Oil Spill Response Research & Renewable Energy Facility

The Ohmsett Gazette

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Chemical Herding Agents to Thicken Slicks

In an effort to assess the use of chemical herding agents to thicken oil spills on open water that would allow the slicks to be more effectively treated with chemical dispersants during offshore operations, SL Ross Environmental Research, Ltd. of Ottawa, Canada conducted a week-long test in October 2009 at Ohmsett. This was the fifth experimental task in a multi-year program that was jointly funded by MMS and ExxonMobil.

"The objective was to determine if herders can be used in a spill situation for other than thickening oil slicks in broken ice for burning," said Ian Buist of SL Ross Environmental Research, Ltd.

According to Buist, in the earlier experiments, they studied:

- If there are better surfactants or chemicals available than the original U.S. Navy herder
- Different formulations of herders for application in cold weather
- Use of herders for improving mechanical recovery (skimmers) in broken ice
- Use of herders in salt marshes

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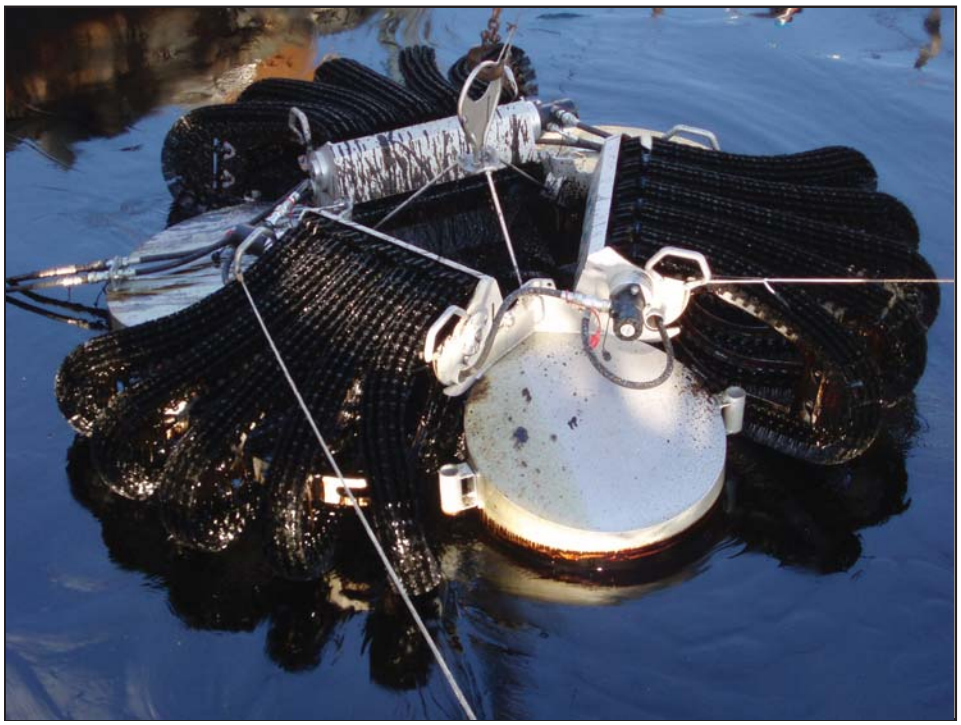
What's Inside

Nameplate Capacity Testing of two Skimmer Systems



The AFTI/Ro-Clean Desmi Giant Octopus was tested to the ASTM protocol for Nameplate Capacity in the Ohmsett test tank.

During the week of December 7-18, 2009, Applied Fabric Technologies, Inc. (AFTI)/Ro-Clean Desmi came to Ohmsett to evaluate the performance of its Desmi Giant Octopus and Polar Bear skimmer systems. The goals of the tests were to quantify the skimmer's Oil Recovery Rate (ORR) and Recovery Efficiency (RE) using the recently adopted ASTM Standard Test Method for Determining Nameplate Recovery Rate of Stationary Oil Skimmer Systems. In addition to the AFTI/Ro-Clean Desmi personnel, there were numerous observers from the U.S. Navy, U.S. Coast Guard and several oil spill removal organizations present to observe the tests.

