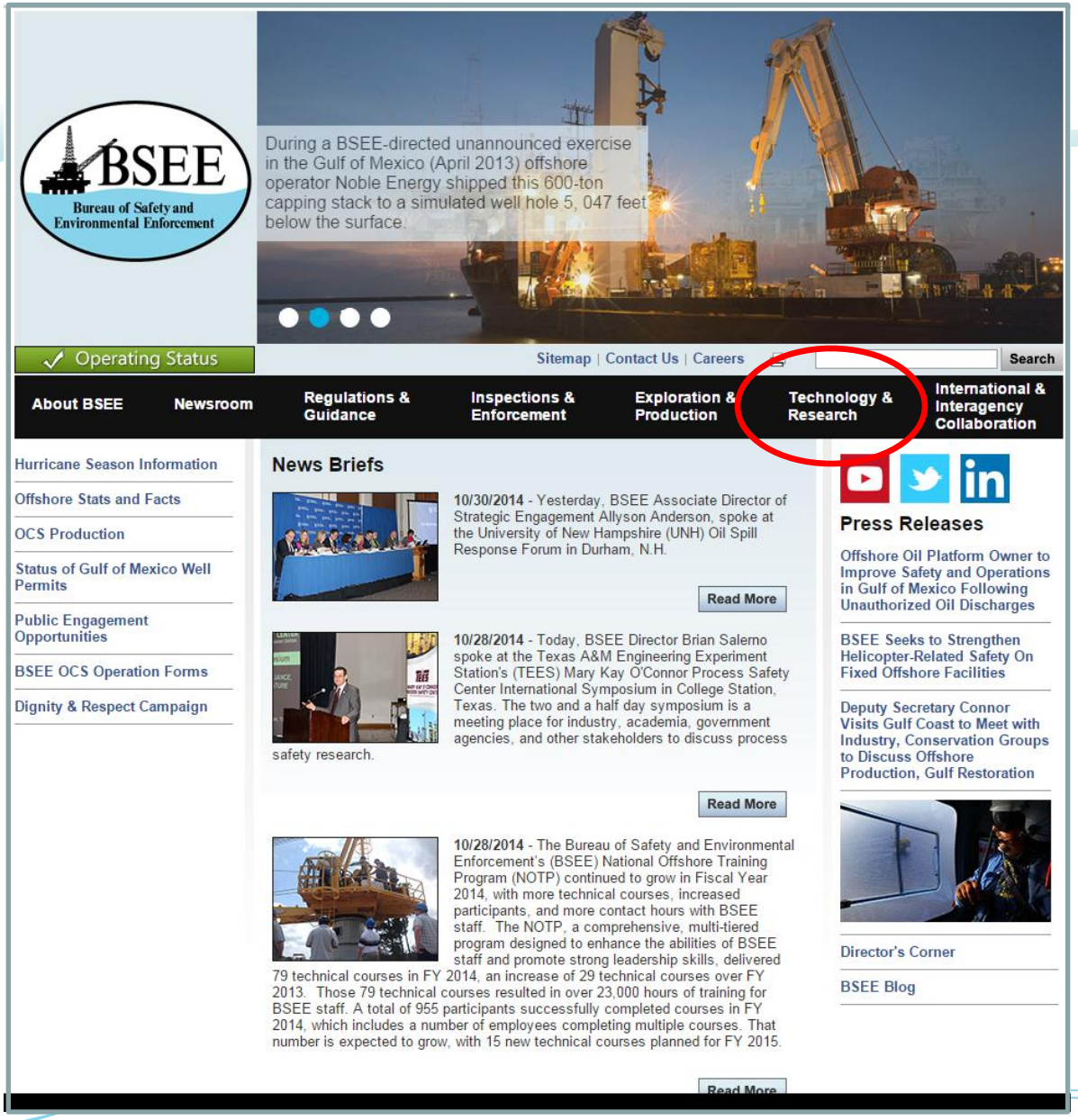
BSEE Agency Update – Oil Spill Response Research

