Ohmsett--The National Oil Spill Response Test Facility

The Ohmsett Gazette

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Research and Development

Three recent tests proved that the Ohmsett facility affords manufacturers the chance to learn more than they might expect about their products--and to redesign and develop accordingly.

In March 2000, engineers from Mar, Incorporated tested the Autonomous Marine Booster Pump. Also in March, Action Petroleum tested their Model 48 Multi-Skimmer, and in October 1999, Ericam Sports and Entertainment tested their SAK-J5 deployable on-board containment system.

The Autonomous Marine Booster Pump is designed to boost flow rates in a ship-to-shore fuel or water hose line when the distance is too great for the shipboard pump alone. The AMBP is self-contained: a diesel engine driven pump is housed in a floating hull that can be moored in the hose halfway between ship and shore and automatically provides a boost in cargo flow (typically fuel) to expedite transfer operations.

The system also includes all the necessary equipment to control and drive the pump and monitor the flow through the pump. The AMBP is designed to operate remotely, sending signals for monitoring system conditions from either the beach or the ship providing the fuel.

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What's Inside

Lessons Learned from Grounded Freighters Lead to Success Story

U.S. Coast Guard personnel from the Pacific Strike Team, Tom Larson, left, and Mark Baumbaertner walk the beach near the grounded freighter New Carissa. (AP Photo/Jack Smith)

Ohmsett recently had the opportunity to play a major role in addressing the lessons learned from the New Carissa, a freighter which ran aground near Coos Bay, Oregon in February 1999.

A viscous oil pumping system workshop and test were held at the Ohmsett facility in November 1999. The Ohmsett workshop was part of a success story that began with a shipwreck, involved an especially cooperative effort by a worldwide cadre of oil spill industry professionals, and resulted in significant improvements to a viscous oil pumping system.

In November 1997, the freight vessel Kuroshima was blown aground in Dutch Harbor, Alaska with 120,000 gallons of Number 6 heavy fuel oil on board. The viscous fuel oil was lightered (pumped off the vessel) to prevent a spill.

Lightering viscous oil is difficult—the more viscous the oil, the more the friction between the oil and the hose wall inhibits fluid flow. Kuroshima spill responders transferred oil from the port and starboard tanks into the center tanks. There, the intact shipboard heating systems warmed the oil, lowering the viscosity enough to pump it to tanks on shore.

An even greater challenge in lightering viscous oil came when the bulk freighter New Carissa, carrying almost 400,000 gallons of Number 6 heavy fuel oil, ran aground. As the wreck drifted toward the

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U.S. Coast Guard Tests Control Stand Flow Totalizer

During August 1999, the U.S. Coast Guard tested a field modification kit to be used with their Vessel of Opportunity Skimming System (VOSS) and Spilled Oil Recovery System (SORS) control stands. Proposed by Hyde Marine, Inc, the field modification kit incorporates a flow sensor and electronic flow meter with flow totalizer into an existing hydraulic control panel to measure the flow of oil through a hose.

The goal is to help recovery personnel avoid overfilling storage bladders and barges.

"Operators often pump recovered product into remote tanks with no way of knowing how quickly the tanks are filling," says Jim Mackey, vice president of Hyde Marine.

The Desmi DOP-250 pump and Terminator skimmer used by the U.S. Coast Guard are positive displacement devices, which means that the hydraulic flow rate can provide an indicator of pumping rate.

"The Hyde Flow Totalizer measures hydraulic flow delivered to the pump motor, but the digital readout is calibrated to present the pump flow rate and total volume," says Mackey. "The operator sees real-time how much product is being delivered to the storage bladder and a running total of the volume pumped."

The pump/skimmer was held stationary in a boomed area pre-loaded with oil, and it was tested with water and with oil in calm and harbor chop conditions. The system included a skimmer, a SORS/VOSS control stand equipped with the flow totalizer, 100 feet of 4 inch cargo hose, and calibrated collection tanks.

"Ohmsett is the perfect place to conduct verification and calibration testing with oil. Nobody minds if you make a mess."
- Jim Mackey, Hyde Marine

Researchers conducted tests using selected fluids at specified flow rates through the control stand, determining the accuracy between flow meter readings and actual cargo pumping volumes and rates.

"Ohmsett is the perfect place to conduct verification and calibration testing with oil," says Mackey. "Nobody minds if you make a mess."

Flow meter mounted on control stand

The test results included a discussion of test parameters, flow rates, volumes pumped, and associated meter readings. Mackey felt the results were encouraging. "We were pleased with the data, which confirms that hydraulic flow can be used to indicate pumping rate with the Desmi pumps."

Ohmsett test engineer Dave DeVitis concurs. "Quantifying the volume pumped during recovery operations is a very important and difficult piece of operational data. Hyde's approach proved to be an intuitively sound solution."

