



**COATED SKIMMER
TECHNOLOGY**

Patent No. US 8,388,839 B1



- **CRUCIAL was formed as a Louisiana corporation in 1991.**
- **CRUCIAL, INC., is a designer, manufacturer and distributor of a full line of oil spill containment and recovery equipment to service the growing need for oil spill control equipment worldwide.**
- **CRUCIAL's president and production manager have over 50 years combined experience in design and manufacture of oil spill equipment.**

ALASKA TANKER OWNERS OBJECTIVES

- POSSIBILITY OF UTILIZING OLEOPHILIC SKIMMERS IN PLACE OF THE EXISTING WEIR SKIMMERS
- INCREASE EFFICIENCY OF OIL RECOVERY TO 360 GPM PURE OIL



**THE HEART OF THEIR OIL RECOVERY
CAPABILITIES IS A PAIR OF TRANSREC SKIMMERS
LOCATED ON THE STERN OF EACH OF THE
BARGES.**



THE TWO SKIMMER HEADS CAN THEN BE ALLOWED TO FLOAT BACK INTO THE APEX OF THE BOOM WHERE THE HIGHEST CONCENTRATION OF OIL IS COLLECTED.

**SKIMMER DESIGN
& BUILDING
DECEMBER 2007**



COATING APPLIED TO TEST DISCS



CONCLUSIONS:

- A CONSIDERABLE AMOUNT OF OIL REMAINED ON THE DISCS AFTER SCRAPING – THICKER SCRAPERS NEEDED**
- STRAIGHT SCRAPERS DID NOT ALLOW FOR EFFICIENT FLOW TO THE OFFLOADING PUMP – ANGLED SCRAPERS REQUIRED**



NEW SCRAPER DESIGN TESTED WELL AND RESULTED IN HIGHER RECOVERY EFFICIENCY. RECOVERY RATE OF ALMOST 400 GPM @ 85% EFFICIENT WERE ACHIEVED.

LARGER SKIMMER TESTING (2008 & 2009)

- 88 EACH ALL FIBER COATED DISCS (4 BANKS OF 22 EA.)**
- REDESIGNED SCRAPER BLADES**
- DUAL POSITIVE DISPLACEMENT LOBE PUMPS**