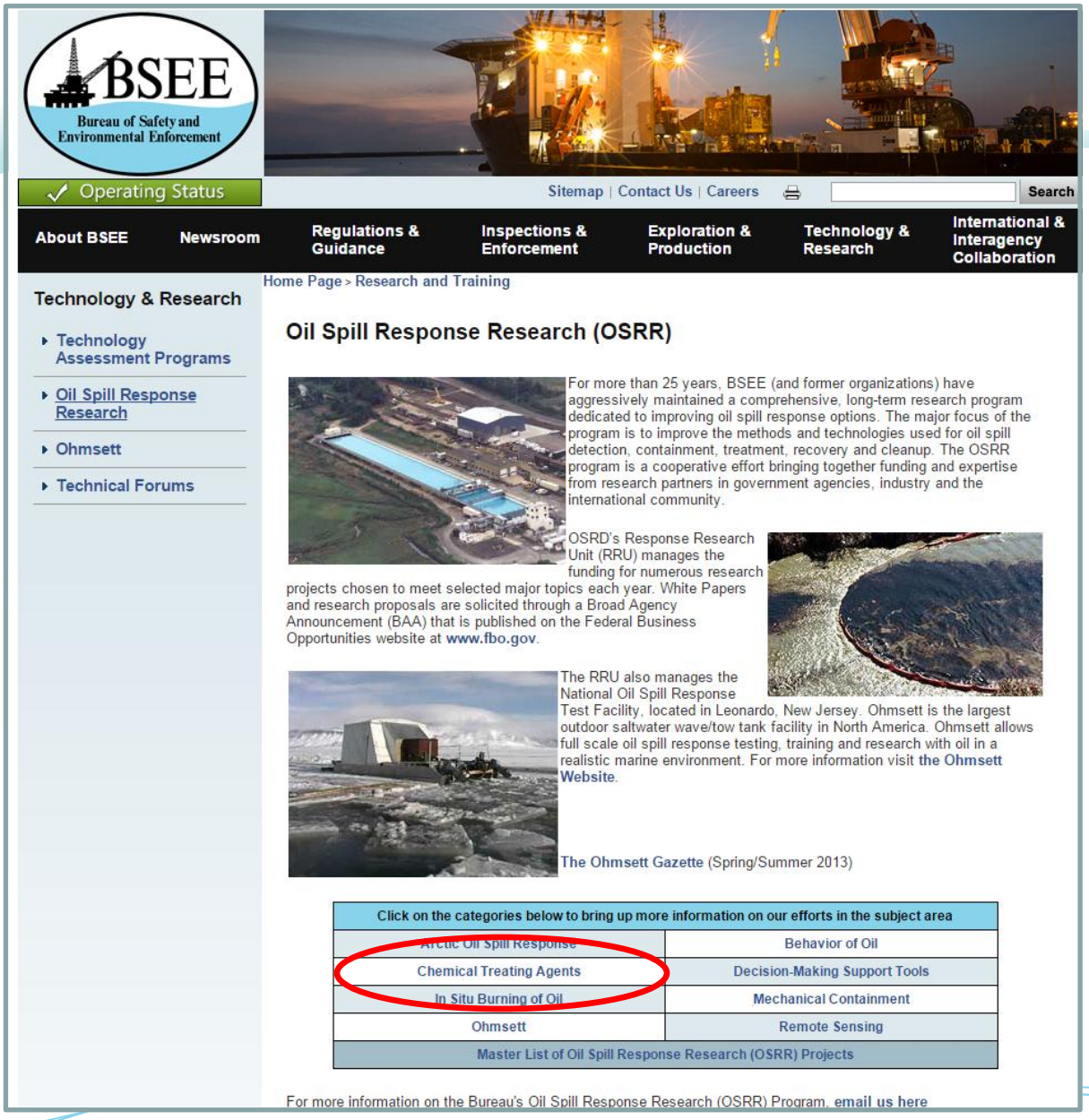
Chevron Technology Workshop
February 2015

- Since 1985, BSEE has maintained a research program dedicated to improving oil spill response options.
- 160+ Projects have been completed with 40+ currently active projects.
- The major focus of the program is to improve the methods and technologies used for oil spill detection, containment, treatment, recovery and cleanup.
- The OSRR program is a cooperative effort bringing together funding and expertise from research partners in government agencies, industry and the international community.
- The Response Research Branch also manages the National Oil Spill Response Test Facility, located in Leonardo, New Jersey.



BSEE
Bureau of Safety and Environmental Enforcement

- Website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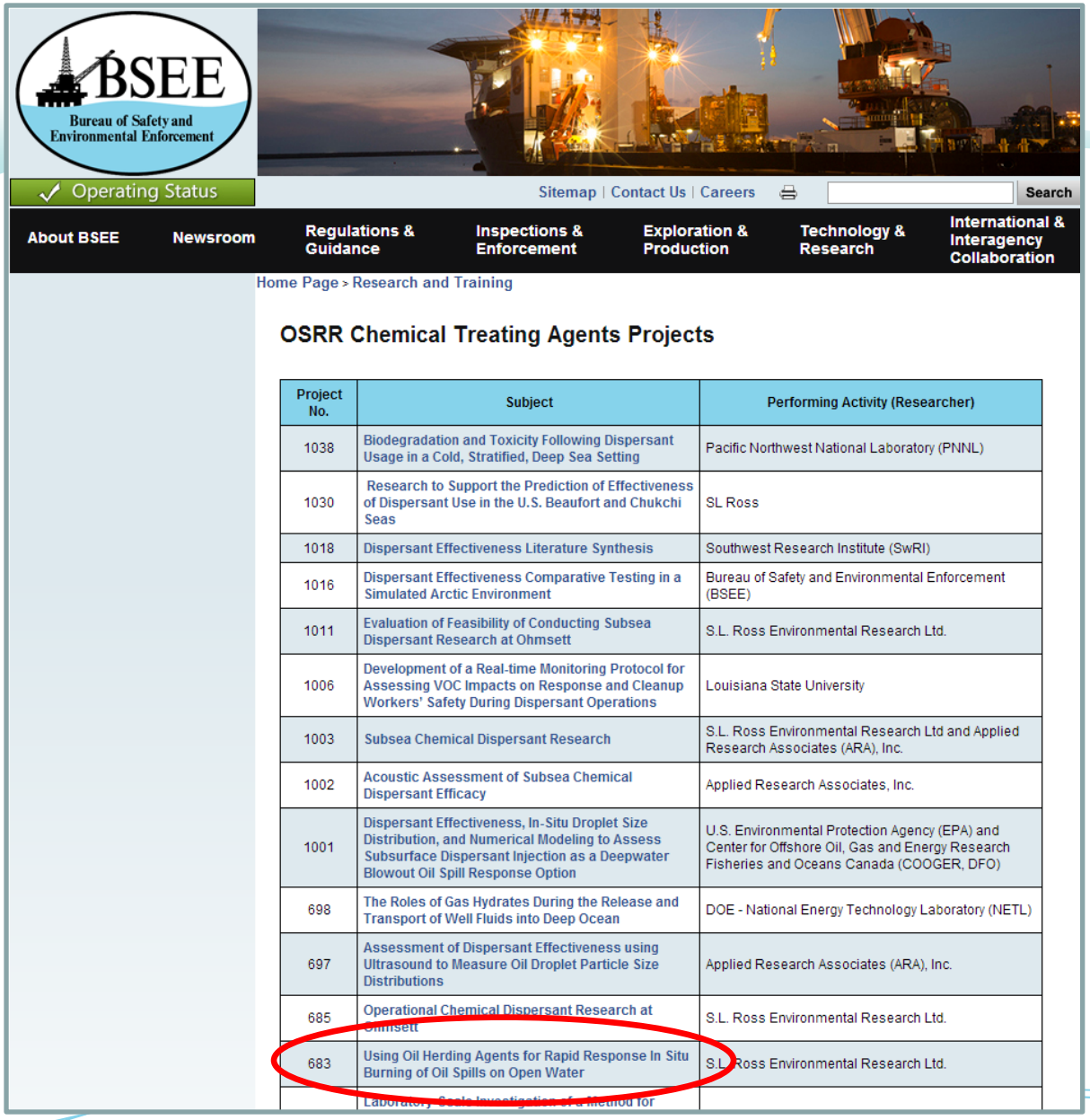
Technology Assessment Programs
Oil Spill Response Research
Ohmsett
Technical Forums
Oil Spill Response Research (OSRR)
For more than 25 years, BSEE (and former organizations) have aggressively maintained a comprehensive, long-term research program dedicated to improving oil spill response options. The major focus of the program is to improve the methods and technologies used for oil spill detection, containment, treatment, recovery and cleanup. The OSRR program is a cooperative effort bringing together funding and expertise from research partners in government agencies, industry and the international community.
OSRD's Response Research Unit (RRU) manages the funding for numerous research projects chosen to meet selected major topics each year. White Papers and research proposals are solicited through a Broad Agency Announcement (BAA) that is published on the Federal Business Opportunities website at www.fbo.gov.
The RRU also manages the National Oil Spill Response Test Facility, located in Leonardo, New Jersey. Ohmsett is the largest outdoor saltwater wave/tow tank facility in North America. Ohmsett allows full scale oil spill response testing, training and research with oil in a realistic marine environment. For more information visit the Ohmsett Website.
The Ohmsett Gazette (Spring/Summer 2013)
Click on the categories below to bring up more information on our efforts in the subject area
Arctic Oil Spill Response
Behavior of Oil
Chemical Treating Agents
Decision-Making Support Tools
In Situ Burning of Oil
Mechanical Containment
Ohmsett
Remote Sensing
Master List of Oil Spill Response Research (OSRR) Projects
For more information on the Bureau's Oil Spill Response Research (OSRR) Program, email us here

