C, Section 7.	App D, App H
(e)(1)(C)2.	All calculations used to determine the Response Planning Volume shall be included in the plan.	App H
(e)(2)	Shoreline Protection Equipment and Services Each plan must identify, and ensure availability through a contract or other approved means (as defined in Section 815.05(b) of this subchapter), the capability of effecting shoreline protection strategies. Such protection strategies must be commensurate with the Response Planning Volume calculated for potential shoreline impact, and must be capable of addressing all appropriate protection, and response strategies. The specific areas where equipment and services must be available for use shall be identified in the Off-Site Consequence Analysis.	
(e)(2)(A)	The equipment identified for a specific area must be appropriate for use in that area given the limitations of the bathymetry, geomorphology, shoreline types and other local environmental conditions. Additionally, the equipment identified shall be appropriate for use on the type of oil identified. Facilities that provide their own shoreline protection of sensitive sites shall participate in the OSPR Sensitive Site Strategy Evaluation Program, as described in Section 819.01 of this Subchapter. The following information shall be provided,; to the extent that the following information is provided by a Rated OSRO, evidence of a contract or other approved means with a Rated OSRO will suffice:	
(e)(2)(A)1.	the amounts of all protective booming, shallow-draft vessels, and shoreline protection equipment necessary to address the specific types of shorelines that may be impacted;	App D, App H
(e)(2)(A)2.	the location, inventory and ownership of the equipment to be used to fulfill the response requirements;	App D, App H
(e)(2)(A)3.	the procedures for storage, maintenance, inspection and testing of spill response equipment under the immediate control of the operator.	App D, App H
(e)(2)(B)	Each plan shall have under contract or other approved means sufficient trained personnel to respond to all oil spills up to the calculated Response Planning Volume, which are to remain on scene until demobilized by the State Incident Command or the Unified Command. For planning purposes, this shall include procedures to obtain sufficient personnel to maintain a response effort of at least 14 days.	App D, App H

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(e)	**Shoreline Protection (Continued)**	
(e)(2)(C)	Any equipment and personnel identified to meet the planning standard requirements must be available for response. Any necessary maintenance for the equipment, vacation periods for response personnel, or other eventuality must be taken into account in relying upon these resources. 1. The equipment owner must notify the Administrator when major equipment is removed from service for a period of 24 hours or more for maintenance or repair. Major equipment is that which, if moved, would affect timely implementation of the plan. Notification must be made prior to removing equipment for regularly scheduled maintenance, and within 24 hours of removing equipment for unscheduled repairs. 2. The equipment owner must demonstrate that backup equipment is available during the time that the primary response equipment is out of service. Backup equipment may be provided from the owner's own inventory or may be made available from another responder. 3. A plan shall remain valid during the time that equipment has been removed from service for maintenance or repair if the Administrator has not disapproved such removal within 24 hours of notification. 4. The equipment owner shall notify the Administrator when the major equipment is back in service.	App D, App H
(e)(3)	*(Reserved)*	
(e)(4)	Shoreline Clean-Up	
(e)(4)(A)	Utilizing the equipment that must be under contract, each plan shall describe the methods that will be used to contain spilled oil and remove it from the environment. The equipment identified for a specific area must be appropriate for use in that area given the limitations of the bathymetry, geomorphology, shoreline types and other local environmental conditions. Additionally, the equipment identified shall be appropriate for use on the type of oil identified. The description shall include:	
(e)(4)(A)1.	all shoreline clean-up procedures and oil diversion and pooling procedures for the close-to-shore environment. These procedures shall include, where appropriate, methods for carrying out response operations and clean-up strategies in shallow-water environments, as identified in the trajectory analysis conducted as part of the Off-site Consequence Analysis;	§ 13
(e)(4)(A)2.	methods for shoreside cleanup, including containment and removal of surface oil, subsurface oil and oiled debris and vegetation from all applicable shorelines, adjacent land and beach types.	§ 15
(e)(4)(A)3.	measures to be taken to minimize damage to the environment from land operations during a spill response, such as impacts to sensitive shoreline habitat caused by heavy machinery or foot traffic.	§ 13

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(e)(4)(B)	Protection, response and clean-up strategies will be specific to the type of oil spilled, the expected spill sites as identified in the Off-Site Consequence Analysis, and the resources at risk at those spill sites.	§ 11, § 13, § 15
(e)(4)(C)	Each plan must utilize all the strategies appropriate to the potential impact sites.	§ 11, § 13, § 15
(e)(4)(D)	Each plan shall have under contract or other approved means sufficient trained personnel to respond to all oil spills up to the Response Planning Volume, which are to remain on scene until demobilized by the State Incident Command or the Unified Command.	App D, App H
(f)	**Response Procedures**	
(f)(1)	Each plan shall describe the organization of the marine facility's spill response system and management team. An organizational diagram depicting the chain of command shall also be included. Additionally, the plan shall describe the method to be used to interface the plan holder's organization into the State Incident Command System and/or the Unified Command Structure as required by Title 8, California Code of Regulations, Subsection 5192(q)(3)(A).	§ 4
(f)(1)(A)	The plan holder may utilize the procedures outlined in the appropriate Area Contingency Plan when describing how the marine facility's chain of command will interface with the State Incident Command System which utilizes the Unified Command.	§ 4.f
(f)(1)(B)	Each plan shall describe the organization of the plan holder's public information office, as it relates to an oil spill incident, and the method by which the Information Officer will be integrated into the State Incident Command System.	§ 4.f
(f)(1)(C)	Each plan shall describe the plan holder's safety program as it relates to an oil spill incident and the method by which their Safety Office will be integrated into the State Incident Command System.	§ 4.f
(f)(2)	Each plan shall identify potential sites needed for spill response operations including location(s) for:	----
(f)(2)(A)	a central command post sufficient to accommodate the State Incident Command or Unified Command as well as the plan holder's response organization;	§ 5
(f)(2)(B)	a central communications post if located away from the command post;	§ 5
(f)(2)(C)	equipment and personnel staging areas.	§ 14

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(f)(3)	Each plan shall include a checklist, flowchart or decision tree depicting the procession of each major stage of spill response operations from spill discovery to completion of cleanup. The checklist, flowchart or decision tree shall describe the general order and priority in which key spill response activities are performed.	§ 12
(f)(4)	Each plan shall describe how the plan holder will provide emergency services before the arrival of local, state or federal authorities on the scene, including:	
(f)(4)(A)	procedures to control fires and explosions, and to rescue people or property threatened by fire or explosion;	
(f)(4)(B)	procedures for emergency medical treatment and first aid;	
(f)(4)(C)	procedures to control ground, marine and air traffic which may interfere with spill response operations;	
(f)(4)(D)	procedures to manage access to the spill response site and the designation of exclusion, decontamination and safe zones; and	
(f)(4)(E)	procedures to provide the required personnel protective gear for responders.	
(f)(5)	Each plan shall describe equipment and procedures to be used by marine facility personnel to minimize the magnitude of a spill and minimize structural damage which may increase the quantity of oil spilled.	
(f)(5)(A)	Spill mitigation procedures shall include immediate containment strategies, methods to stop the spill at the source, methods to slow or stop leaks, and methods to achieve immediate emergency shutdown.	
(f)(5)(B)	For spill mitigation procedures the plan shall include prioritized procedures for marine facility personnel including specific procedures to shut down affected operations. Responsibilities of facility personnel should be identified by job title. A copy of these procedures should be maintained at the facility operations center. These procedures should address the following equipment and scenarios: 1. failure of manifold and mechanical loading arm, other transfer equipment, or hoses, as appropriate; 2. tank overfill; 3. tank failure; 4. pipe rupture; 5. pipe leak, both under pressure and not under pressure, if applicable; 6. explosion and/or fire; and 7. other equipment failure (e.g. pumping system failure, relief valve failure, etc.).	
(f)(6)	Each plan shall detail the lines of communications between the responsible party, the Qualified Individual and the on-scene coordinators, response teams, and local, state, and federal emergency and disaster responders, including:	

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(f)(6)(A)	communication procedures;	
(f)(6)(B)	the communication function (e.g., ground-to-air) assigned to each channel or frequency used;	§ 5
(f)(6)(C)	the maximum broadcast range for each channel or frequency used; and	§ 5
(f)(6)(D)	redundant and back-up systems.	§ 5
(f)(7)	Each plan shall describe the procedures to manage access to the spill response site, the designation of exclusion, decontamination and safe zones, and the decontamination of equipment and personnel during and after oil spill response operations, as required by the California Occupational Safety and Health Administration.	
(f)(8)	Prior to beginning spill response operations and/or clean up activities, a Site Safety Plan must be completed. Each site safety plan shall include information as required pursuant to Title 8, Section 5192(b)(4)(B) of the California Code of Regulations including, but not limited to, a written respiratory protection program, written personal protective equipment program, written health and safety training program, written confined space program and permit forms, direct reading instrument calibration logs, and written exposure monitoring program.	§ 4.f Safety Officer
(g)	Notification Procedures	
(g)(1)	Each plan shall include a list of contacts to call in the event of a drill, threatened discharge of oil, or discharge of oil. The plan shall:	
(g)(1)(A)	detail the procedures for reporting oil spills to all appropriate local, state, and federal agencies;	§ 1 Emergency Incident Placard
(g)(1)(B)	identify a central reporting office or individual who is responsible for initiating the notification process and is available on a 24-hour basis. The individual making this notification must be fluent in English. The following information must be provided: 1. the individual or office to be contacted; 2. telephone number or other means of contact for any time of the day; and 3. an alternate contact in the event the individual is unavailable.	§ 5
(g)(1)(C)	Establish a clear order of priority for notification.	§ 5

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(g)	**Notification Procedures (Continued)**	
(g)(2)	Immediate Notification Nothing in this section shall be construed as requiring notification before response.	
(g)(2)(A)	Each plan shall include a procedure for contacting the OSRO, or other initial response resources if an OSRO is not being used, immediately, but no longer than 30 minutes, after discovery of a discharge of oil or threatened discharge of oil.	§ 1
(g)(2)(B)	Each plan shall include a procedure that ensures that the owner/operator or his/her designee will initiate contact with the Qualified Individual, the California Office of Emergency Services and the National Response Center immediately, but no longer than 30 minutes, after discovery of a discharge of oil or threatened discharge of oil.	§ 1
(g)(2)(C)	All phone numbers necessary to complete the immediate notification procedures must be included in the response manual.	§ 1
(g)(3)	Each plan shall identify a call-out procedure to acquire the resources necessary to address spills that cannot be addressed by the equipment that the owner/operator is required to have under contract. Procedures must allow for initiation of the call-out within 24 hours of the incident and must begin as soon as a determination has been made that additional resources are necessary.	§ 1
(g)(4)	Each plan shall provide a checklist of the information to be reported in the notification procedures, including but not limited to: (A) marine facility name and location; (B) date and time of the incident; (C) the cause and location of the spill; (D) an estimate of the volume of oil spilled and the volume at immediate risk of spillage; (E) the type of oil spilled, and any inhalation hazards or explosive vapor hazards, if known; (F) the size and appearance of the slick; (G) prevailing weather and sea conditions; (H) actions taken or planned by personnel on scene; (I) current condition of the marine facility; (J) injuries and fatalities; and (K) any other information as appropriate.	§ 1 Notification Data Sheet
(g)(5)	Reporting of a spill as required by Subsection 817.02(g)(2) shall not be delayed solely to gather all the information required by Subsection 817.02(g)(4)	§ 1

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(g)(6)	An updated estimate of the volume of oil spilled and the volume at immediate risk of spillage shall be reported to the California Office of Emergency Services whenever a significant change in the amount reported occurs, but not less than every 12 hours within the first 48 hours of response. The State Incident Commander and/or the Federal On-Scene Coordinator through the Unified Command shall have the option of increasing or decreasing this timeframe, as needed. Updated spill volume information included in the Incident Action Plan developed through the Unified Command will meet the requirements of this subsection.	§ 1, § 8
(h)	**Temporary Storage and Waste Management**	
(h)(1)	Each plan shall identify sufficient temporary storage for all recovered oil or all oily waste, and identify facilities that would be able to accept the recovered oil or oily waste for recycling or other means of waste management. Sufficient storage shall be no less than two times the calculated Response Planning Volume up to the Daily Recovery Rate as determined in Section 817.02(d)(3)(B).	§ 16, App H
(h)(1)(A)	To meet the temporary storage requirement described in Subsection (1) above, the following amounts of storage shall be dedicated response resources (as defined in Section 815.05(c) of this subchapter) or OSRO-owned and controlled response resources (as defined in Section 815.05(k) of this subchapter), as applicable to the appropriate risk zone: Sufficient storage to support the skimming systems shall be brought to the scene of the spill during the first four hours of response: 520 barrels of storage, or 20% of the response planning volume, whichever is less, shall be brought to the scene of the spill within four hours of notification of a spill; 12,000 barrels, or two times the response planning volume, whichever is less, shall be available at the scene of the spill within 6 hours of notification of a spill. The balance of the temporary storage requirement described in Subsection (1) above may be provided by non-dedicated storage resources. All skimming systems operating at the scene of a spill shall have adequate storage.	§ 16
(h)(2)	Each plan shall identify the party that shall maintain responsibility for recovered oil and oily waste for the purposes of temporary storage.	§ 16

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(h)(3)	Each plan shall describe site criteria and methods used for temporary storage of recovered oil and oily wastes generated during response and cleanup operations, including sites available within the marine facility, or near the spill area.	§ 16
(h)(4)	Each plan shall identify all applicable permits, and all federal, state and local agencies responsible for issuing those permits for transit, temporary storage and ultimate waste management of all wastes likely to result from an oil spill.	§ 16
(h)(4)	Each plan shall include information which could expedite the state approval process for the use of temporary waste storage sites, including a list of appropriate contacts and a description of procedures to be followed for each approval process.	§ 16
(i)	**Oiled Wildlife Care Requirements** Each plan shall describe how oiled wildlife care will be provided by one of the following approved means:	
(i)(1)	Utilize the California Oiled Wildlife Care Network (OWCN) to meet oiled wildlife care requirements; or	§ 17
(i)(2)	describe procedures that clearly outline how oiled wildlife care will be provided. The equipment, facilities, and personnel necessary to implement these procedures must be identified and assured by contract for each Geographic Area covered by the plan. Standards and written protocols for wildlife care must comply with all applicable State and federal laws.	§ 17
(j)	Training	
(j)(1)	Each plan shall provide that all appropriate personnel employed by the marine facility shall receive training in the use and operation of oil spill response and clean-up equipment. The plan shall describe:	
(j)(1)(A)	the type and frequency of training that each individual in a spill response position receives to achieve the level of qualification demanded by their job description;	App B
(j)(1)(B)	the procedures, if any, to train and use volunteers or other additional personnel in spill response operations as necessary for the size of the spill.	App B
(j)(2)	Each plan shall describe the type and frequency of personnel training on methods to reduce operational risks. The description of the training shall include, if applicable, the following:	
(j)(2)(A)	any established training objectives that address potential spill sources and causes that were identified in the Risk and Hazard Analysis.	App B
(j)(2)(B)	the means of achieving any established training objectives, such as:	
(j)(2)(B)1.	training programs for the positions involved with the various aspects of the marine facility's operation that could result in a spill (e.g., position responsible for facility inspections or transfers);	App B