TOW TEST IN WAVES



TESTING OF 88-DISC MODEL



**88-DISC SKIMMER TEST RESULTS SHOW
RECOVERY OF 880 GPM PURE OIL!
(200 CU.M/HR)**

**Durability, Viscous Oils &
Seaweed Tests
2010**



**EVEN VISCOUS OILS ARE EASILY RECOVERED BY
THE FUZZY DISCS**



**SEAWEED INTRODUCED TO DETERMINE EFFECTS
ON RECOVERY RATE**

DEPLOYMENT TESTS

HOMER, ALASKA

- **“V”-Sweep**
- **Ocean Buster**
- **Boom Vane**



”V”-SWEEP DEPLOYMENT

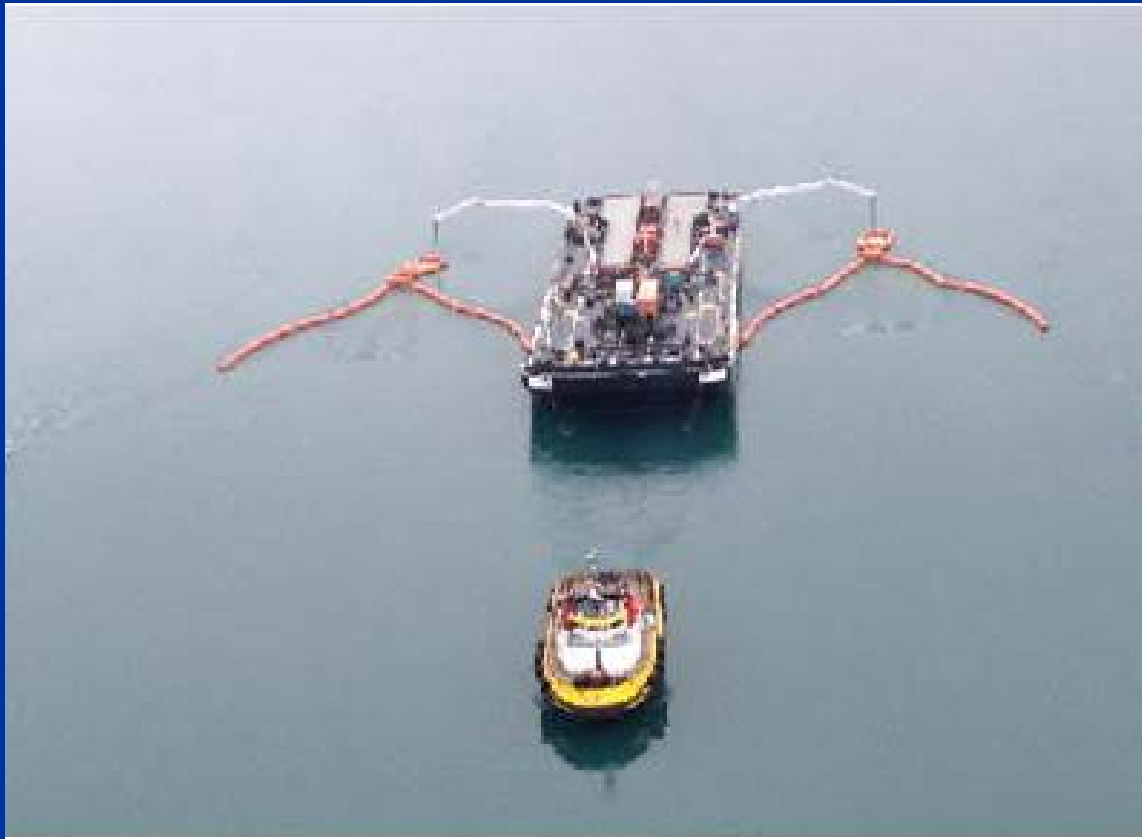


OCEAN BUSTER DEPLOYMENT



BOOM VANE DEPLOYMENT

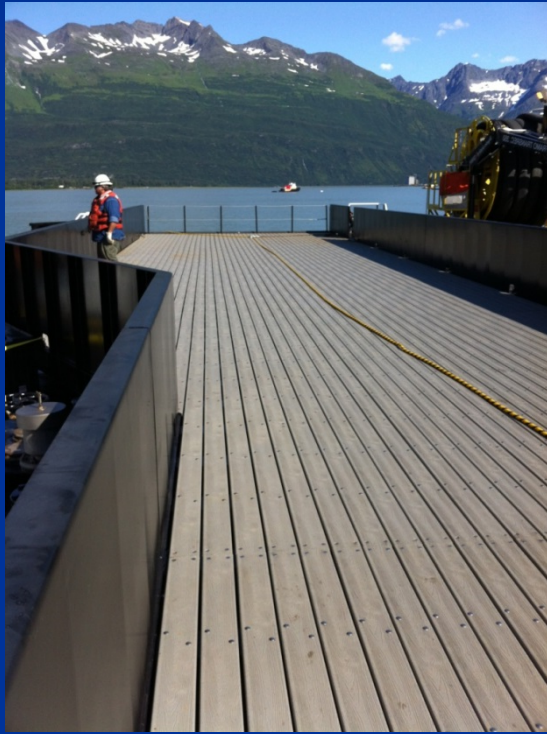
CRUCIAL



PWS Open Water Recovery

- Skimmer selection began in 2007 driven by PWS Regional Citizen Advisory Council (RCAC) and ADEC for Best Achievable Technology in Recovery Efficiency
- On water testing in Homer, AK 2009 to determine optimal arrangement for encounter rate - Current Buster Technology chosen
- Design optimal deployment arrangement for Current Buster/CRUCIAL/Barge
- Raised deck to allow deployment of Current Buster and prep of CRUCIAL Skimmer while barge in transit
- 2014/15 Fully converted one barge to new arrangement and demonstrate to ADEC satisfaction