- Website

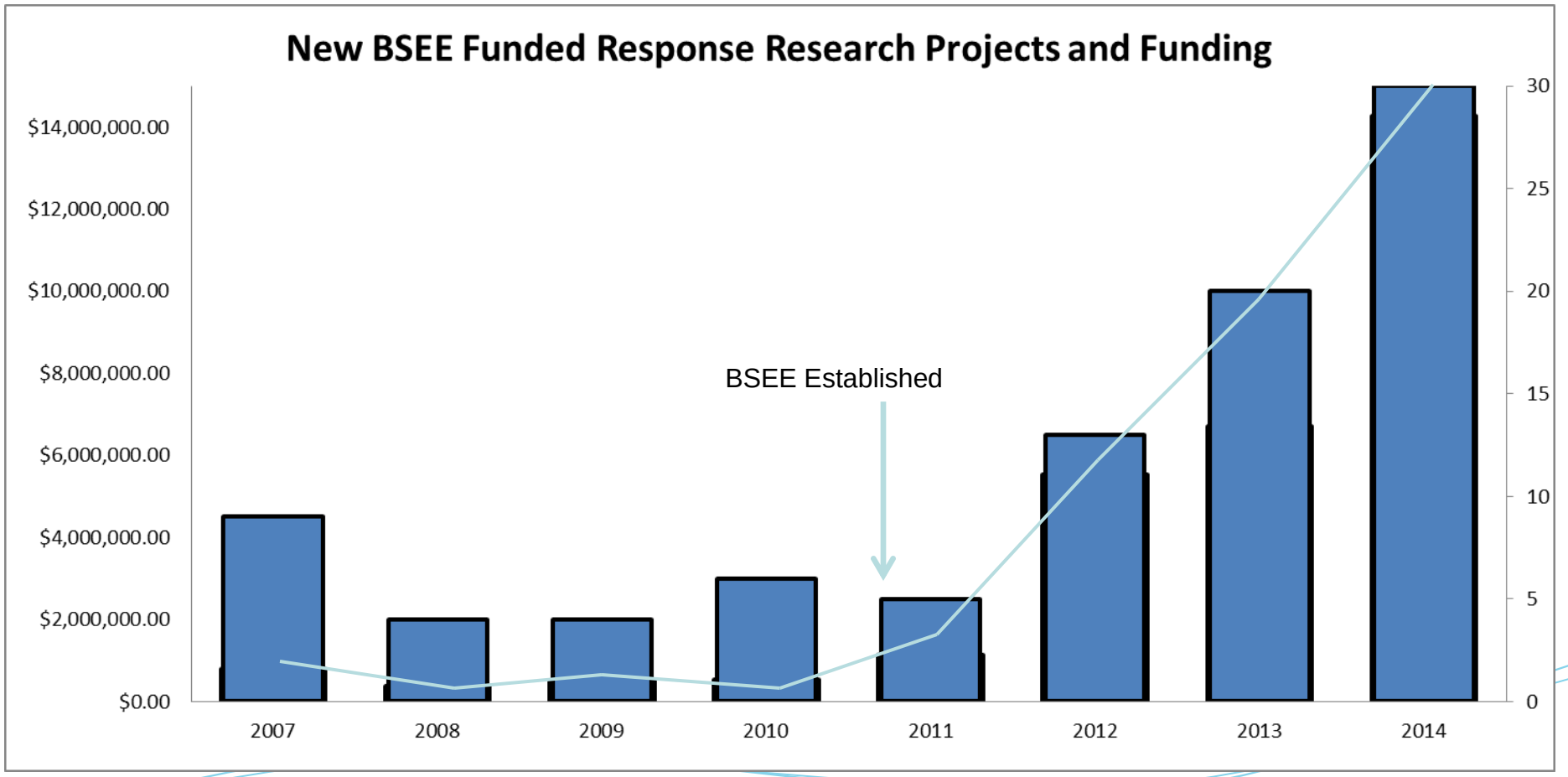


Project No.	Subject	Performing Activity (Researcher)
1038	Biodegradation and Toxicity Following Dispersant Usage in a Cold, Stratified, Deep Sea Setting	Pacific Northwest National Laboratory (PNNL)
1030	Research to Support the Prediction of Effectiveness of Dispersant Use in the U.S. Beaufort and Chukchi Seas	SL Ross
1018	Dispersant Effectiveness Literature Synthesis	Southwest Research Institute (SwRI)
1016	Dispersant Effectiveness Comparative Testing in a Simulated Arctic Environment	Bureau of Safety and Environmental Enforcement (BSEE)
1011	Evaluation of Feasibility of Conducting Subsea Dispersant Research at Ohmsett	S.L. Ross Environmental Research Ltd.
1006	Development of a Real-time Monitoring Protocol for Assessing VOC Impacts on Response and Cleanup Workers' Safety During Dispersant Operations	Louisiana State University
1003	Subsea Chemical Dispersant Research	S.L. Ross Environmental Research Ltd and Applied Research Associates (ARA), Inc.
1002	Acoustic Assessment of Subsea Chemical Dispersant Efficacy	Applied Research Associates, Inc.
1001	Dispersant Effectiveness, In-Situ Droplet Size Distribution, and Numerical Modeling to Assess Subsurface Dispersant Injection as a Deepwater Blowout Oil Spill Response Option	U.S. Environmental Protection Agency (EPA) and Center for Offshore Oil, Gas and Energy Research Fisheries and Oceans Canada (COOGER, DFO)
698	The Roles of Gas Hydrates During the Release and Transport of Well Fluids into Deep Ocean	DOE - National Energy Technology Laboratory (NETL)
697	Assessment of Dispersant Effectiveness using Ultrasound to Measure Oil Droplet Particle Size Distributions	Applied Research Associates (ARA), Inc.
685	Operational Chemical Dispersant Research at Ohmsett	S.L. Ross Environmental Research Ltd.
683	Using Oil Herding Agents for Rapid Response In Situ Burning of Oil Spills on Open Water	S.L. Ross Environmental Research Ltd.
	Laboratory-Scale Investigation of a Method for	

- Website

- Website

Project Number	683
Date of Summary	March 9, 2012
Subject	Using Oil Herding Agents for Rapid Response In Situ Burning of Oil Spills on Open Water
Performing Activity	S.L. Ross Environmental Research Ltd.
Principal Investigator	Mr. Ian Buist
Contracting Agency	Bureau of Safety and Environmental Enforcement
Estimated Completion	Completed
Description	The objective of this research was to evaluate the feasibility of using herders to enable in situ burning as a rapid-response technique in open water. This research was accomplished by performing experiments in the laboratory with the US Navy's hydrocarbon based herder formulation and the best silicone herder formulation to find the most effective product for various water temperatures. Experiments were conducted at the Ohmsett National Oil Spill Response Research and Renewable Energy Test Facility located in Leonardo, NJ to determine the persistence of the herder monolayer in realistic waves. This project wass a continuation of TAR Projects 554 and 617 that examined the use of chemical herders to improve response countermeasures in pack-ice conditions, in salt marshes, and for use in open water with dispersants.
Progress	• Project kickoff meeting was conducted March 22, 2011. • Full-scale Ohmsett experiments were conducted May 14-21, 2011. • The Final Report has been reviewed and accepted by BSEE on March 1, 2012. SL Ross will look to present a shorter version of the approved final report during the Arctic and Marine Oilspill Program (AMOP) on June 5-7, 2012.
Reports	
AA	"Research on Using Oil Herding Agents for Rapid Response *In Situ* Burning of Oil Slicks on Open Water," S.L. Ross Environmental Research Ltd., February 28, 2012.


New BSEE Funded Response Research Projects and Funding
$14,000,000.00
$12,000,000.00
$10,000,000.00
$8,000,000.00
$6,000,000.00
$4,000,000.00
$2,000,000.00
$0.00
30
25
20
15
10
5
0
BSEE Established
2007
2008
2009
2010
2011
2012
2013
2014

Staffing:

- New Hire – Dr. Jay Cho started January 12th
- New Hire – Mr. Alex Ruttenberg started January 12th
- New Hire – Ms. Kimberly Bittler – pending start date
- Chief, Preparedness Verification Branch Mr. Eric Miller started January 12th

FY 2014 New Awards

- Development for Temporary Oil Spill Storage and Recovery in Alaskan Arctic using Petrogel Technology - #1034 Penn State (see separate slide)
- Improved In-Situ Burning for Offshore Use - #1035 USCG RDC
- Burning of Crude Oil in Ice Cavities - II #1036 WPI
- Development of “Smart” Skimming Technologies - #1037 Alion
- Biodegradation and Toxicity Following Dispersant Usage in a Cold, Stratified, Deep Sea Setting - #1038 PNNL
- Oil Leak Detections with a Combined Fluorescence Polarization Instrument and a Wide Band MultiBeam Sonar - #1039 EIC Labs and Norbit (see separate slide)
- Distributed Chemical Sensing for Sub-surface Oil Spill Sensing - #1040 U of Houston
- HC-Sentinel: An AUV Glider for High Endurance Subsea Hydrocarbon Detection - #1041 WHOI
- Technology Readiness Level (TRL) Definitions for Oil Spill Response Technologies and Equipment - #1042 ARA (see separate slide)

FY 2014 New Awards (cont.)