California OSPR 14 CCR § 817.02 Marine Facility Plan Content (Cont'd)		
§ 817.02	**Description**	**Section**
(j)(2)(B)2.	a training schedule, including adequate frequency, (e.g., initial training upon hire and annual refresher training) and type of training (workshops, classroom, videotape, on-the-job training, etc.) for each position trained, by job classification;	App B
(j)(2)(C)	any licenses, certifications or other prerequisites required to hold particular jobs.	App B
(j)(2)(D)	A plan holder whose facility is subject to and in compliance with State Lands Commission training regulations; Title 2, Division 3, Chapter 1, Article 5.3, CCR Sections 2540 through 2548, shall be considered in compliance with the training provisions of this subsection.	----
(j)(3)	Each plan shall provide for safety training as required by state and federal health and safety laws for all personnel likely to be engaged in oil spill response, including a program for training non-permanent responders such as volunteers or temporary help.	App B
(j)(4)	The marine facility owner/operator shall ensure that training records are maintained for 3 years. All such documentation must be made available to the Administrator upon request.	App B
(k)	**Drills and Exercises**	
(k)(1)	Each plan shall describe the small marine facility's drill and exercise program that meets the requirements of Section 820.01(a), to ensure that the elements of the plan will function in an emergency.	App C
(k)(2)	Training sessions may constitute creditable drills and exercises if all requirements in Subsection 820.01(a) are met.	App C
(k)(3)	A marine facility owner/operator shall ensure that all of the response resources identified in the plan participate in equipment deployment exercises at least once every three years.	App C

BSEE 30 CFR Part 254 CROSS REFERENCE		
§254	**BRIEF DESCRIPTION**	**SECTION**
.22	**What information must I include in the "Introduction and plan contents" section?** The "Introduction and plan contents" section must provide:	
(a)	Identification of the facility the plan covers, including its location and type;	§ 2, App. A
(b)	A table of contents;	§ 2
(c)	A record of changes made to the plan; and	§ 2
(d)	A cross-reference table, if needed, because you are using an alternate format for your plan.	App. K
.23	**What information must I include in the "Emergency response action plan" section?** The "Emergency response action plan" section is the core of the response plan. Put information in easy to-use formats such as flow charts or tables where appropriate. This section must include:	
(a)	Designation, by name or position, of a trained qualified individual (QI) who has full authority to implement removal actions and ensure immediate notification of appropriate Federal officials and response personnel.	§ 1, § 4
(b)	Designation, by name or position, of a trained spill management team available on a 24-hour basis. The team must include a trained spill-response coordinator and alternate(s) who have the responsibility and authority to direct and coordinate response operations on your behalf. You must describe the team's organizational structure as well as the responsibilities and authorities of each position on the spill management team.	§ 1, § 4, App. B
(c)	Description of a spill-response operating team. Team members must be trained and available on a 24-hour basis to deploy and operate spill-response equipment. They must be able to respond within a reasonable minimum specified time. You must include the number and types of personnel available from each identified labor source.	§ 1, § 4, App. B
(d)	A planned location for a spill-response operations center and provisions for primary and alternate communications systems available for use in coordinating and directing spill-response operations. You must provide telephone numbers for the response operations center. You also must provide any facsimile numbers and primary and secondary radio frequencies that will be used.	§ 5
(e)	A listing of the types and characteristics of the oil handled, stored, or transported at the facility.	§ 1, App. A, App. L
(f)	Procedures for the early detection of a spill.	
(g)	Identification of procedures you will follow in the event of a spill or a substantial threat of a spill. The procedures should show appropriate response levels for differing spill sizes including those resulting from a fire or explosion. These will include, as appropriate:	
(g)(1)	Your procedures for spill notification. The plan must provide for the use of the oil spill reporting forms included in the Area Contingency Plan or an equivalent reporting form.	§ 1, § 7, § 8

BSEE 30 CFR Part 254 CROSS REFERENCE		
§254	**BRIEF DESCRIPTION**	**SECTION**
.23	**What information must I include in the "Emergency response action plan" section? (Continued)**	
(g)(1)(i)	Your procedures must include a current list which identifies the following by name or position, corporate address, and telephone number (including facsimile number if applicable):	
(g)(1)(i)(A)	The qualified individual;	§ 1, § 4
(g)(1)(i)(B)	The spill-response coordinator and alternate(s); and	§ 1, § 4
(g)(1)(i)(C)	Other spill-response management team members.	§ 1, § 4
(g)(1)(ii)	You must also provide names, telephone numbers, and addresses for the following:	
(g)(1)(ii)(A)	OSRO's that the plan cites;	§ 1, § 4
(g)(1)(ii)(B)	Federal, State, and local regulatory agencies that you must consult to obtain site specific environmental information; and	§ 1, § 8
(g)(1)(ii)(C)	Federal, State, and local regulatory agencies that you must notify when an oil spill occurs.	§ 1, § 8
(g)(2)	Your methods to monitor and predict spill movement;	§ 10
(g)(3)	Your methods to identify and prioritize the beaches, waterfowl, other marine and shoreline resources, and areas of special economic and environmental importance;	§ 11
(g)(4)	Your methods to protect beaches, waterfowl, other marine and shoreline resources, and areas of special economic or environmental importance;	§ 13
(g)(5)	Your methods to ensure that containment and recovery equipment as well as the response personnel are mobilized and deployed at the spill site;	§ 14
(g)(6)	Your methods to ensure that devices for the storage of recovered oil are sufficient to allow containment and recovery operations to continue without interruption;	App. H
(g)(7)	Your procedures to remove oil and oiled debris from shallow waters and along shorelines and rehabilitating waterfowl which become oiled;	§ 15
(g)(8)	Your procedures to store, transfer, and dispose of recovered oil and oil contaminated materials and to ensure that all disposal is in accordance with Federal, State, and local requirements; and	§ 16
(g)(9)	Your methods to implement your dispersant use plan and your in situ burning plan.	§ 15, § 16
.24	**What information must I include in the "Equipment inventory" appendix?** Your ''Equipment inventory appendix'' must include:	
(a)	An inventory of spill-response materials and supplies, services, equipment, and response vessels available locally and regionally. You must identify each supplier and provide their locations and telephone numbers.	§ 1, § 7 App. E, F, H
(b)	A description of the procedures for inspecting and maintaining spill-response equipment in accordance with §254.43.	App. E

BSEE 30 CFR Part 254 ***CROSS REFERENCE***		
§254	**BRIEF DESCRIPTION**	**SECTION**
.25	**What information must I include in the "Contractual agreements" appendix?** Your "Contractual agreements" appendix must furnish proof of any contracts or membership agreements with OSRO's, cooperatives, spill-response service providers, or spill management team members who are not your employees that you cite in the plan. To provide this proof, submit copies of the contracts or membership agreements or certify that contracts or membership agreements are in effect. The contract or membership agreement must include provisions for ensuring the availability of the personnel and/or equipment on a 24-hour-per-day basis.	App. D
.26	**What information must I include in the "Worst case discharge scenario" appendix?** The discussion of your worst case discharge scenario must include all of the following elements:	
(a)	The volume of your worst case discharge scenario determined using the criteria in §254.47. Provide any assumptions made and the supporting calculations used to determine this volume.	App. H
(b)	An appropriate trajectory analysis specific to the area in which the facility is located. The analysis must identify onshore and offshore areas that a discharge potentially could affect. The trajectory analysis chosen must reflect the maximum distance from the facility that oil could move in a time period that it reasonably could be expected to persist in the environment.	App. H
(c)	A list of the resources of special economic or environmental importance that potentially could be impacted in the areas identified by your trajectory analysis. You also must state the strategies that you will use for their protection. At a minimum, this list must include those resources of special economic and environmental importance, if any, specified in the appropriate Area Contingency Plan(s).	§ 11, § 13, App. H
(d)	A discussion of your response to your worst case discharge scenario in adverse weather conditions. This discussion must include:	
(d)(1)	A description of the response equipment that you will use to contain and recover the discharge to the maximum extent practicable. This description must include the types, location(s) and owner, quantity, and capabilities of the equipment. You also must include the effective daily recovery capacities, where applicable. You must calculate the effective daily recovery capacities using the methods described in §254.44. For operations at a drilling or production facility, your scenario must show how you will cope with the initial spill volume upon arrival at the scene and then support operations for a blowout lasting 30 days.	App. H

BSEE 30 CFR Part 254 CROSS REFERENCE		
§254	**BRIEF DESCRIPTION**	**SECTION**
.26	**What information must I include in the "Worst case discharge scenario" appendix? (Continued)**	
(d)(2)	A description of the personnel, materials, and support vessels that would be necessary to ensure that the identified response equipment is deployed and operated promptly and effectively. Your description must include the location and owner of these resources as well as the quantities and types (if applicable);	App. H
(d)(3)	A description of your oil storage, transfer, and disposal equipment. Your description must include the types, location and owner, quantity, and capacities of the equipment; and	App. H
(d)(4)	An estimation of the individual times needed for:	
(d)(4)(i)	Procurement of the identified containment, recovery, and storage equipment;	App. H
(d)(4)(ii)	Procurement of equipment transportation vessel(s);	App. H
(d)(4)(iii)	Procurement of personnel to load and operate the equipment;	App. H
(d)(4)(iv)	Equipment loadout (transfer of equipment to transportation vessel(s));	App. H
(d)(4)(v)	Travel to the deployment site (including any time required for travel from an equipment storage area); and	App. H
(d)(4)(vi)	Equipment deployment.	App. H
.27	**What information must I include in the "Dispersant use plan" appendix?** Your dispersant use plan must be consistent with the National Contingency Plan Product Schedule and other provisions of the National Contingency Plan and the appropriate Area Contingency Plan(s). The plan must include:	
(a)	An inventory and a location of the dispersants and other chemical or biological products which you might use on the oils handled, stored, or transported at the facility;	§ 18
(b)	A summary of toxicity data for these products;	§ 18
(c)	A description and a location of any application equipment required as well as an estimate of the time to commence application after approval is obtained;	§ 18
(d)	A discussion of the application procedures;	§ 18
(e)	A discussion of the conditions under which product use may be requested; and	§ 18
(f)	An outline of the procedures you must follow in obtaining approval for product use.	§ 18
.28	**What information must I include in the "In situ burning plan" appendix?** Your in situ burning plan must be consistent with any guidelines authorized by the National Contingency Plan and the appropriate Area Contingency Plan(s). The in situ burning plan must include:	
(a)	A description of the in situ burn equipment including its availability, location, and owner;	§ 19
(b)	A discussion of your in situ burning procedures, including provisions for ignition of an oil spill;	§ 19
(c)	A discussion of environmental effects of an in situ burn;	§ 19
(d)	Your guidelines for well control and safety of personnel and property;	§ 19
(e)	A discussion of the circumstances in which in situ burning may be appropriate;	§ 19

BSEE 30 CFR Part 254 CROSS REFERENCE		
§254	**BRIEF DESCRIPTION**	**SECTION**
.28	**What information must I include in the "In situ burning plan" appendix? (Continued)**	
(f)	Your guidelines for making the decision to ignite; and	§ 19
(g)	An outline of the procedures you must follow to obtain approval for an in situ burn.	§ 19
.29	**What information must I include in the "Training and drills" appendix?** Your "Training and drills" appendix must:	
(a)	Identify and include the dates of the training provided to members of the spill-response management team and the qualified individual. The types of training given to the members of the spill-response operating team also must be described. The training requirements for your spill management team and your spill-response operating team are specified in §254.41. You must designate a location where you keep course completion certificates or attendance records for this training.	App. B
(b)	Describe in detail your plans for satisfying the exercise requirements of §254.42. You must designate a location where you keep the records of these exercises.	App. B
.30	**When must I revise my OSRP?**	
(a)	You must review your OSRP at least every 2 years and submit all resulting modifications to the Chief, OSPD. If this review does not result in modifications, you must inform the Chief, OSPD, in writing that there are no changes.	§ 3
(b)	You must submit revisions to your OSRP for approval within 15 days whenever:	
(b)(1)	A change occurs which significantly reduces your response capabilities;	§ 3
(b)(2)	A significant change occurs in the worst case discharge scenario or in the type of oil being handled, stored, or transported at the facility;	§ 3
(b)(3)	There is a change in the name(s) or capabilities of the oil spill removal organizations cited in the OSRP; or	§ 3
(b)(4)	There is a significant change to the Area Contingency Plan(s).	§ 3
(c)	The Chief, OSPD, may require that you resubmit your OSRP if the OSRP has become outdated or if numerous revisions have made its use difficult.	§ 3
(d)	The Chief, OSPD, will periodically review the equipment inventories of OSRO's to ensure that sufficient spill removal equipment is available to meet the cumulative needs of the owners and operators who cite these organizations in their OSRPs.	§ 3
(e)	The Chief, OSPD, may require you to revise your OSRP if significant inadequacies are indicated by:	
(e)(1)	Periodic reviews (described in paragraph (d) of this section);	§ 3
(e)(2)	Information obtained during drills or actual spill responses; or	§ 3
(e)(3)	Other relevant information the Chief, OSPD, obtained.	§ 3
.40	**Records.** You must make all records of services, personnel, and equipment provided by OSRO's or cooperatives available to any authorized BSEE representative upon request.	

BSEE 30 CFR Part 254 CROSS REFERENCE		
§254	**BRIEF DESCRIPTION**	**SECTION**
.41	**Training your response personnel.**	
(a)	You must ensure that the members of your spill-response operating team who are responsible for operating response equipment attend hands-on training classes at least annually. This training must include the deployment and operation of the response equipment they will use. Those responsible for supervising the team must be trained annually in directing the deployment and use of the response equipment.	App. B
(b)	You must ensure that the spill-response management team, including the spill-response coordinator and alternates, receives annual training. This training must include instruction on:	
(b)(1)	Locations, intended use, deployment strategies, and the operational and logistical requirements of response equipment;	App. B
(b)(2)	Spill reporting procedures;	App. B
(b)(3)	Oil-spill trajectory analysis and predicting spill movement; and	§ 1, § 9, § 10, App. B, App. H
(b)(4)	Any other responsibilities the spill management team may have.	App. B
(c)	You must ensure that the qualified individual is sufficiently trained to perform his or her duties.	App. B
(d)	You must keep all training certificates and training attendance records at the location designated in your OSRP for at least 2 years. They must be made available to any authorized BSEE representative upon request.	App. B
.42	**Exercises for your response personnel and equipment.**	
(a)	You must exercise your entire OSRP at least once every 3 years (triennial exercise). You may satisfy this requirement by conducting separate exercises for individual parts of the OSRP over the 3-year period; you do not have to exercise your entire OSRP at one time.	App. C
(b)	In satisfying the triennial exercise requirement, you must, at a minimum, conduct:	
(b)(1)	An annual spill management team tabletop exercise. The exercise must test the spill management team's organization, communication, and decision making in managing a response. You must not reveal the spill scenario to team members before the exercise starts.	App. C
(b)(2)	An annual deployment exercise of response equipment identified in your OSRP that is staged at onshore locations. You must deploy and operate each type of equipment in each triennial period. However, it is not necessary to deploy and operate each individual piece of equipment.	App. C
(b)(3)	An annual notification exercise for each facility that is manned on a 24-hour basis. The exercise must test the ability of facility personnel to communicate pertinent information in a timely manner to the qualified individual.	App. C
(b)(4)	A semiannual deployment exercise of any response equipment which the BSEE Regional Supervisor requires an owner or operator to maintain at the facility or on dedicated vessels. You must deploy and operate each type of this equipment at least once each year. Each type need not be deployed and operated at each exercise.	App. C
(c)	During your exercises, you must simulate conditions in the area of operations, including seasonal weather variations, to the extent practicable. The exercises must cover a range of scenarios over the 3-year exercise period, simulating responses to large continuous spills, spills of short duration and limited volume, and your worst case discharge scenario.	App. C