DEPLOYMENT OF BUSTER



CRUCIAL C-DISC 100/30 DEPLOYMENT WITH BUSTER





PWS Barge

- 428 foot swath at 3 to 3.5 knots (up to 5 knots)
 - Current Buster 8 Port and Starboard
- 100 Disc CRUCIAL “Coated” Skimmer Port and Starboard
- Integrated Discharge and Hydraulics on Crane

PWS Open Water Recovery



PWS Open Water Recovery



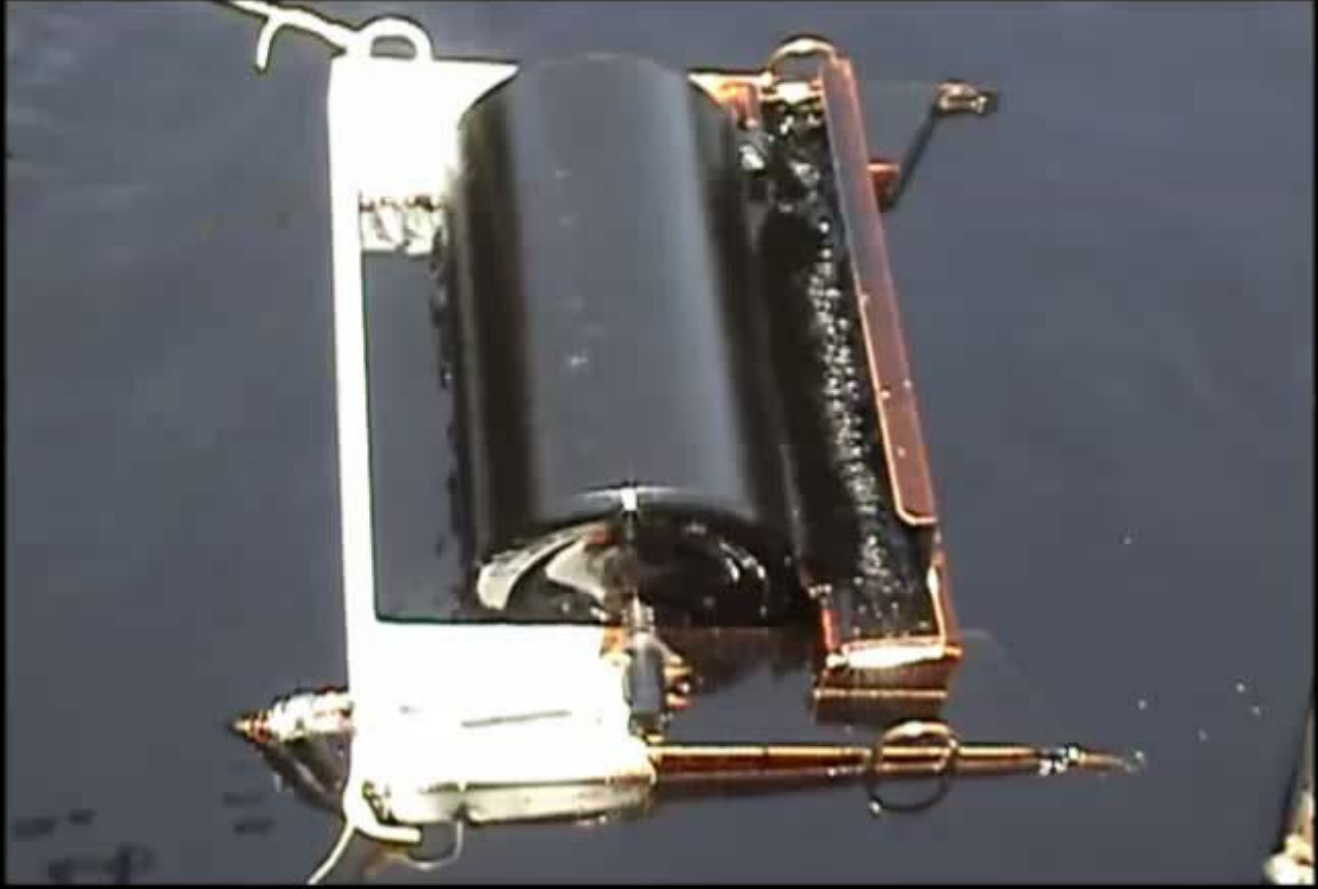
PWS Open Water Recovery



PWS Open Water Recovery



CRUCIAL'S PATENTED