- Development of Scientifically-Based Planning Standards and Test Methods to Predict Effectiveness and Usage Rates for Surface and Subsea Dispersant Use in Various Types of Environmental Conditions - #1043 LSU
- Solidifying the Scientific Capabilities of Ohmsett – Effect of Ambient Chemical Levels - #1044 NJIT
- Solidifying the Scientific Capabilities of Ohmsett – Wave Hydrodynamics - #1045 NJIT
- Leveraging Offshore Hydrocarbon Risk Assessment Models and Datasets to Support the Evaluation and Ranking of Worst Case Discharge Scenarios - #1046 NETL
- Effectiveness of Dispersants in Frazil or Slush Ice - #1047 SL Ross
- Developing a Capabilities-Based Framework for Designing and Evaluating Oil Spill Response Exercises - #1048 GWU
- A Novel Experimental Approach to Enhance Burning of Oil-Water Emulsions by Immersed Objects - #1049 WPI
- Geo-Referencing Identification (GRID) Tag - #1050 URS (see separate slide)

FY 2014 New Awards (cont.)

- Tagging of Oil Under Ice for Future Recovery - #1051 URS
- Enhanced Oil Recovery from Oil-Seawater Mixtures Through the Coupling of Magnetic Nanoparticles and Electrically Conducting Ultrafiltration Membranes - #1052 UC Riverside
- Development of Universal Submersible Skimmer Delivery System - #1053 Alion
- Development of Double Helix Oil/Water Separation Skimmer Technology - #1054 COTS
- Emergency Response Exercise Best Practices - #1055 PCCI (see separate slide)
- Catalog OSRR Funded Research Recommendations and Key Findings - #1056 Nuka(see separate slide)
- Development of a Planning Standards for In-Situ Burning Operations - #1057 SL Ross
- Remote Sensing Systems to Detect and Analyze Oil Spills on the US Outer Continental Shelf – A State of the Art Assessment - #1058 NRL
- Characterizing Wave-induced Mixing Energy in Ohmsett Wave Basin for Dispersant Effectiveness Testing - #1059 NRL
- Airborne Oil Spill Remote Sensing and Reporting – #1060 USCG RDC
- Development of a Low-Emission Spray Combustor for Emulsified Crude Oil - #1061 NRL (see separate slide)

Catalog OSRR-funded Research Recommendations and Key Findings

OSRR # 1056 Nuka Research and Planning Group, LLC
PI: Sierra Fletcher
Estimated Completion: September 28, 2015

The Bureau of Safety and Environmental Enforcement's (BSEE) Oil Spill Response Research (OSRR)-funded projects have formed the cornerstone of U.S. oil spill response research and development. Nuka Research and Planning Group, LLC (Nuka Research) proposes to summarize the results of the more than 160 studies conducted since 1997 and create an accompanying, searchable database designed to facilitate the application of research results to the development and oversight of related regulations.

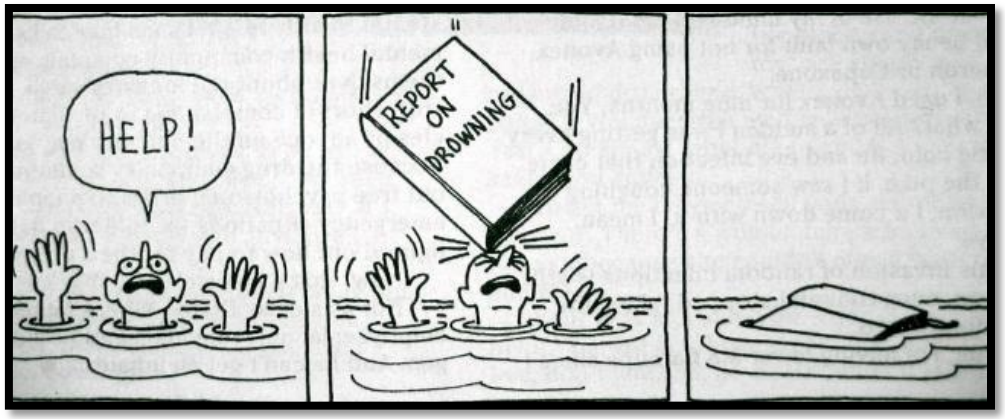


Image from: Google Image Search and www.patdeegan.com

Technology Readiness Level (TRL) Definitions for Oil Spill Response Technologies and Equipment

OSRR # 1042 Applied Research Associates
PI: Dr. Paul Panetta
Estimated Completion: January 30, 2016

Objective: To establish a uniform and objective means to determine the level of maturity of a new technology, and when it is ready for use in the field. TRLs are used extensively in the aerospace and defense communities. This project will take this existing framework and define the simulated and intended environments, as well as the operational systems for anticipated oil spill response scenarios.