BSEE 30 CFR Part 254 CROSS REFERENCE		
§254	**BRIEF DESCRIPTION**	**SECTION**
.42	**Exercises for your response personnel and equipment. (Continued)**	
(d)	BSEE will recognize and give credit for any documented exercise conducted that satisfies some part of the required triennial exercise. You will receive this credit whether the owner or operator, an OSRO, or a Government regulatory agency initiates the exercise. BSEE will give you credit for an actual spill response if you evaluate the response and generate a proper record. Exercise documentation should include the following information:	
(d)(1)	Type of exercise;	App. C
(d)(2)	Date and time of the exercise;	App. C
(d)(3)	Description of the exercise;	App. C
(d)(4)	Objectives met; and	App. C
(d)(5)	Lessons learned.	App. C
(e)	All records of spill-response exercises must be maintained for the complete 3-year exercise cycle. Records should be maintained at the facility or at a corporate location designated in the OSRP. Records showing that OSROs and oil spill removal cooperatives have deployed each type of equipment also must be maintained for the 3-year cycle.	App. C
(f)	You must inform the Chief, OSPD of the date of any exercise required by paragraph (b)(1), (2), or (4) of this section at least 30 days before the exercise. This will allow BSEE personnel the opportunity to witness any exercises.	App. C
(g)	The Regional Supervisor periodically will initiate unannounced drills to test the spill response preparedness of owners and operators.	App. C
(h)	The Chief, OSPD may require changes in the frequency or location of the required exercises, equipment to be deployed and operated, or deployment procedures or strategies. The Chief, OSPD may evaluate the results of the exercises and advise the owner or operator of any needed changes in response equipment, procedures, or strategies.	App. C
(i)	Compliance with the National Preparedness for Response Exercise Program (PREP) Guidelines will satisfy the exercise requirements of this section. Copies of the PREP document may be obtained from the Chief, OSPD.	App. C
.43	**Maintenance and periodic inspection of response equipment.**	
(a)	You must ensure that the response equipment listed in your OSRP is inspected at least monthly and is maintained, as necessary, to ensure optimal performance.	App. E
(b)	You must ensure that records of the inspections and the maintenance activities are kept for at least 2 years and are made available to any authorized BSEE representative upon request.	App. E

BSEE 30 CFR Part 254 CROSS REFERENCE		
§254	**BRIEF DESCRIPTION**	**SECTION**
.44	**Calculating response equipment effective daily recovery capacities.**	
(a)	You are required by §254.26(d)(1) to calculate the effective daily recovery capacity of the response equipment identified in your OSRP that you would use to contain and recover your worst case discharge. You must calculate the effective daily recovery capacity of the equipment by multiplying the manufacturer's rated throughput capacity over a 24-hour period by 20 percent. This 20 percent efficiency factor takes into account the limitations of the recovery operations due to available daylight, sea state, temperature, viscosity, and emulsification of the oil being recovered. You must use this calculated rate to determine if you have sufficient recovery capacity to respond to your worst case discharge scenario.	App. E, App. H
(b)	If you want to use a different efficiency factor for specific oil recovery devices, you must submit evidence to substantiate that efficiency factor. Adequate evidence includes verified performance data measured during actual spills or test data gathered according to the provisions of §254.45(b) and (c).	---
.45	**Verifying the capabilities of your response equipment.**	
(a)	The Regional Supervisor may require performance testing of any spill-response equipment listed in your OSRP to verify its capabilities if the equipment: (1) Has been modified; (2) Has been damaged and repaired; or (3) Has a claimed effective daily recovery capacity that is inconsistent with data otherwise available to BSEE.	App. E
(b)	You must conduct any required performance testing of booms in accordance with BSEE-approved test criteria. You may use the document "Test Protocol for the Evaluation of Oil-Spill Containment Booms," available from BSEE, for guidance. Performance testing of skimmers also must be conducted in accordance with BSEE approved test criteria. You may use the document "Suggested Test Protocol for the Evaluation of Oil Spill Skimmers for the OCS," available from BSEE, for guidance.	App. E
(c)	You are responsible for any required testing of equipment performance and for the accuracy of the information submitted.	App. E
.46	**Whom should I notify if an oil spill occurs?**	
(a)	You must immediately notify the National Response Center (1-800-424-8802) if you observe: (1) An oil spill from your facility; (2) An oil spill from another offshore facility; or (3) An offshore spill of unknown origin.	§ 1, § 8
(b)	In the event of a spill of 1 barrel or more from your facility, you must orally notify the Regional Supervisor without delay. You also must report spills from your facility of unknown size but thought to be 1 barrel or more.	§ 1, § 8
(b)(1)	If a spill from your facility not originally reported to the Regional Supervisor is subsequently found to be 1 barrel or more, you must then report it without delay.	§ 1, § 8

BSEE 30 CFR Part 254 CROSS REFERENCE		
§254	**BRIEF DESCRIPTION**	**SECTION**
.46	**Whom should I notify if an oil spill occurs? (Continued)**	
(b)(2)	You must file a written follow up report for any spill from your facility of 1 barrel or more. The Chief, OSPD must receive this confirmation within 15 days after the spillage has been stopped. All reports must include the cause, location, volume, and remedial action taken. Reports of spills of more than 50 barrels must include information on the sea state, meteorological conditions, and the size and appearance of the slick. The Regional Supervisor may require additional information if it is determined that an analysis of the response is necessary.	§ 1, § 8
(c)	If you observe a spill resulting from operations at another offshore facility, you must immediately notify the responsible party and the Regional Supervisor.	§ 1, § 8
.47	**Determining the volume of oil of your worst case discharge scenario.** You must calculate the volume of oil of your worst case discharge scenario as follows:	
(a)	For an oil production platform facility, the size of your worst case discharge scenario is the sum of the following:	
(a)(1)	The maximum capacity of all oil storage tanks and flow lines on the facility. Flow line volume may be estimated; and	App. H
(a)(2)	The volume of oil calculated to leak from a break in any pipelines connected to the facility considering shutdown time, the effect of hydrostatic pressure, gravity, frictional wall forces and other factors; and	App. H
(a)(3)	The daily production volume from an uncontrolled blowout of the highest capacity well associated with the facility. In determining the daily discharge rate, you must consider reservoir characteristics, casing/production tubing sizes, and historical production and reservoir pressure data. Your scenario must discuss how to respond to this well flowing for 30 days as required by §254.26(d)(1)	App. H
(b)	For exploratory or development drilling operations, the size of your worst case discharge scenario is the daily volume possible from an uncontrolled blowout. In determining the daily discharge rate, you must consider any known reservoir characteristics. If reservoir characteristics are unknown, you must consider the characteristics of any analog reservoirs from the area and give an explanation for the selection of the reservoir(s) used. Your scenario must discuss how to respond to this well flowing for 30 days as required by §254.26(d)(1).	App. H
(c)	For a pipeline facility, the size of your worst case discharge scenario is the volume possible from a pipeline break. You must calculate this volume as follows:	
(c)(1)	Add the pipeline system leak detection time to the shutdown response time	App. H
(c)(2)	Multiply the time calculated in paragraph (c)(1) of this section by the highest measured oil flow rate over the preceding 12-month period. For new pipelines, you should use the predicted oil flow rate in the calculation.	App. H
(c)(3)	Add to the volume calculated in paragraph (c)(2) of this section the total volume of oil that would leak from the pipeline after it is shut in. Calculate this volume by taking into account the effects of hydrostatic pressure, gravity, frictional wall forces, length of pipeline segment, tie-ins with other pipelines, and other factors	App. H

BSEE 30 CFR Part 254 ***CROSS REFERENCE***		
§254	**BRIEF DESCRIPTION**	**SECTION**
.47	**Determining the volume of oil of your worst case discharge scenario. (Continued)**	
(d)	If your facility which stores, handles, transfers, processes, or transports oil does not fall into the categories listed in paragraph (a), (b), or (c) of this section, contact the Regional Supervisor for instructions on the calculation of the volume of your worst case discharge scenario.	*N/A*

APPENDIX L

SAFETY DATA SHEETS

Crude Oil L-2

Eureka Casing Gas/Pad Gas L-3

Nalco COREXIT EC9500A L-4

Nalco COREXIT EC9527A L-5

Crude Oil
Safety Data Sheets

Safety Data Sheet

Material Name: Crude Oil

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Beta Offshore
111 W. Ocean Blvd.
Suite 1240
Long Beach, CA 90802

Phone: 562-628-1526

Emergency # 562-606-5711 or 5712

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Flammable Liquids - Category 2
Carcinogenicity - Category 1B
Specific Target Organ Toxicity Repeat Exposure - Category 2

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

Danger

Hazard Statements

Highly flammable liquid and vapor.
May cause cancer.
May cause damage to organs (liver, kidneys, blood, nervous system, and skin) through prolonged or repeated exposure.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/vapors/spray
Wear protective gloves/protective clothing/eye protection/face protection.

Response

IF ON SKIN (or hair): Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF exposed or concerned: Get medical advice/attention.
In case of fire: Use water spray, fog or fire fighting foam.

Storage

Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
8002-05-9	Petroleum distillates (naphtha)	100
7783-06-4	Hydrogen sulfide	Varies
8006-14-2	Natural gas	Varies
71-43-2	Benzene	Varies
110-54-3	Hexane	Varies

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

Flush eyes with plenty of water for 15 minutes while holding eyelids open. Get medical attention.

First Aid: Skin

Remove contaminated clothing/shoes and wipe excess from skin. Flush skin with water. Follow by washing with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned.

First Aid: Ingestion

Do not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Get medical attention.

First Aid: Inhalation

Effects from overexposure may be delayed. Act quickly! Unconscious victims can die if not removed from contaminated Area as soon as possible. Put on NIOSH approved air-supplied pressure demand respirator before entering contaminated area. Move victim to fresh air. Give artificial respiration if not breathing. Get medical attention as soon as possible. Keep victim quiet and warm. Vaporization of H_2S that has been trapped in clothing can be dangerous to rescuers. Maintain respiratory protection to avoid contamination from victim to rescuer.

First Aid: Notes to Physician

Amyl nitrite perles by inhalation and sodium nitrite by IV may be effective antidotes. Consult a poison control center. If more than 2.0 ml/kg has been ingested and vomiting has not occurred, emesis should be induced with supervision. Keep victim's head below hips to prevent aspiration. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before emesis, gastric lavage using a cuffed endotracheal tube should be considered.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.
Containers exposed to intense heat from fires should be cooled with water to prevent vapor pressure buildup which could result in container rupture. Container areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure. Sulfur oxides and hydrogen sulfide, both of which are toxic, may be released upon combustion.

Hazardous Combustion Products

Carbon monoxide, sulfur oxides and other unidentified organic compounds may be formed upon combustion.

Extinguishing Media

Use water fog, foam, dry chemical or CO2. Do not use a direct stream of water. Product will float and can be reignited on surface of water.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Clear fire area of unprotected personnel. Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure NIOSH approved self-contained breathing apparatus. Cool fire exposed containers with water.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Shut off source of leak only if safe to do so.

Materials and Methods for Clean-Up

Eliminate all ignition sources. Handling equipment must be grounded to prevent sparking.

Small spills: Take up with an absorbent material and place in non-leaking containers; seal tightly for proper disposal.

Large spills: Evacuate the hazard area of unprotected personnel. Wear appropriate respirator and protective clothing. Shut off source of leak only if safe to do so. Dike and contain. If vapor cloud forms, water fog may be used to suppress; contain run-off. Remove with vacuum trucks or pump to storage/salvage vessels. Soak up residue with an absorbent such as clay, sand or other suitable material; place in non-leaking containers for proper disposal. Flush area with water to remove trace residue; dispose of flush solutions as above.

Emergency Measures

Isolate area. Keep unnecessary personnel away.

Personal Precautions and Protective Equipment

Wear appropriate personal protective equipment as outlined in Section 8 when handling spills.

Environmental Precautions

Do not allow the spilled product to enter public drainage system or open water courses.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapors are gone. Containers, even those that have been emptied, can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers. Static electricity may accumulate and create a fire hazard. Ground fixed equipment. Bond and ground transfer containers and equipment. Wash with soap and water before eating, drinking, smoking or using toilet facilities. Launder contaminated clothing before reuse. Dispose of oil-soaked leather articles including shoes which cannot be decontaminated.

Storage Procedures

Keep liquid and vapor away from heat, sparks and flame. Surfaces that are sufficiently hot may ignite even liquid product in the absence of sparks or flame.

Incompatibilities

Strong oxidizing agents.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Petroleum distillates (naphtha) (8002-05-9)

OSHA:	400 ppm TWA; 1600 mg/m3 TWA
NIOSH:	350 mg/m3 TWA
	1800 mg/m3 Ceiling (15 min)

Benzene (71-43-2)

ACGIH:	0.5 ppm TWA
	2.5 ppm STEL
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA:	5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH:	0.1 ppm TWA
	1 ppm STEL

Hydrogen sulfide (7783-06-4)

ACGIH:	1 ppm TWA
	5 ppm STEL
OSHA:	10 ppm TWA; 14 mg/m3 TWA
	15 ppm STEL; 21 mg/m3 STEL
NIOSH:	10 ppm Ceiling (10 min); 15 mg/m3 Ceiling (10 min)

Hexane (110-54-3)

ACGIH:	50 ppm TWA
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA:	50 ppm TWA; 180 mg/m3 TWA
NIOSH:	50 ppm TWA; 180 mg/m3 TWA

Natural gas (8006-14-2)

ACGIH:	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)

Engineering Measures

Use ventilation as required to control vapor concentrations.

Personal Protective Equipment: Respiratory

Use NIOSH approved respiratory protection as required to prevent overexposure to oil mist, vapor, or fumes and H2S. Do not enter storage compartments unless equipped with a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a positive pressure mode.

Personal Protective Equipment: Hands

Wear chemical resistant gloves as required to minimize skin contact.

Personal Protective Equipment: Eyes

No special eye protection is routinely necessary.

Personal Protective Equipment: Skin and Body

Wear protective clothing as required to minimize skin contact.

Hygiene Measures

Eye wash fountain and emergency showers are recommended.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Black	**Odor:**	Moderate hydrocarbon
Physical State:	Liquid	**pH:**	ND
REID Vapor Pressure per Method D323:	1.6 psi	**Vapor Density:**	NA
Boiling Point:	<100°F	**Pour Point (deg F):**	21°F
Solubility (H2O):	Slight	**Specific Gravity:**	>0.7
Evaporation Rate:	NA	**VOC:**	ND
Octanol/H2O Coeff.:	ND	**Flash Point:**	<100°F
Flash Point Method:	PMCC	**Upper Flammability Limit (UFL):**	ND
Lower Flammability Limit (LFL):	ND	**Burning Rate:**	ND
Auto Ignition:	ND		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Heat, sparks, flame and other ignition sources.

Incompatible Products

Strong oxidizing agents.

Hazardous Decomposition Products

Thermal decomposition products are highly dependent on the combustion conditions. A complex mixture of airborne solid, liquid, particulates and gases will evolve when this material undergoes pyrolysis or combustion. Carbon monoxide, sulfur oxides and other unidentified organic compounds maybe formed upon combustion.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

May be irritating to eyes and skin. Inhalation of vapors may cause respiratory tract irritation and possible asphyxiation. Harmful if swallowed.

B: Component Analysis - LD50/LC50

Petroleum distillates (naphtha) (8002-05-9)

Oral LD50 Rat >4300 mg/kg; Dermal LD50 Rabbit >2000 mg/kg

Benzene (71-43-2)

Inhalation LC50 Rat 13050-14380 ppm 4 h; Oral LD50 Rat 1800 mg/kg

Hydrogen sulfide (7783-06-4)
Inhalation LC50 Rat 0.701 mg/L 4 h; Inhalation LC50 Rat 0.99 mg/L 1 h

Hexane (110-54-3)
Inhalation LC50 Rat 48000 ppm 4 h; Oral LD50 Rat 25 g/kg; Dermal LD50 Rabbit 3000 mg/kg

Natural gas (8006-14-2)
Inhalation LC50 Rat 658 mg/L 4 h

Potential Health Effects: Skin Corrosion Property/Stimulativeness

Based on the presence of light hydrocarbons crude oil is presumed to be moderately irritating to the skin. Prolonged and repeated contact may cause various skin disorders such as dermatitis, folliculitis, oil acne or skin tumors. Contact with hot product may result in thermal burns.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Based on the presence of light hydrocarbons crude oil is presumed to be moderately irritating to the eyes. Contact with hot product may result in thermal burns.