Upcoming Tests & Training

U.S. Coast Guard
- VOSS training (3 sessions)
- Boot camp / lightering training
- JBF skimmer modifications
- Tow force measurements
- CSC sorbent boom test
- CSC flow diverter test
- Desmi RO-Mop skimmer test

Minerals Mangement Service
- In-situ burning

U.S. Navy
- Skimmer evaluations

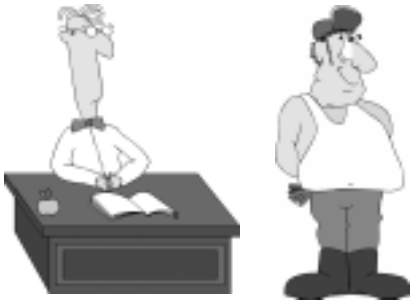
Texas A&M
- Training

Environment Canada
- Emulsion formation test

University of New Hampshire
- Bay Defender evaluation

University of Miami
- New boom design test

Boomer and Dr. Skimmer answer your questions...



Boomer and Dr. Skimmer recently answered the following questions from students:

What was the largest oil spill ever recorded?

Dr. Skimmer: The largest oil spill at sea was 140 million gallons, spilled when the Ixtoc I, an oil well, blew out in Mexico in 1979. The largest amount of oil ever lost on land or sea was 240 million gallons during the Persian Gulf War.

Boomer: By the way, we take spill cleanup for granted now, but, believe it or not, it was in 1967 when we cleaned up a spill for the first time. That was the Torrey Canyon, off the coast of England. That was also the first time dispersants were used to clean up a spill.

What is the government doing to try to prevent oil spills?

Dr. Skimmer: The U.S. government allocates funding for spill cleanup equipment research and development and to train personnel in oil spill cleanup at places like Ohmsett.

Government organizations like the U.S. Coast Guard, Minerals Management Service, and the Environmental Protection Agency help clean up and prevent oil spills.

Laws now exist to prevent contamination and dumping and make companies responsible for cleaning up the spills they cause.

Lessons Learned

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shoreline, putting wildlife habitat in danger, a group of responders from private industry and government institutions scrambled to prevent a spill.

As the vessel's condition deteriorated and rough weather closed in, responders successfully burned more than 200,000 gallons of oil in situ before the New Carissa broke into two pieces. Still, fuel oil remained in tanks on the bow after the burning.

The decision was made to lighter the ship. The U.S. Coast Guard National Strike Force brought in a crew and equipment (screw-type pumps used with an in-line booster and a six-inch hose) and pumped 109,842 gallons of an oil and water mixture over 200 meters to tanks on shore.

It was enough to increase the New Carissa's reserve buoyancy. A few days later, the bow was towed out to sea where it was sunk.

The Kuroshima and the New Carissa groundings brought home the realization that there had to be a more effective way to respond. To address the issue, an international concord of professionals from the oil spill industry—the U.S. Coast Guard and Navy, Oil Spill Response Organization managers, spill contractors, pump suppliers and manufacturers, and engineering consultants—assisted with and attended two important workshops.

The workshops provided lectures and hands-on viscous oil pumping and equipment training. The Pacific Northwest Viscous Oil Pumping workshop was held in September 1999 at the Chevron Asphalt Refinery near Seattle, Washington and a subsequent workshop was held in November 1999, at the Ohmsett facility.

A significant improvement to the viscous oil pumping system was first tested at the Pacific Northwest workshop. The key to the success of the improved pumping system is water injection via an annulus; the injected water forms a "ring" between the oil and the hose wall, thus reducing friction.

"Without the worldwide involvement... we would not have been able to achieve the significant strides we have made."

- LCDR Rob Loesch, U.S.C.G

Two months later at the Ohmsett facility, a second VOPS workshop was held which supported and expanded upon the results of the Pacific Northwest workshop.

The Ohmsett tests were to confirm that changes made in the new prototype annulus were effective, and would produce the same (or better) results as seen at the Pacific Northwest workshop. The Ohmsett tests also would examine whether the water injection ring could hold up in hose lengths up to 400 meters.

U.S. Coast Guard personnel place a pump into the supply tank.

In the Ohmsett tests, divided into three phases, oil (Sundex 790, which has a viscosity exceeding that of Number 6 heavy fuel oil) was pumped from tanks into a hose run around the edges of the test basin. In Phase I, a piping arrangement of about 122 meters of hose was laid out. Phase II consisted of the equivalent of 244 meters of hose, and the third and final phase consisted of the equivalent of 396 meters of hose.

"The most interesting and significant result of the workshop came from the water injection test," says U.S. Coast Guard LCDR Rob Loesch, workshop director. "Water injected through a modified annular injection flange directly resulted in a rapid decrease in hose friction losses as measured by system dynamic head pressure."