COATED TECHNOLOGY
CAN BE USED ON
SMALLER INSHORE
SKIMMERS



CRUCIAL 36" COATED DRUM SKIMMER TESTING IN ALASKA



Test	Disc speed, rpm	ORR, gpm	ORE, %
1	71	46	83%
2	44	41	99%
3	50	50	99%
4	52	56	99%
5	52	54	99%
6	48	52	99%
Average Tests 4, 5, 6 (best results)		54	99%



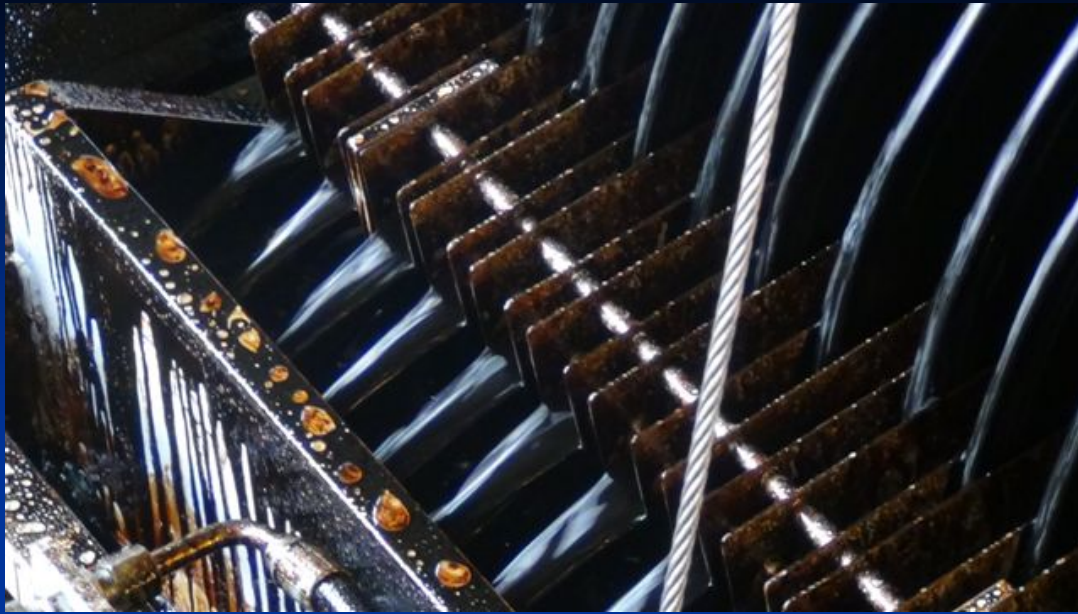
ARCTIC WEATHER TESTING

TESTED BY : S. L. ROSS
VISCOSITY 27cSt AT -3° C
AVERAGE ORR 85gpm (19 M3h) with
ORE 97%

RESULTS:

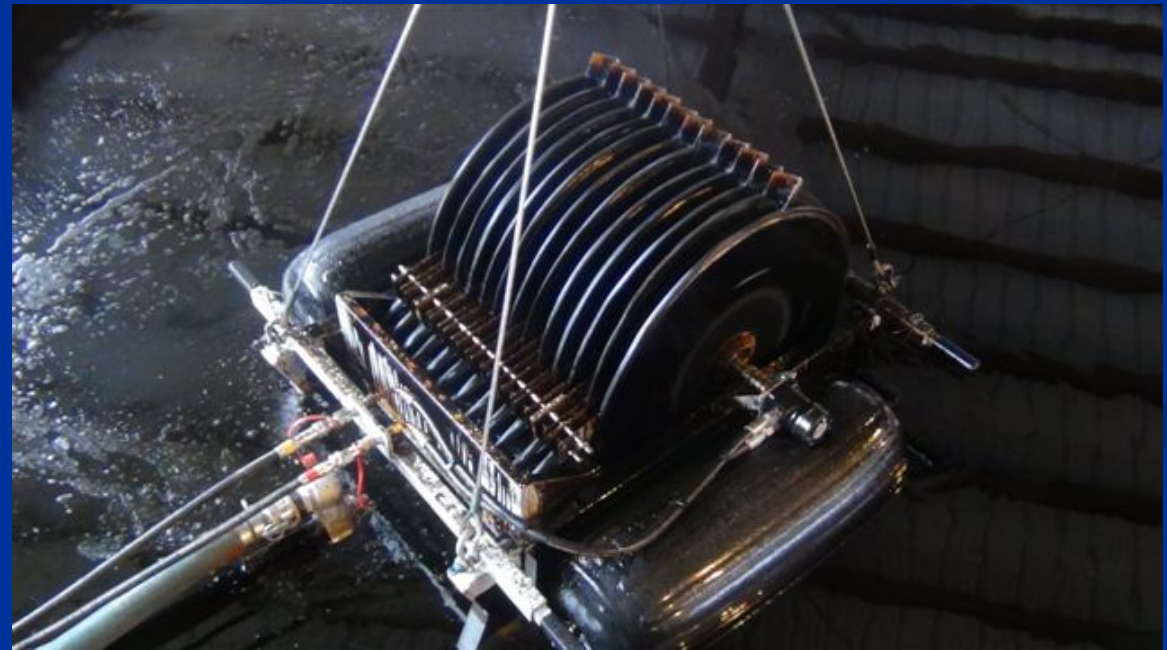
TEST	DISC SPEED	ORR,gpm	RE,%
1	23	78	97
2	22	88	100
3	32	89	94





**TESTING BY
ALYESKA AT
CISPRI
2013 AND 2014**

**CRUCIAL MODELS
13/30LW & 13/24LW
COATED DISC
SKIMMERS**





OHMSETT, 2014
CRUCIAL MODEL C-DISC 13/24
COATED DISC SKIMMER

**MOP WRINGER
UPGRADE
ENHANCED MOP
TESTING
(OHMSETT & CISPRI)
2014 – 2015**



CRUCIAL MODEL C-14d MOP WRINGER UNIT



CRUCIAL MODEL C-14D WITH ENHANCED OLEOPHILIC
MOP CONTAINING SOME OF THE SAME CRUCIAL
PATENTED FUZZY FABRIC AS ON OUR DISC AND DRUM
SKIMMERS