Potential Health Effects: Ingestion

Based on the presence of light hydrocarbons, ingestion of crude oil may result in vomiting; aspiration (breathing) of vomitus into the lungs must be avoided as even small quantities may result in aspiration pneumonitis.

Potential Health Effects: Inhalation

Warning. Hydrogen sulfide (H_2S), natural gas, and other hazardous vapors may evolve and collect in the headspace of storage tanks or other enclosed vessels. Hydrogen sulfide is an extremely flammable, toxic gas. Natural gas is extremely flammable and a simple asphyxiant. Inhalation of other light hydrocarbons may cause pulmonary irritation and result in CNS depression. Prolonged and repeated exposure to benzene may cause serious injury to blood forming organs and is linked to the later development of acute myelogenous leukemia. Prolonged and repeated inhalation of n-hexane may produce peripheral neuropathy.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

Some crude oils and crude oil fractions have been positive in mutagenicity studies.

Carcinogenicity

A: General Product Information

Several long term skin painting studies in experimental animals have shown crude oil to produce skin cancer. Benzene is identified as a chemical causally associated with cancer (acute myelogenous leukemia) in humans.

B: Component Carcinogenicity

Petroleum distillates (naphtha) (8002-05-9)

IARC: Monograph 45 [1989] (Group 3 (not classifiable))

Benzene (71-43-2)

ACGIH:	A1 - Confirmed Human Carcinogen
OSHA:	5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH:	potential occupational carcinogen
NTP:	Known Human Carcinogen (Select Carcinogen)
IARC:	Monograph 100F [in preparation]; Supplement 7 [1987]; Monograph 29 [1982] (Group 1 (carcinogenic to humans))

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

May cause damage to organs (liver, kidneys, blood, nervous system and skin) through prolonged or repeated exposure.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

In high concentrations, this product may be dangerous to aquatic life and fouling to shorelines.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Petroleum distillates (naphtha) (8002-05-9)

Test & Species		Conditions
96 Hr LC50 Salmo gairdneri	258 mg/L [static]	
24 Hr EC50 Daphnia magna	36 mg/L	
48 Hr EC50 Daphnia magna	<0.26 mg/L [Static]	

Benzene (71-43-2)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	10.7-14.7 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	22.49 mg/L [static]	
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]	
96 Hr LC50 Pimephales promelas	22330-41160 µg/L [static]	
96 Hr LC50 Lepomis macrochirus	70000-142000 µg/L [static]	
72 Hr EC50 Pseudokirchneriella subcapitata	29 mg/L	

48 Hr EC50 Daphnia magna	8.76 - 15.6 mg/L [Static]	
48 Hr EC50 Daphnia magna	10 mg/L	

Hydrogen sulfide (7783-06-4)

Test & Species		Conditions
96 Hr LC50 Lepomis macrochirus	0.0448 mg/L [flow-through]	
96 Hr LC50 Pimephales promelas	0.016 mg/L [flow-through]	
96 Hr LC50 Gammarus pseudolimnaeus	0.022 mg/L	

Hexane (110-54-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	2.1-2.98 mg/L [flow-through]	
24 Hr EC50 Daphnia magna	>1000 mg/L	

Persistence/Degradability
No information available.

Bioaccumulation
No information available.

Mobility in Soil
No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions
See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging
Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

DOT Information
Shipping Name: Petroleum Crude Oil
UN #: 1267 **Hazard Class:** 3

* * * Section 15 - Regulatory Information * * *

Regulatory Information

US Federal Regulations

Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Benzene (71-43-2)

CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

Hydrogen sulfide (7783-06-4)

SARA 302: 500 lb TPQ
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Hexane (110-54-3)

CERCLA: 5000 lb final RQ; 2270 kg final RQ

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Petroleum distillates (naphtha)	8002-05-9	No	Yes	Yes	Yes	Yes	No
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	No
Hydrogen sulfide	7783-06-4	Yes	Yes	Yes	Yes	Yes	No
Hexane	110-54-3	No	Yes	Yes	Yes	Yes	No
Natural gas	8006-14-2	No	Yes	No	No	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Petroleum distillates (naphtha)	8002-05-9	Yes	DSL	EINECS
Benzene	71-43-2	Yes	DSL	EINECS
Hydrogen sulfide	7783-06-4	Yes	DSL	EINECS
Hexane	110-54-3	Yes	DSL	EINECS
Natural gas	8006-14-2	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

The information herein is presented in good faith and believed to be accurate as of the effective date given. However, no warranty, expressed or implied, is given. It is the buyer's responsibility to ensure that its activities comply with Federal, State or provincial, and local laws.

End of Sheet

Eureka Casing Gas/Pad Gas
Safety Data Sheets

Eureka Casing Gas / Pad Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Revision date: 03/26/2013 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product Identifier

Product form: Mixture

Trade name: Eureka Casing Gas / Pad Gas

1.2. Intended Use Of The Product

Use of the substance/preparation: Fuel

1.3. Name, Address, And Telephone Of The Responsible Party

Beta Offshore
111 West Ocean Blvd.
Suite 1240
Long Beach, CA 90802

(562) 628-1526

www.betaoffshore.com

1.4. Emergency telephone number

Emergency number : (562) 606-5711

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Simple Asphy.
Flam. Gas 1 H220
Compressed gas H280

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :

GHS02 GHS04

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : May displace oxygen and cause rapid suffocation
H220 - Extremely flammable gas
H280 - Contains gas under pressure; may explode if heated

Precautionary statements (GHS-US) : P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so
P410+P403 - Protect from sunlight. Store in a well-ventilated place

2.3. Other hazards

Other hazards not contributing to the classification: Contact with the product may cause cold burns or frostbite.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	Classification (GHS-US)
Natural gas, debutanizer residues (A complex combination of hydrocarbons separated from	(CAS No.) 125471-80-9	0.837 - 6.577	Not classified

natural gas by distillation. It consists predominantly of saturated aliphatic hydrocarbons having carbon numbers primarily in the range of C3 to C7, predominantly pentanes and hexanes.)			
Butane	(CAS No.) 106-97-8	0.528 - 4.841	Flam. Gas 1, H220 Compressed gas, H280
Propane	(CAS No.) 74-98-6	0.972 - 4.496	Simple Asphy., H380 Flam. Gas 1, H220 Compressed gas, H280 STOT SE 3, H336
Carbon dioxide	(CAS No.) 124-38-9	3.276 - 4.191	Simple Asphy., H380 Compressed gas, H280
Isopentane	(CAS No.) 78-78-4	0.307 - 3.625	Flam. Liq. 1, H224 STOT SE 3, H336 Asp. Tox. 1, H304 Aquatic Chronic 2, H411
Pentane	(CAS No.) 109-66-0	0.187 - 2.886	Flam. Liq. 2, H225 STOT SE 3, H336 Asp. Tox. 1, H304 Aquatic Chronic 2, H411
Isobutane	(CAS No.) 75-28-5	0.39 - 2.541	Flam. Gas 1, H220 Compressed gas, H280
Ethane	(CAS No.) 74-84-0	0.89 - 1.643	Simple Asphy., H380 Flam. Gas 1, H220 Compressed gas, H280

Full text of H-phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
First-aid measures after inhalation: Seek medical attention immediately. When symptoms occur: go into open air and ventilate suspected area.
First-aid measures after skin contact: Rinse with plenty of water.
First-aid measures after eye contact: Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persist.
First-aid measures after ingestion: Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries: Natural Gas is an asphyxiant. Lack of oxygen can be fatal.
Symptoms/injuries after inhalation: Asphyxia by lack of oxygen: risk of death. Vapors are heavier than air and may cause asphyxia by reduction of the oxygen content. In high concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.
Symptoms/injuries after skin contact: If frostbite or freezing occurs, immediately flush with plenty of lukewarm water to GENTLY warm the affected area. Do not use hot water. Do not rub affected area. Get immediate medical attention.
Symptoms/injuries after eye contact: None expected under normal conditions of use.
Symptoms/injuries after ingestion: Ingestion is not considered a potential route of exposure.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: Dry chemical, carbon dioxide, water spray, fog, foam.
Unsuitable extinguishing media: Halons.

5.2. Special hazards arising from the substance or mixture

Fire hazard: Extremely flammable gas.
Explosion hazard: May form flammable/explosive vapor-air mixture.

Reactivity: Readily forms explosive mixtures with air or oxygen in the presence of an ignition source. It will also burn or explode in the presence of chlorine, bromine pentafluoride, oxygen difluoride and nitrogen trifluoride. It will spontaneously ignite in the presence of chlorine dioxide.

5.3. Advice for firefighters

Firefighting instructions: Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Do not allow run-off from fire fighting to enter drains or water courses. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leaking gas fire, eliminate all ignition sources if safe to do so. Remove containers from fire area if this can be done without risk. Extinguish/cool from behind cover/unmanned monitors.
Protection during firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.
Other information: Evacuate danger area. Remove and isolate contaminated clothing and shoes at the site and place in metal container filled with water. Fire hazard if allowed to dry.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures: Use special care to avoid static electric charges. Eliminate every possible source of ignition. Keep away from heat/sparks/open flames/hot surfaces - No smoking.

6.1.1. For non-emergency personnel

Protective equipment: Use appropriate personal protection equipment (PPE).
Emergency procedures: Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment: Equip cleanup crew with proper protection.
Emergency procedures: Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up: Clear up spills immediately and dispose of waste safely.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed: Extremely flammable gas. Product to be handled in a closed system. Handle empty containers with care because residual vapors are flammable.
Precautions for safe handling: Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Securely chain cylinders when in use and protect against physical damage.
Hygiene measures: Handle in accordance with good industrial hygiene and safety procedures.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures: Proper grounding procedures to avoid static electricity should be followed. Comply with applicable regulations.
Storage conditions: Ensure cylinder valve is closed and not leaking after each use. Store tightly closed in a dry, cool and well-ventilated place. Keep in fireproof place.
Incompatible products: Strong oxidizers. Halogens (F, Cl, Br, I).
Storage area: Store in a well-ventilated place.

7.3. Specific end use(s)

Fuel.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Butane (106-97-8)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm

Propane (74-98-6)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m3)	1800 mg/m³

USA OSHA	OSHA PEL (TWA) (ppm)	1000 ppm

Ethane (74-84-0)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm

Isobutane (75-28-5)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm

Isopentane (78-78-4)		
USA ACGIH	ACGIH TWA (ppm)	600 ppm

Pentane (109-66-0)		
USA ACGIH	ACGIH TWA (ppm)	600 ppm
USA OSHA	OSHA PEL (TWA) (mg/m3)	2950 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	1000 ppm

Carbon dioxide (124-38-9)		
USA ACGIH	ACGIH TWA (ppm)	5000 ppm
USA ACGIH	ACGIH STEL (ppm)	30000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m3)	9000 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	5000 ppm

8.2. Exposure controls

Appropriate engineering controls : Gas detectors should be used when flammable gases/vapours may be released. If exposure can exceed the PEL/TLV standard, use only approved supplied air respirator operated in a positive pressure mode.

Personal protective equipment : Respiratory protection of the dependent type. Insulated gloves. Protective goggles.

Respiratory protection : An approved supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. Gas filters do not protect against oxygen deficiency.

Other information : When using, do not eat, drink or smoke.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Gas
Odor : No data available
Odor threshold : No data available
pH : No data available
Relative evaporation rate (butyl acetate=1) : No data available
Melting point : No data available
Freezing point : No data available
Boiling point : No data available
Flash Point : No data available
Auto-ignition temperature : No data available
Decomposition Temperature : No data available
Flammability (solid, gas) : No data available
Vapor pressure : No data available
Relative vapor density at 20 °C : No data available
Relative density : No data available
Solubility : No data available
Log Pow : No data available
Log Kow : No data available

Viscosity, kinematic : No data available
Viscosity, dynamic : No data available
Explosive properties : No data available
Oxidizing properties : No data available
Explosive limits : Not applicable

9.2. Other information No additional information available

SECTION 10: Stability and reactivity

Reactivity Readily forms explosive mixtures with air or oxygen in the presence of an ignition source. It will also burn or explode in the presence of chlorine, bromine pentafluoride, oxygen difluoride and nitrogen trifluoride. It will spontaneously ignite in the presence of chlorine dioxide.
Chemical Stability Extremely flammable gas
Possibility Of Hazardous Reactions Hazardous polymerization will not occur.
Conditions To Avoid Open flame. Overheating. Heat. Sparks. Direct sunlight. Extremely high or low temperatures. Exposure to fire may cause containers to rupture/explode.
Incompatible Materials Halogens (F, Cl, Br, I). Strong oxidizing agents.
Hazardous Decomposition Products Carbon oxides (CO, CO_2)

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Butane (106-97-8)	
LC50 inhalation rat (mg/l)	658 mg/l (Exposure time: 4 h)

Propane (74-98-6)	
LC50 inhalation rat (mg/l)	658 mg/l (Exposure time: 4 h)

Ethane (74-84-0)	
LC50 inhalation rat (mg/l)	658 mg/l (Exposure time: 4 h)

Isobutane (75-28-5)	
LC50 inhalation rat (mg/l)	658 mg/l (Exposure time: 4 h)

Isopentane (78-78-4)	
LC50 inhalation rat (mg/l)	280000 mg/m³ (Exposure time: 4 h)

Pentane (109-66-0)	
LD50 oral rat	> 2000 mg/kg
LD50 dermal rabbit	3000 mg/kg
LC50 inhalation rat (mg/l)	364 g/m³ (Exposure time: 4 h)

Skin corrosion/irritation: Not classified
Serious eye damage/irritation: Not classified
Respiratory or skin sensitization: Not classified
Germ cell mutagenicity: Not classified
Carcinogenicity: Not classified
Reproductive toxicity: Not classified
Specific target organ toxicity (single exposure): Not classified
Specific target organ toxicity (repeated exposure): Not classified
Aspiration hazard: Not classified
Symptoms/injuries after inhalation: Asphyxia by lack of oxygen: risk of death. Vapors are heavier than air and may cause asphyxia by reduction of the oxygen content. Asphyxia by lack of oxygen: risk of death. In high concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.
Symptoms/injuries after skin contact: If frostbite or freezing occurs, immediately flush with plenty of lukewarm water to GENTLY warm the affected area. Do not use hot water. Do not rub affected area. Get immediate medical attention.
Symptoms/injuries after eye contact: None expected under normal conditions of use.
Symptoms/injuries after ingestion: Ingestion is not considered a potential route of exposure.

SECTION 12: Ecological information

12.1. Toxicity

Isopentane (78-78-4)	
EC50 Daphnia 1	2.3 mg/l (Exposure time: 48 h - Species: Daphnia magna)

Pentane (109-66-0)	
LC50 fish 1	9.87 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss)
EC50 Daphnia 1	9.74 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	11.59 mg/l (Exposure time: 96 h - Species: Pimephales promelas)

12.2. Persistence and degradability

Eureka Casing Gas / Pad Gas	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

Eureka Casing Gas / Pad Gas	
Bioaccumulative potential	Not established.

Butane (106-97-8)	
Log Pow	2.89

Propane (74-98-6)	
Log Pow	2.3

Ethane (74-84-0)	
Log Pow	<= 2.8

Isobutane (75-28-5)	
BCF fish 1	1.57 - 1.97
Log Pow	2.88 (at 20 °C)

Isopentane (78-78-4)	
Log Pow	3.2 - 3.3

Pentane (109-66-0)	
Log Pow	3.39

Carbon dioxide (124-38-9)	
BCF fish 1	(no bioaccumulation)
Log Pow	0.83

12.4. Mobility in soil
No additional information available

12.5. Other adverse effects

Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations: Dispose of waste material in accordance with all local, regional, national, and international regulations.

Additional information: Handle empty containers with care because residual vapors are flammable. Empty gas cylinders should be returned to the vendor for recycling or refilling.

Ecology - waste materials: Avoid release to the environment.