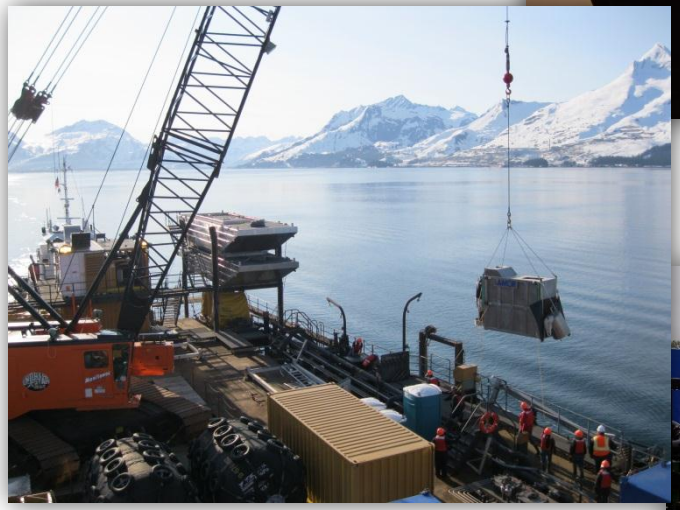
Basic Technology Research:	
TRL 1	Basic principles observed and reported, research to prove feasibility.
TRL 2:	Technology concept and/or application formulated.
TRL 3	Analytical and experimental critical function and/or characteristic proof of concept.
Technology Demonstration	
TRL 4:	Component and/or breadboard validation in laboratory environment.
TRL 5:	Component and/or breadboard validation in relevant environment.
TRL 6	System/subsystem model or prototype demonstration in a relevant environment (ground or space).
TRL7:	System prototype demonstration in a space or operational environment.
System Test, Launch, and Operations:	
TRL 8:	Actual system completed and "flight qualified" through test demonstration (ground and space).
TRL 9:	Actual system "flight proven" through successful mission operations.

John C Mankins,. "Technology Readiness Levels: A White Paper". NASA, Office of Space Access and Technology, Advanced Concepts Office, 1995.

Emergency Response Exercise Best Practices

OSRR # 1055 PCCI, Inc.
PI: Frank Marcinkowski
Estimated Completion: April 25, 2015

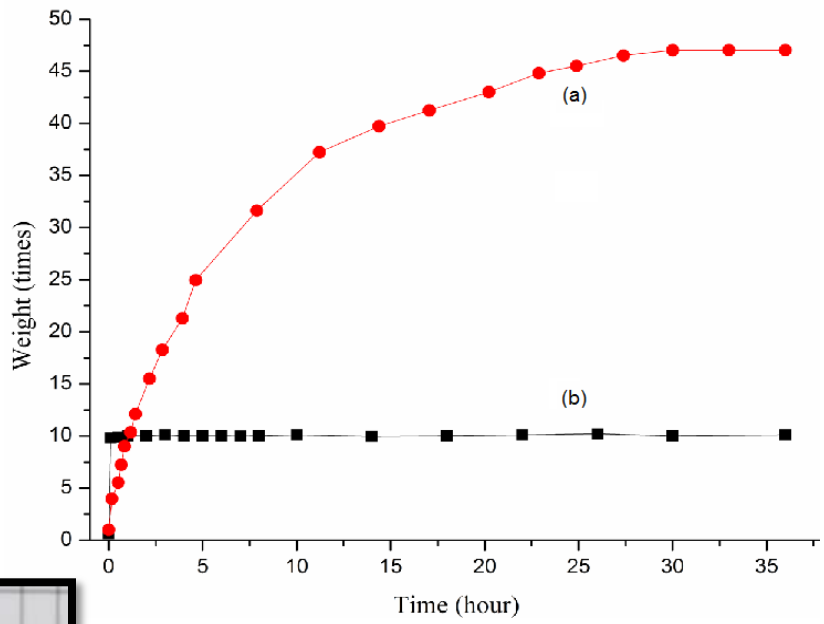
Objective: To identify best practices, innovative approaches, and new concepts for designing, conducting, and evaluating oil spill exercises. All categories of exercises included in the Draft Updated January 2014 NPREP Guidelines will be included in this study, with particular emphasis on notification exercises, announced and un-announced exercises, and equipment deployment exercises.

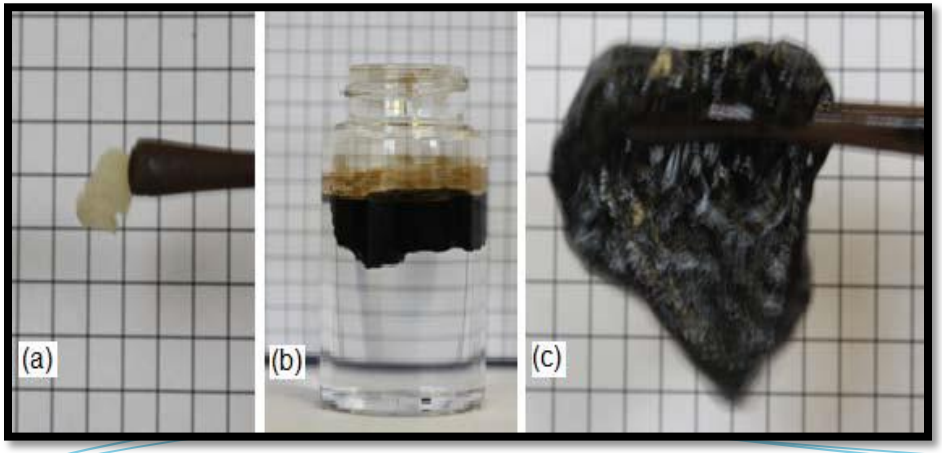


Temporary Oil Spill Storage and Recovery in Alaskan Arctic Using Petrogel Technology

OSRR # 1034 The Pennsylvania State University
PI: Dr. Mike Chung
Estimated Completion: March 2016

Objective: Development of Petrogel, a super-absorbent polymer that exhibits promising oil absorption capacity (40 times its weight in preliminary testing), no water absorption, as well as the potential for being effectively refined as a regular crude oil.