**“COATED”
SKIMMER
CLIENTS**



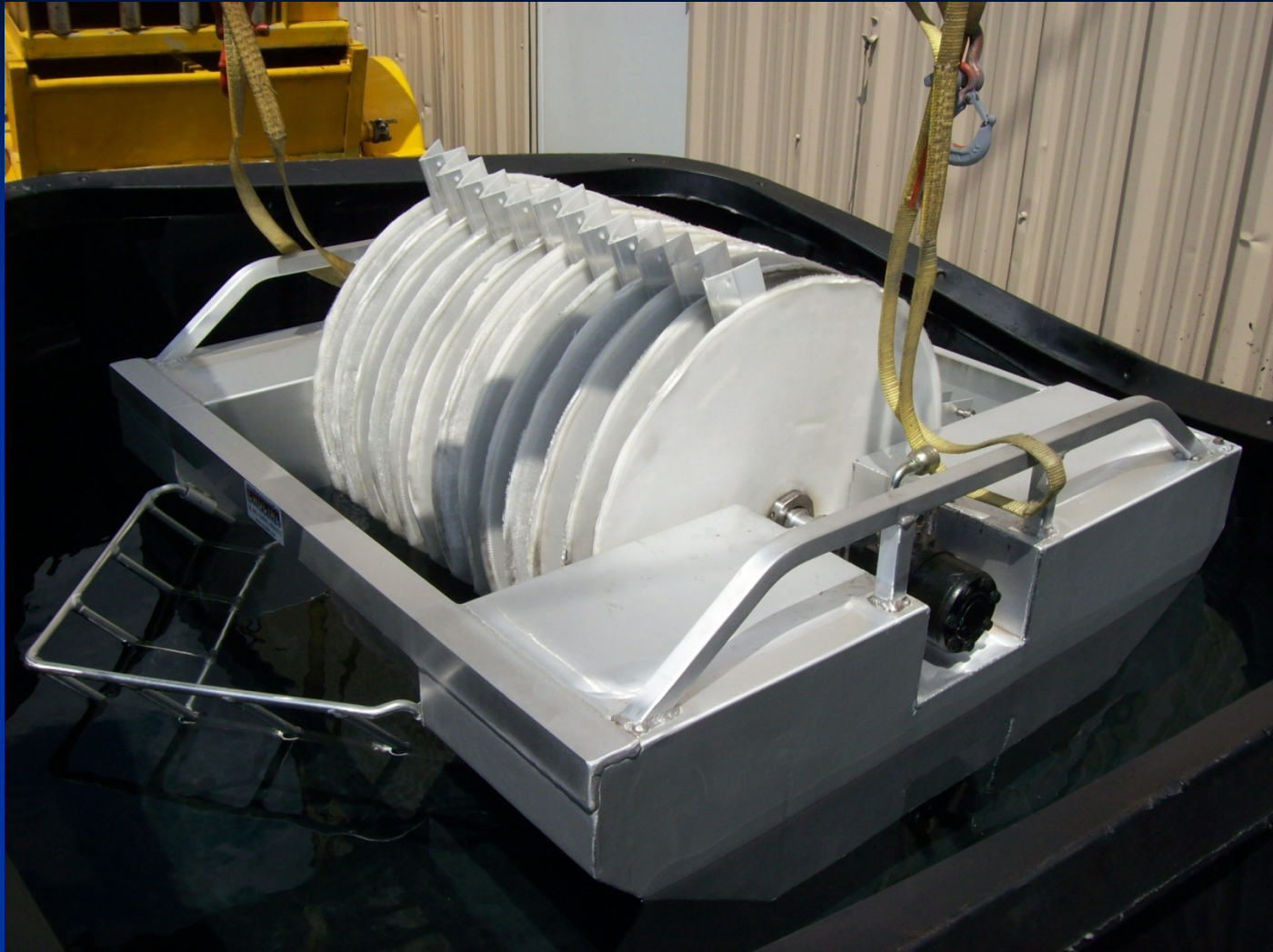
CLEAN HARBORS COOP WAREHOUSE SKIMMER STORAGE