The Desmi Polar Bear broken-ice skimmer collects oil using six banks of wheel-mounted brushes around the perimeter of the skimmer, and a single DOP-200 pump to offload the recovered oil. The Desmi Giant Octopus features a high capacity collection system of 15 belt-mounted brushes, which also allows for 360 degrees of exposure to spilled oil. The Giant Octopus skimmer uses two DOP-250 DUAL pumps to offload recovered oil.

The skimmers were tested in a 24 feet x 24

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Chemical Herding Agents

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"This experiment at Ohmsett was to see whether herders could thicken slicks from offshore platform blowouts and allow responders to apply dispersants more efficiently," said Buist.

During the experiment a light crude oil was released on the water and allowed to spread. A herding agent was then applied to thicken the slick, after which a dispersant was applied at a dosage that either simulated aircraft application, or a vessel spray system.

"We looked at dispersant effectiveness, operational efficiency, and how much dispersant would have to be applied," said Buist.

He also explained that during dispersant operations, vessels can carry more dispersant and apply it to a targeted area of thick oil within the slick; however, it takes time for the vessel to get to the spill. Aircraft can cover a much greater area and spray dispersant on all the oil in the slick, but as a result of the application, overdosing an area of thin sheen and under dosing thick oil can occur.

"So, we really need to answer the question; can herders be used to improve dispersant operational efficiency when responding to a spill?" said Buist

The next step in their research will be to develop the application system for herders incorporating a method to apply it in small doses.

During the Chemical Herding Agent experiment oil was released on the water and allowed to spread. A herding agent was applied to thicken the slick, afterwhich dispersant was applied.

AFTI/Ro-Clean Desmi Skimmer Tests

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feet boomed section of Ohmsett's outdoor saltwater test tank. In accordance with the skimmer test protocol, the skimmer was positioned in the middle of the boomed area during the test runs. Prior to each test, oil was transferred into the tank to create a slick three inches thick. Ro-Clean Desmi representatives determined the optimum skimmer speed during preliminary runs, and qualifying runs were run at the optimum speed.

Oil collected by the skimmer was pumped to a slop tank until steady state was reached, at which time flow was diverted to collection tanks as timing began. After the slick thickness diminished by one inch (from three inches to two inches), flow was diverted from the collection tanks back to the slop tank and timing ceased. The collected oil was decanted of free water, the remaining oil was mixed, and a representative sample was sent to Ohmsett's on-site oil/water lab for analysis of entrained water content. Test runs were conducted three times and considered valid if the results were within 20% of the mean.

For results of these tests, please contact AFTI/Ro-Clean Desmi at 716-662-0632.

Schedule a Test Today!

If you would like to test your skimmer system to the new ASTM Protocol, please call us at 732-866-7183

Visit our website at www.ohmsett.com to view the Ohmsett testing and training schedule.

Prototype Skimmer Tested for Durability

In early March 2010, the Prince William Sound Shippers, Tesoro Maritime, and Crucial Incorporated returned to Ohmsett to continue testing the modified Crucial prototype skimmer to validate its increased efficiency and rate. The modifications, based on previous tests conducted at Ohmsett, included a thicker fabric on the discs, a more robust scraper, a removable debris guard, splash covers, and a larger disc drive shaft.

This was the fifth test conducted at Ohmsett as part of the Prince William Sound Shippers' pre-purchase evaluation of a skimming system. The skimmer will improve their oil recovery systems capabilities and optimize their response capacity.

"Testing prior to a major purchase is very important," said Eric Haugstad, Tesoro Maritime Co., Director of Contingency Planning and Response. "It gives you the opportunity to find out if it effectively meets your needs before you are out on the water conducting recovery operations. You want to find that out here; not during clean up operations."