SECTION 14: Transport information

In accordance with ICAO/IATA/DOT/TDG

14.1. UN number

UN-No.(DOT) : 1971

DOT NA no. UN1971

14.2. UN proper shipping name

DOT Proper Shipping Name : Natural gas, compressed (with high methane content)

Department of Transportation (DOT) Hazard Classes : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115

Hazard labels (DOT) : 2.1 - Flammable gas.

DOT Packaging Exceptions (49 CFR 173.xxx) : 306

DOT Packaging Non Bulk (49 CFR 173.xxx) : 302

DOT Packaging Bulk (49 CFR 173.xxx) : 302

14.3. Additional information

Emergency Response Guide (ERG) Number : 115

Other information : No supplementary information available.

Overland transport No additional information available

Transport by sea No additional information available

DOT Vessel Stowage Location : E - The material may be stowed ‘‘on deck’’ or ‘‘under deck’’ on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length, but is prohibited from carriage on passenger vessels in which the limiting number of passengers is exceeded.

DOT Vessel Stowage Other : 40 - Stow ‘‘clear of living quarters’’

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : Forbidden

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 150 kg

SECTION 15: Regulatory information

15.1. US Federal regulations

Butane (106-97-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Propane (74-98-6)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Ethane (74-84-0)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Isobutane (75-28-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Isopentane (78-78-4)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Pentane (109-66-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
EPA TSCA Regulatory Flag	T - T - indicates a substance that is the subject of a Section 4 test rule under TSCA.

Carbon dioxide (124-38-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.3. US State regulations

Neither this product nor its components appear on lists for the State of California.

SECTION 16: Other information

Other information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

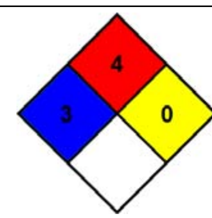
GHS Full Text Phrases:

Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Aquatic Chronic 2	Hazardous to the aquatic environment - Chronic Hazard Category 2
Asp. Tox. 1	Aspiration hazard Category 1
Carc. 1A	Carcinogenicity Category 1A
Compressed gas	Gases under pressure Compressed gas
Flam. Gas 1	Flammable gases Category 1
Flam. Liq. 1	Flammable liquids Category 1
Flam. Liq. 2	Flammable liquids Category 2
Muta. 1B	Germ cell mutagenicity Category 1B
Ox. Gas 1	Oxidizing gases Category 1
Repr. 1A	Reproductive toxicity Category 1A
Simple Asphy.	Simple Asphyxiant
STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H220	Extremely flammable gas
H224	Extremely flammable liquid and vapor
H225	Highly flammable liquid and vapor
H270	May cause or intensify fire; oxidizer
H280	Contains gas under pressure; may explode if heated
H304	May be fatal if swallowed and enters airways
H331	Toxic if inhaled
H336	May cause drowsiness or dizziness
H340	May cause genetic defects
H350	May cause cancer
H360	May damage fertility or the unborn child
H372	Causes damage to organs through prolonged or repeated exposure
H411	Toxic to aquatic life with long lasting effects

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 4 Severe Hazard

Physical : 0 Minimal Hazard

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

Nalco COREXIT EC9500A
Safety Data Sheets

SAFETY DATA SHEET

PRODUCT

COREXIT® EC9500A

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours)   CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **COREXIT® EC9500A**

APPLICATION : OIL SPILL DISPERSANT

COMPANY IDENTIFICATION : Nalco Environmental Solutions LLC
7705 Highway 90-A
Sugar Land, Texas
77478

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours)   CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2   FLAMMABILITY : 1 / 1   INSTABILITY : 0 / 0   OTHER :
0 = Insignificant   1 = Slight   2 = Moderate   3 = High   4 = Extreme   * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Distillates, petroleum, hydrotreated light	64742-47-8	10.0 - 30.0
Propylene Glycol	57-55-6	1.0 - 5.0
Organic sulfonic acid salt	Proprietary	10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
May cause serious eye damage if not treated promptly.
Keep away from heat. Keep away from sources of ignition - No smoking. Keep container tightly closed. Do not get in eyes, on skin, on clothing. Do not take internally. Avoid breathing vapor. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of soap and water.
Wear suitable protective clothing.
Low Fire Hazard; liquids may burn upon heating to temperatures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause serious eye damage if not treated promptly.

SKIN CONTACT :
May cause skin irritation.

INGESTION :
Not a likely route of exposure. In the event of oral ingestion, may cause nausea and vomiting. Can cause chemical pneumonia if aspirated into lungs following ingestion.

INHALATION :
Repeated or prolonged exposure may irritate the respiratory tract.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
Frequent or prolonged contact with product may defat and dry the skin, leading to discomfort and dermatitis.

AGGRAVATION OF EXISTING CONDITIONS :
Skin contact may aggravate an existing dermatitis condition.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. Get medical attention.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting: contains petroleum distillates and/or aromatic solvents. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 181.4 °F / 83 °C (PMCC)

This product does not sustain combustion per the method outlined in 49 CFR Appendix H.

LOWER EXPLOSION LIMIT : Not flammable

UPPER EXPLOSION LIMIT : Not flammable

EXTINGUISHING MEDIA :
Alcohol foam, Carbon dioxide, Foam, Dry powder, Other extinguishing agent suitable for Class B fires, For large fires, use water spray or fog, thoroughly drenching the burning material.
Water mist may be used to cool closed containers.

UNSUITABLE EXTINGUISHING MEDIA :
Do not use water unless flooding amounts are available.

FIRE AND EXPLOSION HAZARD :
Low Fire Hazard; liquids may burn upon heating to temperatures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Do not touch spilled material. Remove sources of ignition. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Use with adequate ventilation. Keep the containers closed when not in use. Do not take internally. Do not get in eyes, on skin, on clothing. Have emergency equipment (for fires, spills, leaks, etc.) readily available.

STORAGE CONDITIONS :
Store away from heat and sources of ignition. Store separately from oxidizers. Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
Stainless Steel 304, Stainless Steel 316L, Aluminum, Hastelloy C-276, MDPE (medium density polyethylene), HDPE (high density polyethylene), PVC, Plexiglass, Perfluoroelastomer, PTFE, TFE, FEP (encapsulated)

UNSUITABLE CONSTRUCTION MATERIAL :
Mild steel, Carbon steel, Buna-N, Brass, Copper, Natural rubber, Polyethylene, Polypropylene, Ethylene propylene, EPDM, Neoprene, Nitrile, Polyurethane, Fluoroelastomer, Chlorosulfonated polyethylene rubber, Polytetrafluoroethylene/polypropylene copolymer

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

Substance(s)	Category:	ppm	mg/m3	Non-Standard Unit
Propylene Glycol (Aerosol.)	WEEL/TWA		10	
Hydrotreated Light Distillate as total hydrocarbons (Vapour.)	MANUFACT/TWA	165	1,200	
Oil Mist (Mineral)	OSHA Z1/PEL ACGIH/TWA		5 5	

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Nitrile gloves PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Hazy Amber
ODOR	Hydrocarbon
SPECIFIC GRAVITY	0.95 @ 60 °F / 15.6 °C
DENSITY	7.91 lb/gal
SOLUBILITY IN WATER	Miscible
pH (100 %)	6.2
VISCOSITY	177 cst @ 32 °F / 0 °C 70 cst @ 60 °F / 15.6 °C
POUR POINT	< -71 °F / < -57 °C
BOILING POINT	296 °F / 147 °C
VAPOR PRESSURE	15.5 mm Hg @ 100 °F / 37.8 °C

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Heat and sources of ignition including static discharges.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of sulfur

11. TOXICOLOGICAL INFORMATION

SENSITIZATION:
This product is not expected to be a sensitizer.

CARCINOGENICITY:
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION:
Based on our hazard characterization, the potential human hazard is: Low

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TOXICOLOGICAL INFORMATION RELATED TO THE WHOLE PRODUCT AND ITS COMPONENTS:

Acute mammalian toxicity studies have been conducted under laboratory conditions that test the toxicity of the product following exposure that would not reflect those for humans under normal use situations. This information is provided below. Other information is also provided from third party sources related to the mammalian toxicity for the six components in the product.

ACUTE TOXICITY OF THE PRODUCT MIXTURE:

ORAL (Rat): LD50 > 5,000 mg/kg
DERMAL (Rabbit): LD50 > 5,000 mg/kg
DERMAL IRRITATION (Rabbit): Mild irritant. No clinically significant effects beyond 10 days post-application.
INHALATION (Rat): LC50 > 5.35 mg/L
EYE IRRITATION (Rabbit): In 2/3 rabbits, some corneal opacity and conjunctival effects still present at day 21; initial iritis effects resolved by day 21.

ACUTE ORAL TOXICITY FOR THE COMPONENTS:

Component:	Polyol ester
Species:	Rat
LD50:	> 16,000 mg/kg
Remarks:	This data was sourced from the supplier MSDS.

Component:	Distillates, petroleum, hydrotreated light
Species:	Rat
LD50:	> 5,000 mg/kg
Remarks:	This data was sourced from an IUCLID Dataset searched on 6/2/2010.

Component:	Glycol Ether
Species:	Rat
LD50:	4,000 mg/kg
Remarks:	This data was sourced from an IUCLID Dataset searched on 6/2/2010.

Component:	Glycol Ether
Species:	Mouse
LD50:	2,160 mg/kg
Remarks:	This data was sourced from an IUCLID Dataset searched on 6/2/2010.

Component:	Oxyalkylated Fatty Acid Derivative

Species: Rat
LD50: > 38,000 mg/kg
Remarks: This data was sourced from the supplier MSDS.

Component: Oxyalkylate Polymer
Species: Rat
LD50: > 36,400 mg/kg
Remarks: This data was sourced from the supplier MSDS.

Component: Organic Sulfonic Acid Salt
Species: Rat
LD50: 4,620 mg/kg
Remarks: This data was sourced from an IUCLID Dataset searched on 6/2/2010.

ACUTE DERMAL TOXICITY FOR THE COMPONENTS:

Component: Distillates, petroleum, hydrotreated light
Species: Rabbit
LD50: > 3,160 mg/kg
Remarks: This data was sourced from an IUCLID Dataset searched on 6/2/2010.

Component: Glycol Ether
Species: Rat
LD50: > 2,000 mg/kg
Remarks: This data was sourced from an IUCLID Dataset searched on 6/2/2010.

Component: Organic Sulfonic Acid Salt
Species: Rabbit
LD50: 10,000 mg/kg
Remarks: This data was sourced from an IUCLID Dataset searched on 6/2/2010.

ACUTE INHALATION TOXICITY FOR THE COMPONENTS:

Component: Distillates, petroleum, hydrotreated light
Species: Rat
LD50: > 290 mg/l (4 hrs)
Remarks: This data was sourced from an IUCLID Dataset searched on 6/2/2010.

Component: Glycol Ether
Species: Rat
LD50: 42.1 mg/l (4 hrs)
Remarks: This data was sourced from an IUCLID Dataset searched on 6/2/2010.

Component: Organic Sulfonic Acid Salt
Species: Rat
LD50: 20 mg/l (96 hrs)
Remarks: This data was sourced from an IUCLID Dataset searched on 6/2/2010.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product, unless otherwise indicated.

Acute Fish Results :

Species	Exposure	Test Type	Value	Test Descriptor
Inland Silverside	96 hrs	LC50	25.2 mg/l	Product
Common Mummichog	96 hrs	LC50	140 mg/l	Product
Turbot	96 hrs	LC50	75 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	Test Type	Value	Test Descriptor
Artemia	48 hrs	LC50	20.7 mg/l	Product
Mysid Shrimp (Mysidopsis bahia)	48 hrs	LC50	32.23 mg/l	Product
Acartia tonsa	48 hrs	LC50	2 mg/l	Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
Based on a review of the individual components, utilizing U.S. EPA models, this material is not expected to bioaccumulate. The product is readily eliminated.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Distillates, petroleum, hydrotreated light : Irritant
Propylene Glycol : Exposure Limit
Organic sulfonic acid salt : Irritant

CERCLA/SUPERFUND, 40 CFR 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Components listed under this regulation may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Propylene Glycol	57-55-6

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 03/01/2012
Version Number : 4.3

Nalco COREXIT EC9527A
Safety Data Sheets

SAFETY DATA SHEET

COREXIT™ EC9527A

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	COREXIT™ EC9527A
Other means of identification	:	Not applicable.
Recommended use	:	OIL SPILL DISPERSANT
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	Nalco Environmental Solutions LLC 7705 Highway 90-A Sugar Land, Texas 77478 USA TEL: (281) 263-7000
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	09/29/2016

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 4
Acute toxicity (Oral)	:	Category 4
Acute toxicity (Dermal)	:	Category 4
Eye irritation	:	Category 2A

GHS Label element

Hazard pictograms :

Signal Word	:	Warning
Hazard Statements	:	Combustible liquid Harmful if swallowed or in contact with skin Causes serious eye irritation.
Precautionary Statements	:	**Prevention:** Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Wash skin thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/ eye protection/ face protection. **Response:** IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.If eye irritation persists: Get medical advice/ attention.Wash contaminated clothing before reuse.

Storage:
Store in a well-ventilated place. Keep cool.

Other hazards : None known.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

Pure substance/mixture : Mixture

Chemical Name	CAS-No.	Concentration: (%)
2-Butoxyethanol	111-76-2	30 - 60
Organic sulfonic acid salt	Proprietary	10 - 30
Propylene Glycol	57-55-6	1 - 5

Section: 4. FIRST AID MEASURES

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.

In case of skin contact : Wash off immediately with plenty of water for at least 15 minutes. Use a mild soap if available. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops and persists.

If swallowed : Rinse mouth. Get medical attention if symptoms occur.

If inhaled : Get medical attention if symptoms occur.

Protection of first-aiders : In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders. Use personal protective equipment as required.

Notes to physician : Treat symptomatically.

Most important symptoms and effects, both acute and delayed : See Section 11 for more detailed information on health effects and symptoms.

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Foam
Carbon dioxide
Dry powder
Other extinguishing agent suitable for Class B fires
For large fires, use water spray or fog, thoroughly drenching the burning material.

Unsuitable extinguishing media : None known.

Specific hazards during firefighting : Fire Hazard
Keep away from heat and sources of ignition.
Flash back possible over considerable distance.

Hazardous combustion products	:	Decomposition products may include the following materials: Carbon oxides Sulphur oxides metal oxides
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. In the event of fire and/or explosion do not breathe fumes.

Section: 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Ensure adequate ventilation. Remove all sources of ignition. Ensure clean-up is conducted by trained personnel only. Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	Do not allow contact with soil, surface or ground water.
Methods and materials for containment and cleaning up	:	Eliminate all ignition sources if safe to do so. Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Flush away traces with water.

Section: 7. HANDLING AND STORAGE

Advice on safe handling	:	Avoid contact with skin and eyes. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Do not ingest. Keep away from fire, sparks and heated surfaces. Wash hands thoroughly after handling. Use only with adequate ventilation.
Conditions for safe storage	:	Keep away from heat and sources of ignition. Keep away from oxidizing agents. Keep out of reach of children. Keep container tightly closed. Store in suitable labelled containers.
Suitable material	:	The following compatibility data is suggested based on similar product data and/or industry experience: Stainless Steel 316L, Hastelloy C-276, MDPE (medium density polyethylene), Nitrile, Plexiglass, TFE, HDPE (high density polyethylene), Neoprene, Aluminum, Polypropylene, Polyethylene, Carbon Steel C1018, Stainless Steel 304, FEP (encapsulated), Perfluoroelastomer, PVC, PTFE, Polytetrafluoroethylene/polypropylene copolymer, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.
Unsuitable material	:	The following compatibility data is suggested based on similar product data and/or industry experience: Copper, Mild steel, Brass, Nylon, Buna-N, Natural rubber, Polyurethane, Ethylene propylene, EPDM, Fluoroelastomer, Chlorosulfonated polyethylene rubber

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Form of exposure	Permissible concentration	Basis
2-Butoxyethanol	111-76-2	TWA	20 ppm	ACGIH
		TWA	5 ppm 24 mg/m3	NIOSH REL
		TWA	50 ppm 240 mg/m3	OSHA Z1
Propylene Glycol	57-55-6	TWA	10 mg/m3	AIHA WEEL

Engineering measures : Effective exhaust ventilation system. Maintain air concentrations below occupational exposure standards.