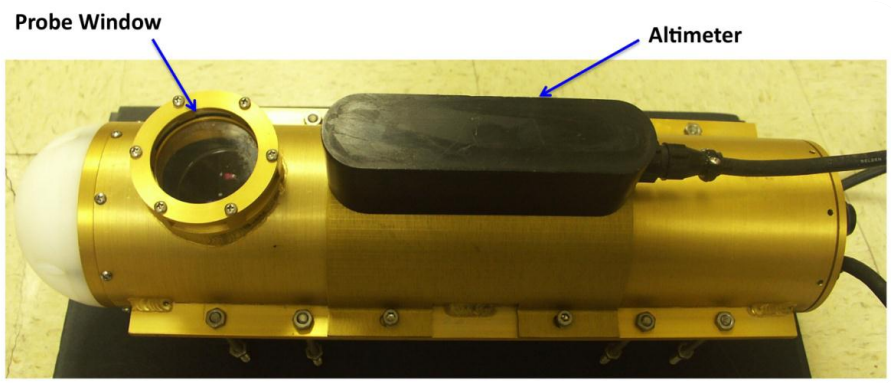




Oil Leak Detections with a Combined Fluorescence Polarization Instrument and a Wide Band MultiBeam Sonar

OSRR # 1039 EIC Laboratories, Inc. and Norbit US, Ltd.
PI: Dr. Job Bello
Estimated Completion: December 2015

Objective: This project will develop and test a prototype sensor that integrates two partial solutions (fluorescence and sonar) with a goal of operating at a suitable standoff distance and interrogating a wide area, while providing real-time data feed from the subsea environment.



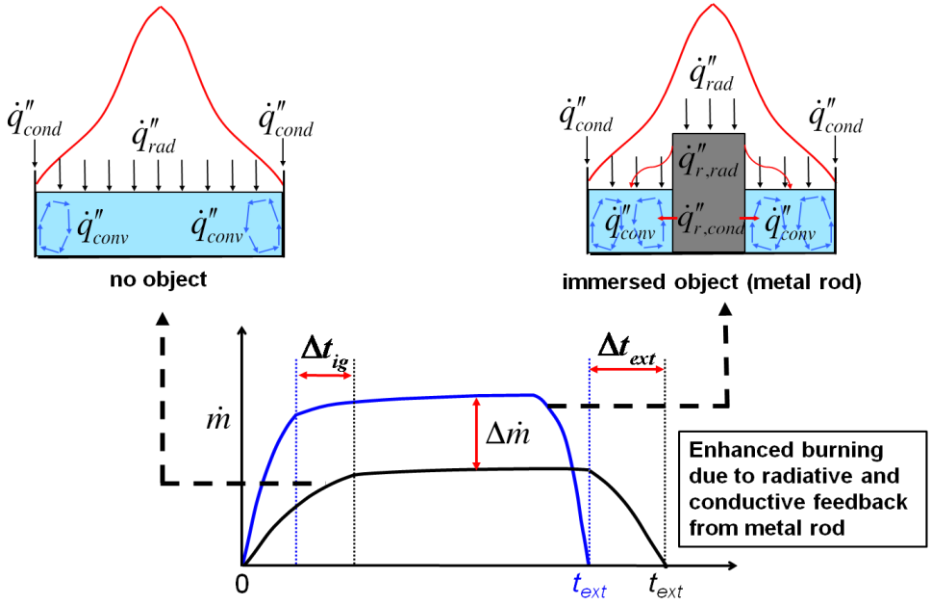
EIC's fluorescence polarization instrument - Oscar

NORBIT's WBMB sonar platform

A Novel Experimental Approach to Enhance Burning of Oil-Water Emulsions by Immersed Objects

OSRR # 1049 Worcester Polytechnic Institute
PI: Dr. Ali S. Rangwala
Estimated Completion: September 29, 2015

Objective: The objective of this study is to develop a technology to use conductive metal rods to enhance the burning rate of a liquid pool of emulsified oil. Worcester Polytechnic Institute (WPI) will develop experiments in order to evaluate and optimize various parameters of importance in developing this technology, including the length, diameter, and spacing of the rods.