The skimmer was tested to the ASTM nameplate capacity standard using fresh and weathered Alaska North Slope (ANS) crude oil. In accordance with the standard, the skimmer was placed in a 9m x 9m boomed off section of the test tank. The test area was filled with 7000 liters of ANS crude oil to create a slick 8cm thick. Data was collected as the skimmer recovered the oil and the slick thickness diminished from 8cm to 5 cm.

"Testing to the ASTM standard allows manufacturers the ability to compare their skimmers on a level playing field," said Wally Landry, President and CEO of Crucial Incorporated. "It also gives us the opportunity to improve our device to obtain effective recovery rates."

In addition to the initial oil recovery test, an extended-run (24 hours) durability test was performed to evaluate skimmer's ability to run continuously for long periods of time. At the end of the durability test, the thick emulsified oil was skimmed and replaced with ANS crude and the skimmer was retested to determine the Oil Recovery Rate and Oil Recovery Efficiency. The results from both tests were compared in order to determine if there was degradation of performance after the extended-run. According to Mr. Haugstad, the skimmer results were very good even after running for 24 hours, non-stop.

After the durability test, the skimmer was evaluated to see how well the skimmer's debris guards performed when seaweed was introduced to the oil slick. "The skimmer preformed very well and the kelp that was used really did not impede the flow of oil or cause the skimmer any problems," commented Mr. Haugstad.

Throughout the week, representatives from the oil/shipping industry, oil spill cooperatives, and independent observers from the U.S. Coast Guard were present to observe the tests. It also provided the Prince William Sound Shippers with the opportunity to conduct their annual meeting.

The Prince William Sound Shippers will be looking to prototype one of the barges in Prince William Sound in an effort to conduct additional field testing before changing over all the barges to the newest oleophillic technology.

With modifications, the Crucial skimmer prototype was tested to the ASTM Skimmer Protocol to determine the Oil Recovery Rate and Oil Recovery Efficiency. In addition, it endured a 24-hour extended run durability performance test.

Wave Energy Prototype Withstands the Marine Environment

In 2002 Able Technologies, LLC of Englewood, NJ received a patent for their design of a wave energy device that can produce clean and renewable energy. After seven years of research and development that included bench-scale modeling, architectural blueprints for siting, and a scale-model built for wave tanks, Stanley and Linda Rutta brought their device to Ohmsett for a week in November to test in realistic marine environment.

The Electricity Generating Wave Pipe (EGWaP) is a point absorber wave device that is fixed to the bottom of the ocean floor.

The Electricity Generating Wave Pipe (EGWaP) was placed in the water fitted with probes and sensors that measured the energy output of the device. Waves were introduced to determine its ability to produce energy, as well as its ability to withstand the marine environment.

As waves pass over the device, the kinetic energy of the isolated vertical movement of the water is converted to power. This in turn may be converted to electricity.

"It is simple, but elegant. It's a very efficient way to make electricity," said Linda Rutta, President, Able Technologies, LLC.

In the Ohmsett test tank, the 12-foot cylindrical prototype was placed in the water fitted with probes and sensors that measured the energy output of the device. Waves were introduced to determine its ability to produce energy, as well as its ability to withstand the marine environment.

"The tank configuration was perfect and it proved to be a positive experience. It tuned to the waves beautifully and the output performance was very good," said Rutta. "This test was immensely important. It showed us that we can work with models but without the waves, we can not determine how it would perform."

Rutta believes that the tests performed on the Electricity Generating Wave Pipe provided encouraging and very helpful data relating to output and performance. "Now that we have the test and credibility behind us, we look forward to more successes."

Able Technologies, LLC has applied for a small business grant from the Department of Energy, so that they can move forward with the development of the Electricity Generating Wave Pipe. "We need the funding to analyze the data from this test and customize a scale-up version to put into the ocean to see what it will do," said Rutta. "Once the device is commercialized it is a very clean and renewable form of energy."