Personal protective equipment

Eye protection : Safety goggles
Face-shield

Hand protection : Wear the following personal protective equipment:
Standard glove type.
Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Skin protection : Wear suitable protective clothing.

Respiratory protection : When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Wash face, hands and any exposed skin thoroughly after handling.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Liquid

Colour : clear

Odour : Mild

Flash point : 72.7 °C, Method: ASTM D 56, Tag closed cup, Does not sustain combustion.

pH : 6.1, 100 %, (20 °C)

Odour Threshold : no data available

Melting point/freezing point : POUR POINT: -55 °C, ASTM D-97
POUR POINT: < -40 °C

Initial boiling point and boiling range : 171 °C

Evaporation rate : 0.1, (water=1)

Flammability (solid, gas) : no data available

Upper explosion limit : no data available

Lower explosion limit : no data available

Vapour pressure	:	< 5 mm Hg, (38 °C), similar to water
Relative vapour density	:	no data available
Relative density	:	0.98 - 1.02,
Density	:	0.98 - 1.02 g/cm3 , 8.2 - 8.5 lb/gal
Water solubility	:	completely soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Thermal decomposition temperature	:	no data available
Viscosity, dynamic	:	90 mPa.s (0 °C)
		35 mPa.s (20 °C)
Viscosity, kinematic	:	160 mm2/s (0 °C)
Molecular weight	:	no data available
VOC	:	no data available

Section: 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Strong oxidizing agents
Hazardous decomposition products	:	Decomposition products may include the following materials: Carbon oxides Sulphur oxides metal oxides

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Causes serious eye irritation.
Skin	:	Harmful in contact with skin.
Ingestion	:	Harmful if swallowed.
Inhalation	:	Health injuries are not known or expected under normal use.

Chronic Exposure	:	Health injuries are not known or expected under normal use.

Experience with human exposure

Eye contact	:	Redness, Pain, Irritation
Skin contact	:	No information available.
Ingestion	:	No information available.
Inhalation	:	No symptoms known or expected.

Toxicity

Product

Acute oral toxicity	:	LD50 rat: 1,750 mg/kg Test substance: Product
Acute inhalation toxicity	:	LC50 rat: 2.08 mg/l Test substance: Product Acute toxicity estimate: 28.48 mg/l Exposure time: 4 h
Acute dermal toxicity	:	LD50 rat: 2,000 mg/kg Test substance: Product
Skin corrosion/irritation	:	Species: rabbit Result: Mild skin irritation GLP: yes Test substance: Product
Serious eye damage/eye irritation	:	Species: rabbit Result: Moderately irritating GLP: yes Test substance: Product
Respiratory or skin sensitization	:	no data available
Carcinogenicity	:	no data available
Reproductive effects	:	no data available
Germ cell mutagenicity	:	no data available
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	no data available

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects	:	Toxic to aquatic life.

Product

Toxicity to fish	:	LC50 Turbot: 50 mg/l Exposure time: 96 hrs Test substance: Product LC50 Pimephales promelas (fathead minnow): 201 mg/l Exposure time: 96 hrs Test substance: Product LC50 Inland Silverside: 14.57 mg/l Exposure time: 96 hrs Test substance: Product LC50 Common Mummichog: 81 mg/l Exposure time: 96 hrs Test substance: Product LC50 Pimephales promelas (fathead minnow): 316 mg/l Exposure time: 96 hrs Test substance: Product LC50 Common Mummichog: 92 mg/l Exposure time: 96 hrs Test substance: Product NOEC Turbot: 32 mg/l Exposure time: 96 hrs Test substance: Product
Toxicity to daphnia and other aquatic invertebrates	:	LC50 Acartia tonsa: 23 mg/l Exposure time: 48 hrs Test substance: Product LC50 Mysid Shrimp (Mysidopsis bahia): 24.14 mg/l Exposure time: 48 hrs Test substance: Product LC50 Artemia: 40 mg/l Exposure time: 48 hrs Test substance: Product
Toxicity to algae	:	EC50 Marine Algae (Skeletonema costatum): 9.4 mg/l Exposure time: 72 hrs Test substance: Product

Components

Toxicity to bacteria	:	2-Butoxyethanol 463 mg/l Propylene Glycol > 20,000 mg/l

Components

Toxicity to fish (Chronic toxicity)	:	2-Butoxyethanol NOEC: > 100 mg/l

		Exposure time: 21 d
		Propylene Glycol Chronic Toxicity Value: 2,500 mg/l Exposure time: 30 d

Components

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	2-Butoxyethanol NOEC: > 100 mg/l Exposure time: 21 d
		Propylene Glycol NOEC: 13,020 mg/l Exposure time: 7 d

Persistence and degradability

The organic portion of this preparation is expected to be readily biodegradable.

Mobility

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	:	<5%
Water	:	10 - 30%
Soil	:	70 - 90%

The portion in water is expected to be soluble or dispersible.

Bioaccumulative potential

Based on a review of the individual components, utilizing U.S. EPA models, this material is not expected to bioaccumulate.

Other information

no data available

Section: 13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

Disposal methods	:	The product should not be allowed to enter drains, water courses or the soil. Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.

Disposal considerations	:	Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

Land transport (DOT)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Air transport (IATA)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Sea transport (IMDG/IMO)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Section: 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Acute Health Hazard
Fire Hazard

SARA 302 : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

2-Butoxyethanol	111-76-2	30 - 60 %

California Prop 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

INTERNATIONAL CHEMICAL CONTROL LAWS :

TOXIC SUBSTANCES CONTROL ACT (TSCA)
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

COREXIT™ EC9527A

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

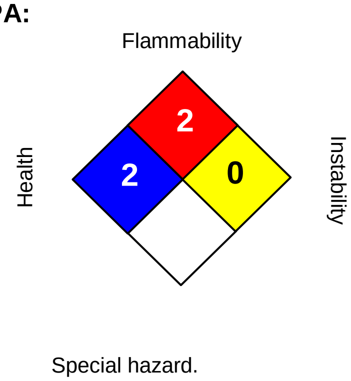
KOREA
All substances in this product comply with the Chemical Control Act (CCA) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

Section: 16. OTHER INFORMATION

NFPA:



HMIS III:

HEALTH	**2**
FLAMMABILITY	**2**
PHYSICAL HAZARD	**0**

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date : 09/29/2016
Version Number : 1.3
Prepared By : Regulatory Affairs

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

APPENDIX M

ACRONYMS

Acronyms M-1

ACP	-	Area Contingency Plan
ADMN	-	Administration Unit Leader
AFFF	-	Aqueous Film Forming Foam
AOBD	-	Air Operations Branch Director
AOR	-	Area of Responsibility
API	-	American Petroleum Institute
AQI	-	Alternate Qualified Individual
AREP	-	Agency Representatives
ASOF	-	Assistant Safety Officers or Aviation Safety Officer
AST	-	Aboveground Storage Tank
ASTM	-	American Society for Testing and Materials
ATC	-	Air Traffic Control
BBL	-	Barrel (Unit of Volume Equal to 42 Gallons)
BPD	-	Barrels Per Day
BPH	-	Barrels Per Hour
BOD	-	Biological Oxygen Demand
BOEM	-	Bureau of Ocean Energy Management
BSEE	-	Bureau of Safety and Environmental Enforcement
C	-	Degrees Centigrade
CAER	-	Community Awareness and Emergency Response
CERCLA	-	Comprehensive Environmental Response, Compensation and Liability Act
CIRs	-	Critical Information Requirements
CFM	-	Cubic Feet per Minute
CFR	-	Code of Federal Regulations
CG or USCG	-	Coast Guard
COML	-	Communications Unit Leader
COMP	-	Compensation/Claims Unit Leader
COST	-	Cost Unit Leader
COTP	-	Captain of the Port Zone
CRZ	-	Contamination Reduction Zone
CWA	-	Clean Water Act (Federal - Public Law 100-4)
CZM	-	Coastal Zone Management
DECON	-	Decontamination
DEMOB	-	Demobilization Unit Leader
DEPRO	-	Display Processor(s)
DIVS	-	Division Supervisor
DOCL	-	Documentation Unit Leader
DOSC	-	Deputy On-Scene Coordinator
DOT	-	Department of Transportation
EDRC	-	Effective Daily Recovery Capacity
EMS	-	Emergency Medical Service
EMT	-	Emergency Medical Technician
ENVL	-	Environmental Unit Leader
EPA	-	U. S. Environmental Protection Agency
EPCRA	-	The Emergency Planning and Community Right-to-Know Act of 1986 (Title III of SARA)
ESA	-	Endangered Species Act
ESD	-	Emergency Shutdown
ETA	-	Estimated Time of Arrival
FAA	-	Federal Aviation Administration
FACL	-	Facilities Unit Leader
FAX	-	Facsimile Machine
FDUL	-	Food Unit Leader
FEMA	-	Federal Emergency Management Agency
FOBS	-	Field Observers
FOSC	-	Federal On-Scene Coordinator
FR	-	Federal Register
FRV	-	Fast Response Vessel
FSC	-	Finance Section Chief
FWPCA	-	Federal Water Pollution Control Act (as amended) (33 U.S.C. 1251 et seq.)
GIS	-	Geographic Information System
GPM	-	Gallons Per Minute
GRA	-	Geographic Response Area
GRP	-	Geographic Response Plan
GSUL	-	Ground Support Unit Leader
GT	-	Gross Tons
HASP	-	Health and Safety Plan
HAZMAT	-	Hazardous Materials
HAZWOPER	-	Hazardous Waste Operations and Emergency Response
HIPAA	-	Health Insurance Portability and Accountability Act
HSE	-	Health Safety Environmental
IAP	-	Incident Action Plan
IC	-	Incident Commander
ICC	-	Incident Communications Center
ICP	-	Incident Command Post
ICS	-	Incident Command System

IDLH	-	Immediately Dangerous to Life -or Health
IMT	-	Incident Management Team
INTO	-	Intelligence/Investigations Officer
IT	-	Information Technology
JIC	-	Joint Information Center
LA	-	Los Angeles
LB	-	Long Beach
LEL	-	Lower Explosive Limit
LEPC	-	Local Emergency Planning Committee
LFL	-	Lower Flammable Limit
LOFR	-	Liaison Officer
LOSC	-	Local On-Scene Coordinator
LSC	-	Logistics Section Chief
MBL	-	Mobile
MEDL	-	Medical Unit Leader
MOU	-	Memorandum of Understanding
MSRC	-	Marine Spill Response Corp.
MTSL	-	Marine Transportation System Recovery Unit Leader
N/A	-	Not Applicable
NCP	-	National Contingency Plan
NCWS	-	Non-Community Water System
NEPA	-	National Environmental Policy Act
NIMS	-	National Incident Management System
NIOSH	-	National Institute for Occupational Safety and Health
NM	-	Nautical Mile
NMFS	-	National Marine Fisheries Service
NOAA	-	National Oceanic and Atmospheric Administration (Department of Commerce)
NOTAM	-	Notice to Airmen
NPFC	-	National Pollution Funds Center
NPS	-	National Park Service
NRC	-	National Response Center
NRDA	-	Natural Resource Damage Assessment
NRF	-	National Response Framework
NRT	-	National Response Team
NTNCWS	-	Non -Transient Non-Community Water System
OC	-	Orange County
OCS	-	Outer Continental Shelf
OPA	-	Oil Pollution Act
OPBD	-	Operations Branch Director
OPS	-	Office of Pipeline Safety (DOT)
ORM	-	Operational Risk Management
OSC	-	On-Scene Coordinator <u>or</u> Operations Section Chief
OSHA	-	Occupational Safety and Health Administration (USDL)
OSLTF	-	Oil Spill Liability Trust Fund
OSPR	-	Office of Spill Prevention and Response (California)
OSRB	-	Oil Spill Response Barge
OSRC	-	Oil Spill Response Coordinator
OSRO	-	Oil Spill Removal Organization
OWS	-	Oily Water Separator
PFD	-	Personal Flotation Device
PHMSA	-	Pipeline and Hazardous Materials Safety Administration
PIAT	-	Public Information Assist Team
PIC	-	Person In Charge (On-Duty Supervisors)
PII	-	Personally Identifiable Information
PIO	-	Public Information Officer
POLREP	-	Pollution Report
PPE	-	Personal Protective Equipment
PPM	-	Parts Per Million
PROC	-	Procurement Unit Leader
PROP	-	Property Management Unit Leader
PSC	-	Planning Section Chief
QI	-	Qualified Individual
RBDM	-	Risk Based Decision Making
RCP	-	Regional Contingency Plan
RCRA	-	Resource Conservation and Recovery Act
RESL	-	Resource Unit Leader
ROW	-	Right-of-Way
RQ	-	Reportable Quantity
RRT	-	Regional Response Team
SARA	-	Superfund Amendments and Reauthorization Act
SCAQMD	-	South Coast Air Quality Management District
SECM	-	Security Manager
SERC	-	State Emergency Response Commission

SITL	-	Situation Unit Leader
SMT	-	Spill Management Team
SPUL	-	Supply Unit Leader
SOFR	-	Safety Officer
SONS	-	Spill of National Significance
SOP	-	Standard Operating Procedure
SOSC	-	State On Scene Coordinator
SROC	-	Spill Response Operations Center
SROT	-	Spill Response Operating Team
SSC	-	Scientific Support Coordinator (NOAA)
STAM	-	Staging/Group Area Manager
STEL	-	Short Term Exposure Limits
SUBD	-	Support Branch Director
SUPSALV	-	United States Navy Supervisor of Salvage
SWD	-	Salt Water Disposal
SVBD	-	Service Branch Director
TIME	-	Time Unit Leader
TFR	-	Temporary Flight Restrictions
THSP	-	Technical Specialists
TLV	-	Threshold Limit Value
TSCA	-	Toxic Substances Control Act
TSDF	-	Treatment, Storage or Disposal Facility
UC	-	Unified Command
UCS	-	Unified Command System
USACOE	-	U.S. Army Corps of Engineers
USCG	-	U.S. Coast Guard
USDA	-	U.S. Department of Agriculture
USDL	-	U.S. Department of Labor
USDOD	-	U.S. Department of Defense
USDOE	-	U.S. Department of Energy
USFWS	-	U. S. Fish and Wildlife Services
USGS	-	U. S. Geological Survey
VSUL	-	Vessel Support Unit Leader
WCD	-	Worst Case Discharge

APPENDIX N

RISK AND HAZARD ANALYSIS/VULNERABILITY ANALYSIS

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N.1 INTRODUCTION

This Appendix addresses the California Office of Spill Prevention and Response (OSPR) and Pipeline and Hazardous Materials Safety Administration (PHMSA) requirements for a risk and hazard analysis/vulnerability analysis. The requirements of each agency are addressed separately below with referencing used to minimize repetition where possible.

N.2 CALIFORNIA OFFICE OF SPILL PREVENTION AND RESPONSE (OSPR)

The following components of the Beta Unit Complex fall under the OSPR regulations and are addressed in this section.

The 16” San Pedro Bay Pipeline from Platform Elly to the onshore Beta Pump Station that falls within State jurisdiction.

Breakout/storage tank at the onshore Beta Pump Station.

Pumps, meters, internal piping, etc. at the onshore Beta Pump Station.

The 10” delivery lines from the onshore Beta Pump Station to the THUMS manifold.