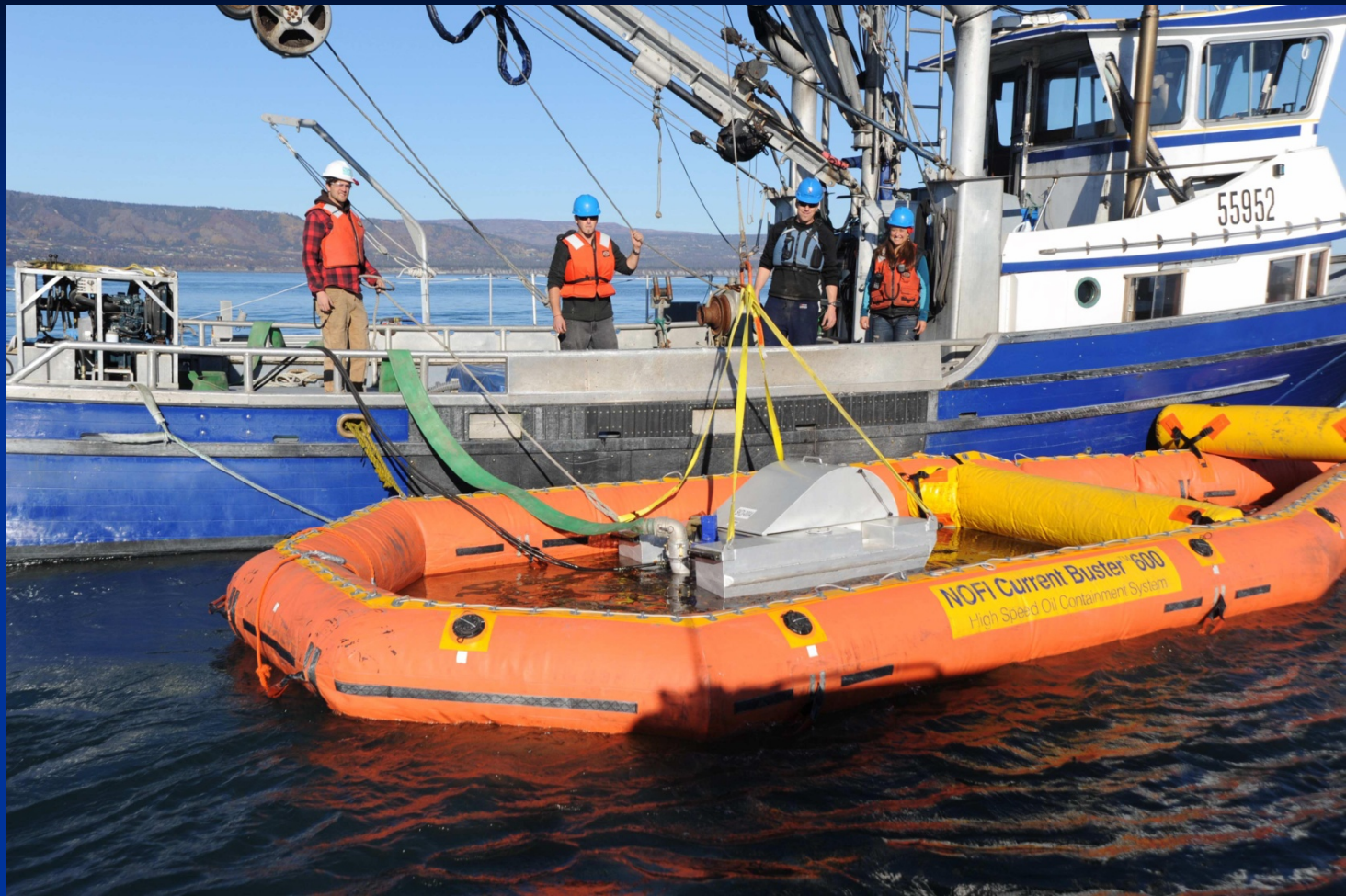
CLEAN RIVERS COOP – MINI COATED DRUM SYSTEM –
SKIMMER, POWER PACK & PUMP



CLEAN RIVERS COOP –
36 INCH COATED DRUM SKIMMER STORAGE BOX



ALASKA CLEAN SEAS C-DISC 13/24 IN TEST TANK



CISPRI UTILIZING LOCAL FISHERMAN AND CURRENT BUSTER FOR TRAINING WITH MODEL C-DISC 13/30



CISPRI – MODEL C-DISC 56/30 IN TEST TANK



MSRC OPERATING C-DISC 88/30



**MSRC 88/30 SKIMMERS BEING SHIPPED TO VARIOUS
LOCATIONS**



MSRC 56/30 SKIMMERS LOADED FOR SHIPMENT



16465

Mr. Wally Landry
General Manager
Crucial, Inc.
142 Enterprise Drive
Gretna, LA 70056