Wave Energy to Electric Power Technology

Float Incorporated is a small, San Diego-based company working on proprietary technology for the operation of large floating platforms typically moored offshore. The generic Float platform, known as a Pneumatically Stabilized Platform (PSP), is composed of multiple open-bottom cylindrical air buoyancy tanks assembled in a rectangular pattern to form a construction module. Air flow is controlled from cylinder to cylinder through manifolds. This airflow helps reduce the magnitude of wave pressures beneath the structure, providing platform motion stability and acts a mechanism for dissipating wave energy.

Recently, Float Incorporated designed a wave energy converter (WEC) for use with a PSP that can potentially convert wave energy into electricity very efficiently. During the first week of December 2009, they conducted a WEC study at Ohmsett. The device, known as the "Rho-Cee," is a large, floating oscillating water column (OWC) system. The design's central principle is that its input impedance (pressure / velocity) matches the characteristic impedance of the targeted waves, to ensure maximum energy capture.

The study in the Ohmsett wave tank, funded by the Minerals Management Service (MMS), was to verify the impedance-

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Device Proves to be an Absorber of Wave Energy

Resolute Marine Energy, Inc., based in Boston, MA, designs and builds wave energy converters (WECs) that harvest clean energy from ocean waves. The company came to Ohmsett in February 2010 to conduct experiments to determine certain performance characteristics of a prototype wave energy converter in Ohmsett's test tank.

The prototype WECs Resolute tested at Ohmsett is based on a patent-pending design that, according to Resolute CEO Bill Staby, may generate electricity at low cost and with minimal ecological impact. In preparation for the full week of tests at Ohmsett, RME staff had to design, build, program, and pre-test the sensing and data acquisition system they used to monitor the WEC buoys while being exposed to waves in the tank.

"With the advanced sensing and data acquisition system we built, we can accurately measure the hydrodynamic response of the device in real time and then use the information we've collected to further-optimize the design." Mr. Staby said.

During the test run, various WEC buoys were anchored to the bottom of the tank while a series of cables and pulleys transmitted the wave energy absorbed to dynamometers equipped with sensors mounted on the Main Bridge. Various anchoring configurations were also tested. While the wave maker was generating various wave configurations, power generated by the WEC was run through a load bank and certain parameters were viewed and recorded in an Excel database.

"The tests were very successful and they proved that our WEC is an extremely efficient absorber of wave energy," Mr. Staby said. "In addition, our work at Ohmsett will allow us to start assembling base-line data that we will use to derive an accurate estimate of the levelised cost of energy we can expect from this WEC. So far, we're optimistic that this particular design can eventually achieve grid parity - i.e. compete with electricity generated by coal- and natural gas-fired plants."

Funded by the Minerals Management Service (MMS), the tests were observed by staff members of MMS, the Department of Energy and the National Renewable Energy Laboratory (NREL) who have partnered to develop test tank protocols for marine hydrokinetic devices.

"Ohmsett is a terrific facility for the types of experiments we needed to conduct," commented Staby. "The wave maker produces lovely sinusoidal waves that are completely undisturbed as they move down the very long tank," said Staby. "The MAR, Inc. crew was attentive to our needs and we never had to waste time looking for particular parts or supplies…everything was right there! We'll definitely be back for more testing."

The Resolute prototype wave energy converter was anchored to the bottom of the Ohmsett wave tank while waves were gernerated in various configurations to determine certain performance characteristics of the device.

Wave Energy Technology

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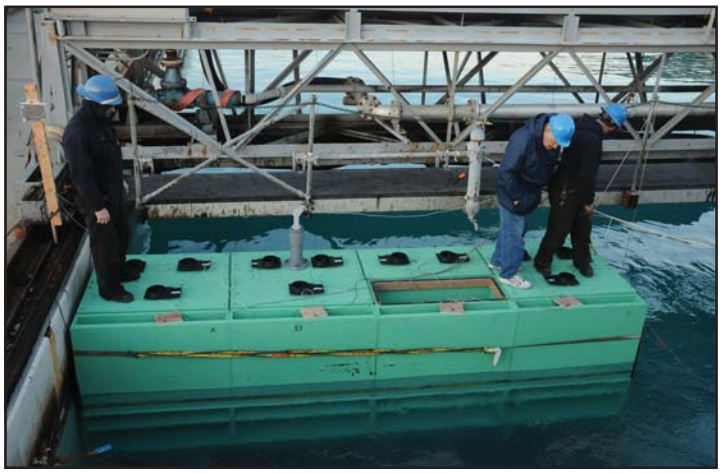
matching basis of the Rho-Cee WEC concept and design, and to reveal any discrepancies between performance expectations and observations so that they may be identified, remedied, and subjected to further testing. It also provided a graphic demonstration of the Rho-Cee WEC performance in wave environments.