N.2.1 History of Significant Spills

FIGURE N.1

BETA UNIT COMPLEX SPILL HISTORY

DATE	LEASE	BO	BW	DESCRIPTION/CAUSE	NRC No.
01/04/1991	ELLY	<1 CUP		DRIP PAN OVERFILLED ON EAST CRANE INTO OCEAN	
09/12/1991	ELLY	<1 CUP	0.1	AN OIL/WATER MIXTURE FR. WET/DRY OIL TANK SPILT OVERBOARD	
09/15/1991	ELLY	1 TBSP.	0.1	VALVE ON PRESSURE MED SYSTEM HAD SLOW LEAK-MECH. FAILURE	
09/16/1991	ELLY	0.67	0	PILOT GAS LINE LADEN W/OIL, SPILL TO OCEAN - HUMAN ERROR	
09/24/1991	ELLEN	0.03	0	SAMPLE VALVE LEFT OPEN - HUMAN ERROR	
10/29/1991	ELLEN	0.214	0	FAILED CHECK VALVE - MECH. FAILURE	
03/28/1992	ELLEN	0.01	0	HIGH PRESSURE MUD LINE PULLED APART-MECH. FAILURE	
04/23/1992	EUREKA	<1 CUP	0	SOURCE UNCONFIRMED-POSSIBLY FR. SOLIDS LOOSEN AT EMERG. PUMP	
12/23/1992	EUREKA	0.03	1.5	HOLE IN DRAIN SYSTEM PIPING-INT. CORR.	
02/01/1993	EUREKA	1 TSP.	0	OIL SUMP PUMP STRAINER LEAKED-MECH. FAILURE	
01/29/1994	EUREKA	<1 CUP	0	BELIEVED DRILL CUTTINGS LOOSEN FR EMERG. SUMP BY EARTHQUAKE	
02/17/1994	ELLEN	3 TBSP	0	FAILURE OF PRESSURE GAUGE, OIL SPILLED, WIND SWEPT IT AWAY	
02/23/1994	EUREKA	2 CUPS	0	RESIDUE OIL LEFT ON EMERG. PUMP LEAKED	
11/22/1994	EUREKA	0.03	0	LEAKY SEAL ON PUMP - MECH FAILURE	
03/10/1995	ELLY	2 TBSP	0	CRANE DRAIN PAN CONNECTION LOOSEN, DRIPPING OIL-MECH FAIL.	
09/25/1995	ELLEN	2 CUPS	0	INCORRECT PRESSURE ON TUBING CAUSED VALVE TO BLOW OFF-HUM ERROR	
10/05/1995	EUREKA	1 CUP	0	SHEEN OCCURRED ON SUMP DUE TO TIMER FAILURE-MECH FAILURE	
11/04/1995	ELLEN	<1 CUP	0	OIL COMING FR. DRILLING MUD CUTTINGS	
11/14/1995	EUREKA	1 TSP	0	LEAK IN DIESEL TRANSFER HOSE-EQUIP. MALFUNCTION	
11/22/1995	EUREKA	1 TBSP	0	CONTAINMENT NOT PROPERLY INSTALLED-HUMAN ERROR	
11/29/1995	ELLEN	2 CUPS	0	POSSIBLE SKIM PILE	
11/30/1995	EUREKA	<1 CUP	0	FITTING BROKE REPLACING TRANSFER HOSE	
04/26/1996	EUREKA	7 TBSP.	0	LEVEL TO LOW IN DRAIN LINE, INT. CORR.	338565
04/28/1996	ELLY	1 TSP.	0	4" LINE, PRESSURE ELIMINATED BY SHUTDOWN OF TURBINE	338863
05/04/1996	EUREKA	1 PT.	0	6" DRAIN LINE, TEMP CONTAINMENT FAILED DURING LINE REPLACEMENT	339748
07/17/1996	Not known	.25 Bbl		DIESEL RINSE WATER	
10/09/1996	ELLY	<1 GAL.	0	OVER PRESSURE/TEMP OF HEAT MEDIA SYSTEM - HUMAN ERROR	363816

N.2.1 History of Significant Spills (Cont'd)

FIGURE N.1

BETA UNIT COMPLEX SPILL HISTORY (Cont'd)

DATE	LEASE	BO	BW	DESCRIPTION/CAUSE	NRC No.
12/05/1996	EUREKA	< 1 CUP	0	STRIPPING RUBBERS ON SANDLINE, WIND CAUSE OIL OUT OF CONTAIN. AREA	369544
03/23/1997	EUREKA	3 TBSP.	0	OIL DRIPPED OFF OILY EQUIP WHEN TRANSPORTING TO WORK BOAT	381257
04/11/1997	ELLY	2 TBSP.	0	BAD SEAL ON DECK DRAIN ALLOWED SPILL, EQUIP. MALFUNCTION	383365
05/21/1997	ELLY	0	0.8	HEAT/PRES IN HEAT EXCHG. SYSTEM, DISCHRG TO PRESS RELIEF VALVE	None
08/24/1997	ELLY	1 QRT.	0.1	SYSTEM OVERHEATED/OVERPRESSURED & RELIEVED-HUM. ERROR	400764
10/04/1997	EUREKA	0.12	0	DISCHARGE FR. EMERGENCY SUMP- DUE TO SEA GROWTH	406237
11/10/1997	ELLEN	1 TBSP	0	LEAK IN SEAWATER EXCHANGER - MECHANICAL FAILURE	410862
12/12/1997	ELLY	2 OZ.	0	FUEL TRANSFER FROM PUMP DISHARGED-EQUIP MALFUNCTION	415660
12/24/1997	PIER D	5 OZ.	0	FUEL DIESEL RAN OUT OF DUMPSTER	417140
04/13/1998	EUREKA	<1	0	OILY RESIDUE IN OVERBOARD LINE FR. PRIOR OPERATION	432329
05/15/1998	PUMP STATION	10	0	PICO & OCEAN, 2" LINE BLEW OUT (did not reach water)	
06/25/1998	EUREKA	8 OZ.	N/A	8 OZ. DIESEL FROM RIG EXHAUST INTO OCEAN	443249
02/16/1999	ELLY	20 DROPS	0	DIESEL/MOTOR OIL FR. ENGINE EXHAUST	474118
03/16/1999	EUREKA	8 OZ.	0	RIG ENGINE LEAKED MOTOR OIL INTO SEAWATER-EQUIPMENT MALFUNCTION	477112
03/20/1999	EUREKA	1/2 CUP	0.5	PIN HOLE LEAK IN DISCHARGE PIPING	477551
04/26/1999	EUREKA	30 DROPS	0	DIESEL SPLASHED INTO OCEAN WHILE PULLING DIESEL FILTERS FROM THEIR HOUSING.	481789
06/05/1999	EUREKA	1 BBL	0.5	HOLES IN EUREKA GROSS PRODUCTION LINE	486321
06/13/1999	ELLY	3-4 DROPS	0	CONDENSATION FROM CRUDE-CONTAMINATED HEAT MEDIUM VAPOR.	
09/24/1999	ELLEN	<1 CUP	0	OVER PRESSURED PIPELINE & PUMP WHICH ALLOWED SEAL TO LIFT IN THE SEA	500056
10/27/1999	EUREKA	7.14 GAL	0	PUMPING PRESSURE DURING PIGGIND CAUSED OIL TO LEAK THROUGH HOLES IN 12" PIPELINE	503881
09/15/2000	ELLEN	½ PT.	0	PRESSURE GAUGE O-RING BLEW OUT SPRAYING FLUID OUT	542289
11/06/2000	ELLY	2 GAL.	0	ENGINE LUBE OIL LINE FAILURES	547396
03/02/2001	ELLEN	1 PT.	0	4" HOSE BLEW OUT OF SWACO UNIT	558394
03/12/2001	ELLEN	6 OZ.	0	DIESEL TRANSFER HOSE LEAK	559292
03/16/2001	ELLEN	¼ CUP	0	DIESEL LEAKED WHILE REMOVING TRANSFER HOSE	559850
03/21/2001	ELLEN	4 OZ.	0	TUGGER TIPPED OVER ON +15 SPILLING GEAR OIL	560263
09/03/2001	ELLEN	12 OZ.	0	DIESEL TANK DRAIN PAN OVERFLOWED WHILE TAKING ON DIESEL FUEL	578688
06/29/2002	ELLEN	1 GAL.	?	LEAK 2" B TEST LINE SPRAYED PRODUCED FLUID	614865
10/14/2002	ELLEN	2 DRPS	0	RIG ENGINE #2 EXHAUST LEAK (LUBE OIL?)	626215
12/21/2002	ELLY	3 TBS	2 TBS	INSECURED NEEDLE VALVE DIESEL FUEL LEAK	632480
06/04/2003	ELLY	<1 GAL.	0	CONDENSATE DRIPPINGS FROM VENT LINE	646875

N.2.1 History of Significant Spills (Cont'd)

FIGURE N.1

BETA UNIT COMPLEX SPILL HISTORY (Cont'd)

DATE	LEASE	BO	BW	DESCRIPTION/CAUSE	NRC No.
10/08/2003	EUREKA	1 TSP	0	CRANE LOAD CELL LINE WAS CUT RELEASING HYDRAULIC FLUID	701933
10/13/2003	EUREKA	½ TSP	½ TSP	HEATED LUBE GREASE ON CRANE LIVE MAST BRIDLE SHEAVES DRIPS INTO WATER	702349
12/07/2003	ELLEN	<1 GAL.	<1 GAL.	OILY WATER ESCAPES CLAMP/PACKING AND RUNS DOWN CONDUCTOR WHILE CLEANING	707354
12/09/2003	ELLY	<1 TBSP	0	LEAK IN 3" DIESEL SUPPLY LINE ON THE +45 DECK	707616
08/01/2004	ELLY-EL	5 DROPS	0	RELEASED 4-5 DROPS LUBE OIL FROM E.CRANE PAN	
09/12/2005	ELLEN	1 CUP	0	BLEW HOLE IN DRAIN LINE WHILE SANDBLASTING CAUSING DIESEL LEAK	772210
10/22/2005	ELLEN	<1 CUP	0	PIN HOLE LEAK IN DRAIN LINE	777148
10/25/2005	EUREKA	<1 GAL.	<1 GAL.	PAINT OVERSPRAY FROM MIANTENANCE OPERATION AT THE +15 DECK	777440
06/01/2006	ELLEN	1 CUP		SEAL ON ELLEN CRANE FAILED, RELEASE OIL TO FLOOR, WIND CARRIED ABOUT 1 CUP TO OCEAN	
08/24/2006	ELLY-EL	1 PT.		OIL RELEASED FROM PIN HOLE IN DRAIN LINE	
10/05/2006	ELLY-EL	10 GAL	3 GAL	PAINT OVERSPRAY FROM MAINTENANCE OPS, +15 DECK	
06/11/2007	ELLY	SHEEN >20' DIA.	0	DIESEL DRIPS FROM EMERGENCY GENERATOR DRAIN PAN ORIGINATING FROM A FLANGE	
07/20/2007	ELLEN	<5 GAL.	0	TEMPORARY DRAIN PLUG FAILED ON ELLEN DRAIN SYSTEM	842814
02/25/2008	EUREKA	1 QT.	0	SUMP DRAIN VALVE KICKED OPEN, LEAK IN CONTAINMENT VESSEL	863316
05/12/2008	ELLY	.05 GAL.	0	HYDRAULIC LINE ON UNDERSIDE OF WEST CRANE BROKE	870672
12/03/2008	EUREKA	<2 GAL	0.2	OILY WATER DISCHARGE FROM WHITAKER DURING LOADING	891569
12/11/2008	ELLEN	SHEEN	NA	CONDUCTED SYSTEM CHECK AND FOUND NO LEAKS	892255
06/01/2009	EUREKA	0.4 OZ.	2 QT.	HYDRAULIC LEAK ON EUREKA DRILLING RIG CAUSED DISCHARGE INTO OCEAN	907459
10/20/2010	EUREKA	SHEEN 10' x 15' 0.001 gal		THREADED CAP CAME OFF SHIPPING PUMP STUFFING BOX RELEASING A SPRAY OF OIL AND WATER EMULSION	957189
04/18/2011	Beta Station	Est. 30 bbl		RELEASE OF OIL FROM SHIPPING PUMP #3 DURING PUMP REPAIR JOB	CAL-EMA #11-2433
09/28/2011	EUREKA	2 DRPS	0	CLEANING EDGE OF PLATFORM	991125
11/28/2011	EUREKA	SHEEN 40'	0	BLACK PLASTIC BAGS WITH OILY RAGS & FILTERS SPOTTED FLOATING IN THE PACIFIC	996653
05/03/12	ELLY	DROPS	0	OIL DROPLETS RISING UP FROM SUBSURFACE 14" OVER-FLOW LINE TO EMERGENCY SUMP. PINHOLE LEAK FOUND	1010337
05/10/12	ELLY	0	0	LINE ABOVE WAS CLEANED. ADDITIONAL HOLES ID'D	1011137
06/10/12	ELLY	<1 GAL	NA	RELEASE OF OIL THROUGH FLARE BOOM AT ELLY	1014119
11/19/12	ELLY	5 drops	NA	OIL DRIPPED FROM THE OUTSIDE OF A SMALL METAL BUCKET ONTO GRATING AND FROM GRATING TO OCEAN	1031077
3/23/13	ELLEN	1 TSP	0	DIESEL ON +45 DECK SEEPED THROUGH A CRACK AT A DECK PENETRATION STRUCTURE, DRIPPING TO OCEAN	1041918
5/21/13	ELLY	1 GAL	0	HIGH-LEVEL SAFETY DEVICE IN FWKO-V01A FAILED SENDING OIL TO THE FLARE. MSRC RESPONSE USED	1047881

N.2.1 History of Significant Spills (Cont'd)

FIGURE N.1

BETA UNIT COMPLEX SPILL HISTORY (Cont'd)

DATE	LEASE	BO	BW	DESCRIPTION/CAUSE	NRC No.
5/23/13	ELLY	½ CUP	0	RESIDUAL OIL IN FLARE PILOT GAS LINE ESCAPED TO OCEAN	1048241
6/06/13	ELLEN	2 TBSP	0	MINOR RELEASE FROM ELLEN WELLBAY DRAIN HOSE	1049535
11/12/13	ELLY	15-20 drp		4" SUMP LINE MISSING GASKET FOLLOWING MAINTENANCE ALLOWED DROPS OF OIL TO BE RELEASED TO OCEAN. REPAIRED. NO RESPONSE NEEDED.	1065578
		5 GAL			
01/28/14	ELLEN			RESIDUAL OIL FROM 6" SUMP LINE UNDERGOING DEMOLITION LEAKED OUT OVERNIGHT WHEN TEMPORARY PLUG WAS PULLED OUT BY HIGH TIDE AND ROUGH WATER. MSRC RESPONSE USED.	1072312
		1 TSP.			
02/03/16	EUREKA			OIL DRIPPED FROM A PINHOLE IN DRAIN PAN INTO OCEAN	1139670
08/09/16	ELLY	Trace		OVERBOARD DISCHARGE 197 BBLS PRODUCED WATER WHEN SATURN TURBINES WOULDN'T STARTUP WHEN SWITCHING FUEL SAMPLE RESULTS ABOVE NPDES PERMIT LIMIT	1156753
11/20/17	ELLY	6-8 oz.		OILY WATER LEAKED FROM DECK DRAIN SYSTEM AFTER DELUGE WATER SYSTEM REPAIR	1197804
4/30/2019	ELLEN	2 OZ.	0	YELLOW PAINT WITH THINNER SPILLED DURING CLEANUP	1244240

N.2.2 Risk and Hazard Analysis

The risk and hazard analysis for the Beta (San Pedro Bay Pipeline Company) Pipeline System was conducted on January 21, 1994, using the "checklist" methodology. The system consists of the 16-inch diameter pipeline from Platform Elly to the Beta Pump Station, the Beta Pump Station including the storage tank, pumps, meters, internal piping, etc., and the three 10-inch delivery lines beginning at the pump station and ending at the THUMS manifold located approximately 1,000 feet from the Beta Pump Station. The system was divided into four subsystems, or nodes, for analysis purposes. The analysis examined each node to determine how much oil could be released and, if released, could it reach the Pacific Ocean.