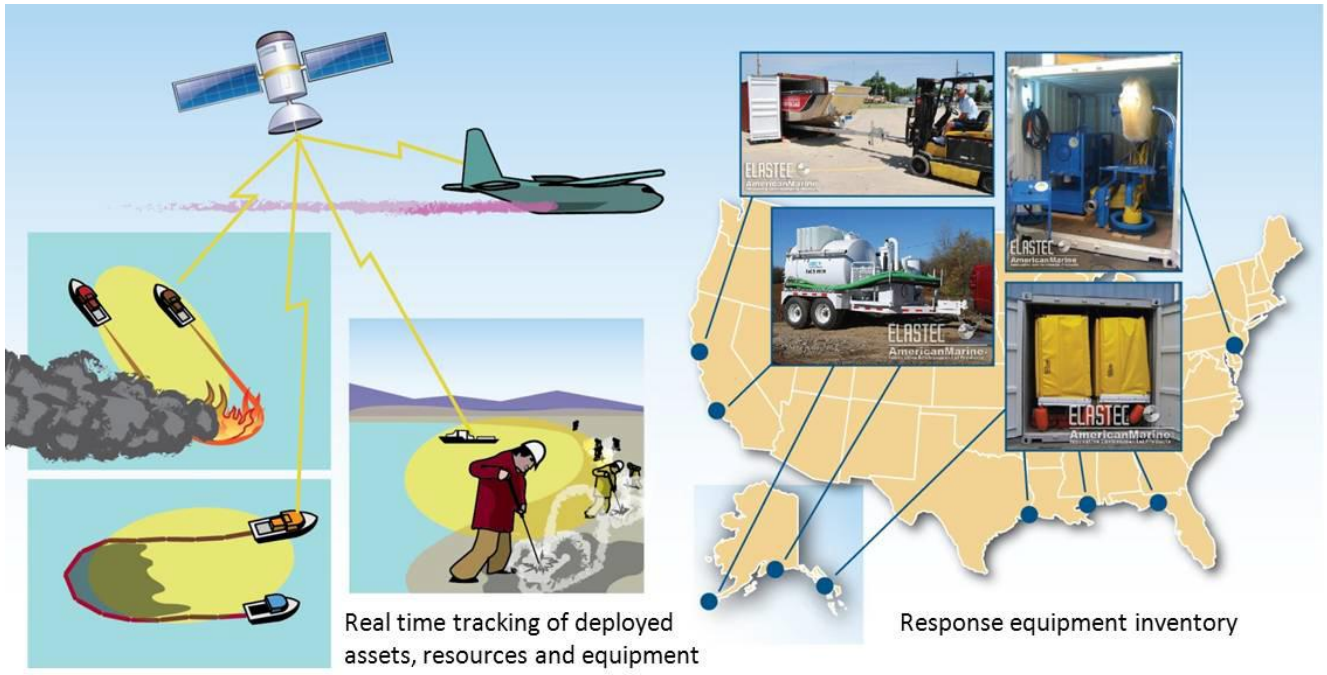


Hypothesis: enhanced heat and mass transfer because of metal rod immersed in a pool fire will increase burn efficiency

Geo-Referencing Identification (GRID) Tag

OSRR # 1050 URS Group Inc.
PI: Ben Schreib
Estimated Completion: October 2015

Objective: To develop a low cost radio-frequency identification tag that can be used to track and inventory oil spill response equipment on a continuous basis. These tags will be designed to withstand a harsh marine arctic environment.



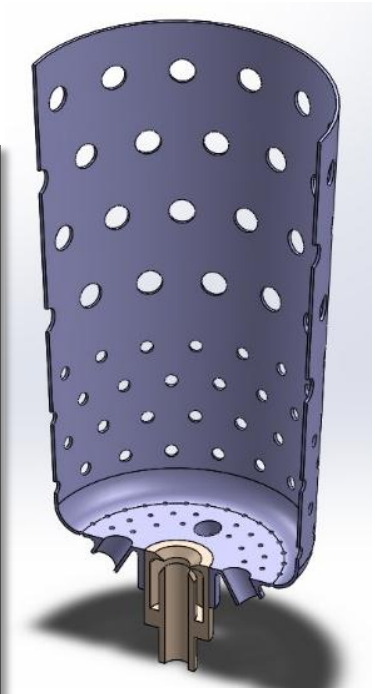
Real time tracking of deployed assets, resources and equipment

Response equipment inventory

Development of a Low-Emission Spray Combustor for Emulsified Crude Oil

OSRR # 1061 Naval Research Laboratory (NRL)
PI: Steven Tuttle
Estimated Completion: October 2016

Objective: This project builds off of the proof-of-concept project previously complete and further advances the development of a low-emission, low pressure atomization and combustion process for emulsified crude oil by developing and refining the performance of a quarter and half-scale flow blurring atomizer spray burner.



FY 2015 BAA 1

https://www.fbo.gov/notices/ce0bc9baa12db301197957defd01124f

Innovative Methods to Remove Surface Oil under Arctic Conditions – Traditional methods of recovering surface oil are challenged by the Arctic operating environment. Environmental conditions may preclude human response. Technologies/methods submitted under this topic should be new, innovative concepts. Technologies submitted should be proof-of-concept level projects. New methods should include demonstrations in relevant environments.

Decanting Recovered-Oil at Sea – A limiting factor in an oil spill response is the storage capacity for recovered oil. Recovered oil typically contains a significant amount of water. The effective storage capacity may be enhanced if responders are able to decant the recovered oil/water mixture at sea. Develop new technology, or conduct a study to predict the feasibility of decanting recovered oil/water mixtures at sea and how it can be optimized. Factors to consider include oil viscosity, temperature, emulsification, sea state, vessel characteristics, and recovered-oil storage tank parameters.

Quantifying *In-situ* Burn Efficiency – *In-situ* burning proved to be an effective response tool during past oil spills and promises to be an effective means of remediating crude oil on water in the Arctic. Concepts and/or development of new tools to quantify the efficiency and amount of oil remediated by these burns will be evaluated under this topic.

Innovative New Uses of Chemical Herders to Enhance Oil Spill Mitigation Efforts – Chemical herders may be an effective tool in aiding the removal of oil spilled in icy regions or in shoreline protection. Concepts submitted under this topic should represent novel ideas and include proof-of-concept level testing and/or demonstrations.

FY 2015 BAA 1 Cont.

Develop an Innovative Dispersant Spray Drift Model – Oil spill responders and decision makers need accurate information to not only predict windows of opportunity for aerial dispersant spraying, but also to protect the safety of those in the vicinity of the aerial spraying. Develop an innovative method of modeling aerial dispersant spraying that takes into consideration the safety of those in the affected region to determine the best windows of opportunity.

Determine the Effect of Various Deep-Ocean Conditions on Dispersant Effectiveness – Numerous factors contribute to dispersant effectiveness when dispersant is introduced at the source of a subsea oil release. To optimize subsea dispersant application, conduct a series of experiments to determine the effects of various conditions (e.g., pressure, pressure drop, temperature, solution gas, hydrate formation, sediment, dispersant dosage and orifice size) on subsea dispersant effectiveness.

Evaluate Dispersant Effectiveness of Subsea Applications in Ocean Brine Pools - With the development of subsea dispersant application, there is a need to study the performance and behavior of dispersants should these products be introduced into naturally occurring seafloor brine pools in Arctic waters and the Gulf of Mexico. Conduct a series of experiments to determine high salinity's effect on subsea dispersant effectiveness.

White Papers were due February 9, 2015

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