"In this test, we had clear real-time data from electronic sensors and from gauges. The results demonstrated the effectiveness of the water injection assisted transfer findings," says LCDR Loesch.

Shortly after the Ohmsett workshop, the U.S. Coast Guard Pacific Strike Team received the first prototype VOPS equipment. The equipment includes a water injection flange with a water injection pump, hydraulic hoses, fittings, hard pipe with pressure gauge, and 400 meters of six-inch transfer hose.

LCDR Loesch credits the success of the workshops to the cooperation of oil spill professionals from around the world.

"Without the worldwide involvement, the water injection flange would not have been considered and we would not have been able to achieve the significant strides we have made."

Ohmsett technician Dave Knapp makes adjustments to the discharge valve.

Ohmsett Specs

We sometimes get questions about the parameters of the Ohmsett test basin. How deep is the water? What kind of oil is available? What sort of waves does that wave flap make, anyway?
We hope the following list of specifications answers your questions.

Basin Specifics

Length	665 feet
Width	65 feet
Water depth	8 feet
Brackish water	Typically 15 - 17 ppt
Tow bridge speed	0 to 6.5 knots
Bridge oil supply tank	2000 Gal

Typical Wave Characteristics

Wave Type	Type	Nominal $H^1/_3$ (inches)	Wave Length (feet)	Period (sec)
#1	Sinusoidal	16.5	42	2.9
#2	Sinusoidal	12.0	14	1.7
#3	Harbor Chop	15.0	N/A	N/A

Test Oil Characteristics

Oil Type	Specific Gravity	Viscosity @ 25°C (cPs)
Hydrocal 300	0.88	150
Calsol 8240	0.932	1,375
Sundex 8600T	0.95	10,000

What's New at the Test Basin?

Repairs, More Salt, and Water Clean Enough to Discharge into the Bay

Think maintaining your backyard swimming pool is a never-ending chore? The Ohmsett test basin has artificial beaches and a wavemaker, holds 2.6 million gallons of water, and hundreds of gallons of oil are regularly discharged into it.

Try keeping that in top condition.

In January 2000, all the water was pumped from the Ohmsett test basin in preparation for repairs to the beaches, wave flap and bridge.

Where did all the water go? Into Sandy Hook Bay…and the New Jersey Department of Environmental Protection didn't mind. That's because testing prior to release of the water revealed that it was pristine enough to discharge as-is into the bay, thanks to Ohmsett's filtration system.

In the emptied basin, bearings on the wave flap were repaired, and the bridges and beaches were painted.

The basin was refilled with water from Sandy Hook Bay, pumped in with the help of USCG Atlantic Strike Team members. Once in the test basin, the water was filtered, the salinity was adjusted, and debris was vacuumed off the bottom of the basin.

Salt was added to raise the basin water salinity for dispersant testing...130 tons of of salt, in fact, to more closely approximate the salinity of open ocean water.

The salinity level can be adjusted and maintained for any testing need, but the water will be allowed to return to its usual brackish state after the dispersant test.

Ohmsett program manager Bill Schmidt, left, and U.S. Coast Guard chief Dale Hemingway comment on the clean water being pumped from the test basin into Sandy Hook Bay.

The empty test basin reveals the beaches awaiting repair.

Please pass the salt! A load of salt arrives to raise the basin water salinity.

This Old House

A new bridge house now crowns the main bridge over the Ohmsett test basin. In August, 1999, the old bridge house, beyond repair, was removed and a new bridge house was put into place with a crane.

The air-conditioned structure houses new electronics and instrumentation. Wiring comes in via a cable trough system which keeps the wiring off the decks during testing.

Out with the old bridge house....

...and in with the new

Research and Development

Continued from page 1

During the course of testing, researchers discovered something unexpected. According to the initial design, they found that the control panel was not accessible for repairs, adjustments, and instrument readings. The AMBP's designers will go back to the drawing board to modify the design.

Action Petroleum tested their drum skimmer to attain recovery rate and efficiency values at varying drum speeds. The skimmer was operated within a circular containment area and supplied with an oil slick one inch thick. Recovery data was obtained for three different drum speeds.

The intent of the test was to measure the drum skimmer's efficiency, but researchers discovered something else, as well. The skimmer was able to recover more of the higher viscosity oil than the pump could offload. Action Petroleum intends to find a higher capacity pump and return to Ohmsett for further testing.

The SAK-J5 oil containment barrier was designed to contain an oil spill in turbulent waters. A skirt anchored beneath the water is meant to prevent oil from surging outside the containment wall.

The first test determined the maximum speed at which the SAK J-5 could be towed. Ohmsett's moveable bridges towed three sections (45 feet) of the SAK J-5, accelerating to and maintaining a speed of 2 knots.