N.2.2.1 Methodology

The "checklist" analysis technique as described in the American Institute of Chemical Engineers' *Guidelines for Hazard Evaluation Procedures* was utilized to conduct the risk and hazard analysis. A unique Hazard Analysis Checklist was developed and used for each node. A summary of the questions included in the checklists is provided in Figure N.2. The checklist form provided for three responses to each question: yes, no, or not applicable. In addition, the forms included areas to record information such as production flow rate, vessel capacity, and component throughput. The four components listed earlier were analyzed separately and are referred to as nodes.

The risk and hazard analysis was conducted at Anaheim, California on January 21, 1994. **Mr. Greg Meisinger** of CalResources (later became Aera Energy LLC) served as the team leader during the analysis exercise. Mr. Meisinger, at the time of the analysis, had over 12 years of experience in facilities engineering and health, safety, and environmental issues, and had participated in previous hazard and operability studies (HAZOPs).

N.2.2.1 Methodology (Cont'd)

Other participants in the January 21 analysis, together with their pertinent experience, are listed below.

- **Mr. John Fanta** was a Staff Facilities Engineer for CalResources. He is a registered Professional Mechanical Engineer in the State of California with over 19 years of experience in the oil and gas industry.
- **Mr. Larry Alexander** was the West Coast Area Technical Supervisor for Shell Pipe Line Corporation. He is a Professional Engineer and has 14 years of pipeline experience.
- **Mr. John McCain** had over 25 years of experience with Shell in operations and maintenance of warehouses and pipelines. Experience included the Los Angeles Terminal and Anaheim Control Center.
- **Mr. Don Herman** was an Operations Foreman for the West Coast Division of Shell Pipe Line Corporation. He had over 13 years of experience with pipeline construction, corrosion control, measurement, and regulations.
- **Mr. Tim Chambers** of Reese-Chambers Systems Consultants, Inc. had over 14 years of experience conducting risk and hazard analyses and had served as team leader for the conduct of nine previous HAZOPs. Mr. Chambers' role was to assist the team leader and to document the results for inclusion in the spill plans.

In conducting the risk and hazard analysis, each node was analyzed using the Hazard Analysis Checklist. Each question was discussed and the answer verified. Whenever the answer to one of the questions indicated that a release could foreseeably reach the ocean, an Oil Spill Prevention and Response Hazard Analysis Worksheet was filled out. A copy of this worksheet is included as Figure N.3.

The probability of the incident resulting in an uncontained oil spill and the amount of oil that could be released was then estimated. The appropriate box in Chart 1 of the worksheet was then checked. The probability of an uncontained oil spill was estimated to be either Probable, Potential, or Unlikely. The estimated size of the spill was put in one of three sizes: less than 1 bbl, between 1 bbl and 250 bbls, and greater than 250 bbls. A potential release falling outside the shaded area in Chart 1 was not considered to require mitigation. A potential release falling in the shaded area was considered a potential candidate for further mitigation. A final determination of the necessity for further mitigation was made based on the results obtained by completing Chart 2.

Chart 2 of the worksheet was filled out for each incident. Chart 2 was used to estimate the probability that the spill could actually reach the ocean. This risk was broken down into the following four categories: Probable, Potential, Unlikely, and Very Unlikely. A potential release falling in the shaded area of this chart was considered a candidate for further mitigation.

FIGURE N.2

SUMMARY OF QUESTIONS IN HAZARD ANALYSIS CHECKLISTS

A. GENERAL

1. Does the component overhang or come into contact with tidal waters?

B. DESIGN

1. Do the wells free flow?
2. Is the wellhead rating appropriate?
3. Are there sufficient valves to isolate the component?
4. Is the component fabricated out of appropriate material?
5. Does the component have adequate local containment?
6. Does the component have adequate regional containment?
7. Does the component have a high pressure shutdown?
8. Does the component have a high level shutdown?
9. Does the component have a high level alarm?
10. Does the component have a high pressure alarm?
11. Does the component have a proper pressure relief valve?
12. Where does the pressure relief valve go?
13. Is the relief valve processing equipment properly designed?
14. Is the component constructed of proper material?
15. Does the component/containment have a drain?
16. Where does the drain go?
17. Is the drain processing equipment adequately designed?
18. Does the component have leak detection?

C. ACTS OF GOD

1. Does the weather pose a hazard?
2. Is the component appropriate designed for earthquakes?

D. HUMAN ERROR

1. What happens if a valve is inadvertently opened?
2. What happens if a valve is inadvertently closed?
3. Is the component adequately protected from mechanical damage?
4. Does maintenance/servicing represent a risk of spill?
5. Are personnel adequately trained in the operation/maintenance of the component?
6. Is there adequate surveillance of the component?

E. MECHANICAL FAILURE

1. What happens if the component fails/rupture?
2. Does the component instrumentation failsafe on power failure?
3. Does the component instrumentation failsafe on instrument air failure?

F. CORROSION

1. Is the component adequately protected from corrosion?

G. OTHER

1. Is the component adequately protected from fire?
2. Is the component adequately protected from vandalism?
3. Are there any other hazards?

FIGURE N.3

HAZARD ANALYSIS WORKSHEET

DATE:

HAZARD ANALYSIS SHEET ID:

FIELD LOCATION:

FACILITY ID:

EQUIPMENT ID:

RISK ID:

RISK DESCRIPTION:

CHART 1

PROBABILITY OF UNCONTAINED OIL

PROBABLE

POTENTIAL

UNLIKELY

<1 1+ >250
Barrels

CHART 2

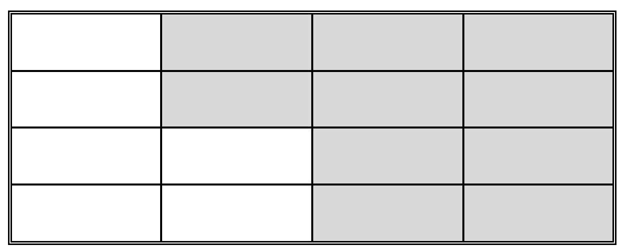
PROBABILITY OF OIL REACHING TIDAL WATERS

PROBABLE

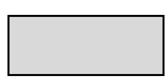
POTENTIAL

UNLIKELY

VERY UNLIKELY



<1 >1 but <10 >10 but <250 > 250
Barrels

 Reasonable Risk to be addressed in risk & hazard analysis

RATIONALE FOR RISK CLASSIFICATION:

RECOMMENDATIONS TO REDUCE RISK:

REACTION TIME:

SPILL VOLUME:

REVIEWERS:

N.2.2.2 Inventory of Hazards Identified

Potential hazards were identified during the conduct of the risk and hazard analysis that were classified as having a Probable, Potential, or Unlikely probability of one or more barrels of oil reaching tidal waters. Each of these is discussed below.

- **Returning storage tank to service** – The inlet and outlet valves on the storage tank are chained and locked open to prevent accidental closure during routine operations. However, it is possible, though very unlikely, that one or both of the valves could be inadvertently left closed upon restarting the system after returning the tank to service after it has been shut down for maintenance. In this case, the Platform Elly shipping pumps would briefly pump against a closed system before shutting down on high pressure at 1,300 psig. This could result in pressures in excess of the 280 psig rating of the ANSI #150 valves and flanges, thereby causing a leak. The tank is located in a secondary containment system that can contain 140 percent of the tank volume.

- **Power failure** – The level in the tank is monitored 24 hours a day by the Elly Control Room Operator. The tank instrumentation fails "as is" on power failure and thus an overfilling of the tank could go undetected during a power failure. Again, the tank is located in a reinforced concrete containing wall.

- **Leak or rupture in the offshore pipeline** – The amount of any release from the offshore pipeline in the event of a leak or rupture is a function of the amount of time required to close the platform shutdown valves.

N.2.2.3 Mitigation Plan

Although no significant hazards were identified that could result in oil reaching marine waters, the following measures were recommended to mitigate the Very Unlikely events described above. All of these mitigation measures were implemented by the listed completion date.

- **Returning storage tank to service** – A procedure should be developed to ensure that the tank inlet and outlet valves are chained and locked open prior to re-start of the system to ensure that the line is not over-pressured.

  Mitigation completion date: 9/1/94

- **Power failure** –Operating procedures should be reviewed to ensure that the system is not operated during power failure for any period of time longer than that which would result in an overfilling of the tank, assuming the tank was operating at the high level shutdown level in the tank.

  Mitigation completion date: 9/1/94

N.2.2.3 Mitigation Plan (Cont'd)

- **Leak or rupture in the offshore pipeline** – A training program for the operators should be conducted to emphasize that, in the event a leak is detected, it is essential to close the platform and onshore shut-in valves as quickly as possible after shutting down shipping pumps to minimize the volume of oil released from the line.

  Mitigation completion date: 9/1/94

N.2.3 Remaining Risk

For oil to reach marine waters, two things must happen: (1) oil is released, and (2) it flows to marine waters. The risk and hazard analysis addressed each system component that could potentially release oil, identified what type events (e.g., material failure, operational error) could lead to a release, and estimated how much oil could be released. The analysis then addressed where the released oil would flow, whether it would be contained by local and/or regional containment, and how much, if any, could reach marine waters. Based on this analysis, mitigation measures were recommended as appropriate. These measures either addressed reducing the potential for a spill (e.g., equipment additions, operational procedures) or preventing the spill from reaching marine waters. While it is believed that the risk of oil reaching marine waters has been mitigated to the maximum extent feasible, it is impossible to entirely eliminate this possibility. Thus, reasonably foreseeable worst case spill volumes for each facility component were calculated and recorded on the Hazard Analysis Sheets. The largest reasonably foreseeable worst case spill that could potentially reach marine waters has been used to define the remaining risk and to drive the spill response planning effort. The assumptions presented below were used in determining the reasonable worst case spills for each of the facility components. It is emphasized here that the probability of spills of this magnitude occurring and reaching marine waters is extremely remote.

Pipelines

The total amount of oil that can be released from the offshore and onshore pipelines was calculated as the sum of the following three factors:

The volume of oil released prior to detection of a leak.

The volume of oil released during the response time required to shut-in the line.

The volume of oil that drains from the line after shut-in.

The volume of oil released prior to detection of a leak was calculated considering the sensitivity of the pipeline monitoring system in detecting volume, flow, and pressure deviations. The volume of oil that can be released during the response time required to shut-in the line was calculated by multiplying the maximum flow rate expected by the length of the response time. The volume of oil that can drain from the offshore pipeline after shut-in was calculated considering hydraulic forces of the seawater column above the rupture point. The volume of oil that can drain from the onshore pipeline was assumed to be the volume of the pipeline since there are no mitigating hydraulic forces.

N.2.3 Remaining Risk (Cont'd)

Tanks

The RWCS from a tank was based on the catastrophic failure of the tank. The RWCS volume of the tank was assumed to be the maximum oil volume contained in the tank during normal operation. In addition, the oil throughput of the tank was multiplied by the number of hours between surveillance tours. This volume of oil was then added to the oil contained in the tank to determine the reasonable worst case spill. If more than one tank performed the same function and the multiple tanks were normally operated in parallel, the combined volumes of the tanks were used to calculate the RWCS.

If a tank did not have a containment berm with a volume equal to 110 percent of the tank volume, the volume of the reasonable worst case spill was considered to be the oil volume of the tank and the tank throughput as discussed above. In most cases, if the tank had a containment berm with a volume greater than or equal to 110 percent of the tank volume, the berm was considered to contain 75 percent of the tank volume. This deration of the containment volume is a conservative estimate to account for fluid splashing over the side of the berm and any potential deterioration in the berm. If the tank was located in a reinforced concrete containment system capable of containing the tank volume plus the tank throughput multiplied by the number of hours between surveillance tours, then it was assumed that the worst case spill could be contained and no oil could reach tidal waters. However, if the release could overflow the containment area before being detected by surveillance, then the RWCS is assume to be the amount of oil that could overflow the containment prior to isolating the tank.

N.2.4 Worst Case Spill Calculations

The worst case spill calculations for the system pipelines and tank are presented below.

Pipelines

In accordance with the methodology described in Section N.2.3, the RWCS from the 16" San Pedro Bay Pipeline has been calculated to be 3,134 bbls of oil. The details of the calculations are presented in Appendix H-5.

The Reasonable Worst Case Spill (RWCS) calculations for the piping at the pump station, and the delivery lines are presented below.

- **Pump Station Piping** – The RWCS calculations assume that a leak is detected in two minutes, and the throughput is 7,000 BOPD. This equates to a spill of 10 bbls, which would most likely be contained by onsite curbing.

  (7,000 BOPD/24 hours/60 minutes) * 2 minutes = 10 bbls

- **Delivery lines** – There are three lines, all approximately 1,000 feet long and 10 inches in diameter. Based on current production, the maximum throughput of each of the lines is 2,800 BOPD at a pumping rate of 810 barrels per hour (BPH); a rupture would be detected by the leak detection system within 5 minutes and the pumps will be shut-in. Thus, the RWCS would be:

  800 BPH/60 min/hr x 5 min + 1,000 feet x 0.09 bbl/ft = 156.6 bbls

N.2.4 Worst Case Spill Calculations (Cont'd)

Tanks

The RWCS from the storage tank was determined to be 0 bbls of oil (see discussion below). This was calculated in accordance with the methodology described in Section N.2.3 as follows:

- The maximum throughput to the tank is 7,000 BOPD.
- The volume of the tank is 10,000 Barrels.
- The capacity of the containment area is 14,000 Barrels. It is a reinforced concrete containment system capable of containing the tank volume plus an additional 13 hours of throughput.
- The tank is equipped the following safety controls that are monitored 24 hours a day by the control room.

Level monitors - these show the Platform Elly control room operators the level of oil in the tank. This is monitored to see when to start and stop shipping through one of the 10-inch sales line. In the event of a tank failure the level of oil inside the tank will decrease. This unexplained decrease in oil level will cause the automatic control system to shut the pump in at the Platform and personnel will be activated to investigate the situation.

Tank High Level Switches – If the level gets too high, the 16" pipeline from Platform Elly will be shut in automatically, and personnel will be mobilized to investigate the situation.

Taking into account the above items and the mitigation plans referenced in N.2.2.3, the RWCS would be 0 bbls that could reach marine waters from the tank.

Refer to Appendix H for PHMSA breakout tank Worst Case Discharge calculations for this tank.

Therefore, as addressed earlier in N.2.3 the largest foreseeable RWCS that could potentially reach marine waters for OSPR calculations is 3,134 bbls of oil from the 16" San Pedro Bay Pipeline from Platform Elly to the Beta Pump Station. Refer to Appendix H for calculations.

<u>Note</u>: In 2016, Beta Offshore retained Risk Management Professionals, Inc. to identify the risks posed in the Port of Long Beach, Gerald Desmond Bridge Replacement Project, and the proximity of the new ramps to Beta Pump Station Facility. The Gerald Desmond Bridge Replacement Project will widen and relocate the southern ramp, and add a second elevated ramp to the facility's northern boundary, greatly increasing the exposure of the facility's process equipment and piping to impacts from falling debris from the ramps. Therefore, a high level risk assessment was commissioned to determine the acceptability of the risks posed by the changes and additions to the ramp configuration. The results were presented to the Port of Long Beach after the assessment was completed.

N.2.5 Documentation

The documentation and materials (drawings, diagrams, plot plans, etc.) used in the risk and hazard analysis are maintained in the Company office in Long Beach, California. The point of contact and address are:

Diana Lang
HSE Manager
Beta Offshore
111 W. Ocean Blvd, Suite 1240
Long Beach, CA 90802
(562) 628-1526

N.3 PHMSA

The 16-inch pipeline between Platform Elly and the Beta Pump Station is a DOT PHMSA-regulated pipeline with the response plan requirements presented in 49 CFR 194. Refer to Appendix H-3 for Worst Case Discharge calculations.