NAR 2 8 2013

Dear Mr. Landry:

Thank you for sending us the OHMSETT test results for your coated disc and coated drum skimming systems that you recently evaluated using the ASTM F2709 standard. We wholeheartedly applaud Crucial Inc.'s efforts and investments to develop your patented skimmer technologies and validate their nameplate recovery rates at OHMSETT. Your willingness to submit to testing provides valuable data to plan holders, oil spill removal organizations (OSROs), and regulators in comparing and analyzing skimmer capabilities. As such, the Coast Guard is pleased to officially recognize the following nameplate recovery rates:

Skimmer Model	Skimmer Type	Nameplate Recovery Rate (NRR)	Test Standard
C-DISC 88/30	Coated Disc Skimmer	860 GPM	ASTM F2709-08
C-DISC 56/30	Coated Disc Skimmer	402 GPM	ASTM F2709-08
C-DISC 13/30	Coated Disc Skimmer	138 GPM	ASTM F2709-08
C-DISC 13/24	Coated Disc Skimmer	85 GPM	ASTM F2709-08
ICD18H-36	Coated Drum Skimmer	54 GPM	ASTM F2709-08

As you are likely aware, the Coast Guard and the Bureau of Safety and Environmental Enforcement (BSEE) are currently sponsoring a joint research project on evaluating Effective Daily Recovery Capacity (EDRC), and in particular, looking for ways to improve both the nameplate rating of skimming systems based on performance and the means to apply the nameplate data to a set of planning requirements that better approximates recovery potential in anticipated operating environments. As we are in the final stages of this study, we anticipate that the recommendations may suggest incorporating a standard test, such as ASTM F2709-08, into a new methodology that more fully evaluates skimmer system potential. Our hope and intent is that technologies and skimmer system designs like your coated disc and coated drum skimmers will inform future improvements/changes to the existing EDRC regulations, with the ultimate goal of better aligning planning standards with expected actual performance. Furthermore, we are looking at ways to provide regulatory incentives for plan holders and OSROs to invest in the best skimmer system technology available, including systems that demonstrate, through recognized testing standards, the highest recovery potential in both ideal and realistic spill conditions.

We sincerely appreciate the extra efforts you have undertaken to gather actual performance data on your skimmers in advance of any future regulatory requirements. They also speak very highly to your commitment to develop quality oil spill response products, your drive to push response technologies forward, and to your desire to be fully transparent regarding their actual capability with both government regulators and industry partners. I look forward to reviewing future test results as Crucial Inc. continues to pioneer new and exciting skimmer technologies as an industry leader in spill response equipment.

Sincerely,

J. R. Caplis
Captain, U.S. Coast Guard
Chief, Office of Marine Environmental Response
Policy (CG-MER)

U. S. COAST GUARD NAMEPLATE CERTIFICATION

ENHANCING RECOVERY
RATES OF OTHER
MANUFACTURERS' DISCS
AND DRUMS



CONVERSION OF AQUAGUARD SKIMMER
DISCS TO PATENTED CRUCIAL COATED
TECHNOLOGY .



TESTING OF AQUAGUARD DISC SKIMMER WITH
CRUCIAL'S COATING ON THE DISC SHOWED
INCREASED RATE OF 400%



AQUAGUARD DRUM SKIMMER WITH CRUCIAL'S
COATING ON THE DRUM



VIKOMA DISC SKIMMER -- AFTER APPLYING CRUCIAL'S PATENTED COATING TO THE DISCS, RECOVERY RATE WAS INCREASED OVER 7 TIMES.