For the second test, researchers rigged the SAK-J5 barrier in a circular containment area 10 feet in diameter within the Ohmsett test basin. While the boom was stationary, 1200 gallons of Calsol were pumped in to a slick thickness of 2 feet.

Researchers modified the SAK J-5 on site, adding lead weights to the outriggers for ballast to maintain the barrier in waves.

Ohmsett instrumentation technician Don Backer connects sensors to the AMBP system.

Out of the hull, the Autonomous Marine Booster Pump system is ready to go.

Tim Kaylor, president of Action Petroleum, and Ohmsett's Dave DeVitis observe drum skimmer testing.

The Action Petroleum drum skimmer ...in action

A look at the SAK J-5 boom with a pump

Ohmsett test director Dave DeVitis and William Showalter and Akil Kamau of Ericam examine the SAK J-5 boom.

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Editor ..... Laurie Holland
Technical Editor ..... Phillip Coyne
Coordinator ..... Kathleen Nolan
Administrator ..... Joyce Rosenberg

News Briefs - Happenings at Ohmsett

Now Showing

Kathleen Nolan, Ohmsett's technical writer, is overseeing the production of an Ohmsett video.

The short video will demonstrate Ohmsett's testing and training capabilities, and will be shown at conferences and trade shows.

But, don't worry if you can't make it to the shows this year. The video can be mailed to prospective clients and will be available early this summer.

Smile for the camera!

Dispersant Feasibility Study Yields Promising Results

A continuation of a feasibility study to see if the Ohmsett test basin might be appropriate for testing dispersants took place during the last two weeks of April 2000.

Dispersants are substances that break oil down into smaller droplets when added to oil spills. Dispersed oil biodegrades with the help of wind and waves, and reduces the oil's impact on the shoreline.

The study, funded by Minerals Management Service and conducted by SL Ross Environmental Research and Ohmsett staff, began in the Fall of 1999.

Last Fall's feasibility study suggested that several dispersant tests could be done in sequence without the concentrations of dispersant in the test basin affecting subsequent test outcomes.

Results also showed that low concentrations of dispersant in the test basin would not obscure underwater viewing.

Fall 1999 tests also revealed that a cellulose filter aid effectively removed dispersed oil from the test basin. This allows Ohmsett staff to quickly prepare the test basin for conventional mechanical equipment tests after a dispersant test.

Jim Lane, left, Lisa Goins-Berntsen, and Joe Mullin, all of Minerals Management Service, with Ian Buist of SL Ross and Ohmsett's Bill Schmidt during the dispersant test series

The aim of the April 2000 portion of the study was to develop a protocol for testing dispersants in the test basin. As the Ohmsett Gazette goes to press, the April portion of the feasibility study has just been completed. Results look promising and will be reported upon in the next issue of the Gazette.

Take the Five-Cent Tour

Actually, a tour of the Ohmsett facility is free. Students from schools, summer camps, and science clubs may take an educational tour, available to anyone interested in learning more about the facility.

Organizations that have taken tours in the past include the High Tech High School (Lincroft, New Jersey), the Monmouth (New Jersey) Junior Science Symposium, MAST, and participants in Take Your Children to Work Day.

One of Ohmsett's most rewarding outreach programs focuses on student interest in oil spills, environmental contamination, cleanup methods, and testing. Staff members work with students to help them with science project research, and Ohmsett plans to add a section especially for students to its website, www.ohmsett.com.

College work-study positions are also available at the facility.

Contact Joyce Rosenberg at (732) 866-7183 for more information, or e-mail ohmsettnj@monmouth.com.

High Tech High School students on a recent Ohmsett tour

Catch us at these conferences

Arctic & Marine Oilspill Pollution
June 14-16, 2000
Vancouver, BC, Canada

Society of Petroleum Engineers
June 26-28, 2000
Stavanger, Norway

ASTM F-20 Meeting
October 10-12, 2000
Sparks, Nevada

Clean Gulf
November 14-16, 2000
New Orleans, Louisiana

Interspill 2000
November 28-30, 2000
Brighton, United Kingdom

International Oil Spill Conference
March 26-29, 2001
Tampa, Florida

Research and Development at Ohmsett

Testing, evaluation and burning of fireboom

Train with oil and full scale equipment

Fastest tow tank speeds for testing full size skimmers and boom with waves and oil

Largest full scale oil spill test facility in North America

For more information about testing or training at Ohmsett, call

Bill Schmidt, Program Manager
Phone: (732) 866-7183
Fax: (732) 866-7189
E-mail: **Ohmsettnj@monmouth.com**

Jim Lane, Project Officer, MMS
Phone: (703) 787-1065
Fax: (703) 787-1549
E-mail: **James.Lane@mms.gov**

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Ohmsett Facility
MAR, Inc.
PO Box 473
Atlantic Highlands, NJ 07716