With the data collected during this study, Float Incorporated was able to gain new insight allowing further advancement of the concept program.



The Rho-Cee wave energy converter can potentially convert wave energy into electricity.

Experiment to Predict How Dispersants Perform at Sea

Visitors gathered at Ohmsett during the week of October 26, 2009 to observe dispersant effectiveness tests in real world conditions. Funded by the Minerals Management Service (MMS), the tests were the last in a series of Ohmsett dispersant experiments to determine their effectiveness as a tool for oil spill response. This particular experiment compared the different oils dispersed at Ohmsett scale tests with lab-scale testing, enabling researchers to make predictions on how dispersants would perform at sea.

The visitors consisted of members from the Korean Coast Guard, the Korean Ocean Research and Development Institute, private industry, as well as members from the Regional Response Team II (RRTII) which is comprised of federal agencies and is a planning, policy and coordinating organization for New York, New Jersey and Puerto Rico. All the guests were interested to see how MMS tests and evaluates the effectiveness of chemical dispersants.

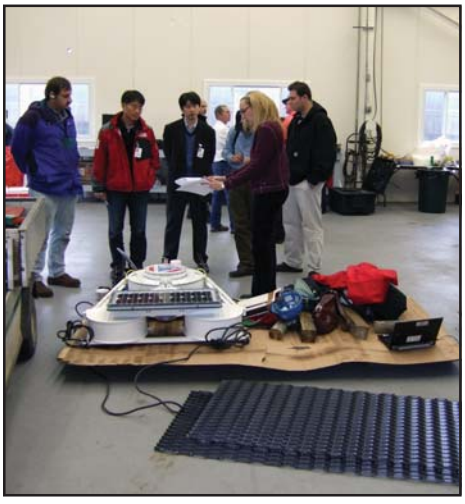
In the high bay at Ohmsett, stations were set up where the U.S. Coast Guard Atlantic Strike Team, EPA/ERT New Jersey and General Electric (GE) Analytical Instruments, provided demonstrations of oil detection and monitoring systems. The Atlantic Strike Team brought the C-3 Fluorometer that determines the concentration of dispersed oil in the water column. The EPA/ERT brought the C-6 Fluorometer which has enhanced monitoring capabilities that show the health and vitality of the water-ways. GE brought the Slick Tracer Buoy which is a self contained photo cell unit that when deployed, monitors for the presence of oil, then alerts the responders either remotely or by cell phone.

After these demonstrations, the visitors were escorted tank-side to view the dispersant tests being conducted to establish large-scale dispersant effectiveness estimates. The experiment was conducted by Randy Belore of S.L. Ross Environmental Research, Ltd. He explained the theory behind the dispersant work and proceeded to apply dispersants to a slick.

"It was a good opportunity to see the dispersant test from start to finish; from laying oil down to applying dispersants, to the fluorometer readings." said Joe Mullin, program manager for MMS.

Twenty oil samples taken from the Ohmsett dispersant experiments were sent to various laboratories world-wide for small-scale laboratory testing of the dispersant effectiveness.

"When all of the oil analyses are complete, we have a data set of how these oils worked at large-scale and how they performed at laboratory-scale. The next step is to review the results and determine if we can predict performance at sea," explained Mr. Mullin.



Stations were set up in the Ohmsett high bay to provide demonstrations of oil detection monitoring systems.

Dispersant tests were conducted in the Ohmsett tank to establish large-scale dispersant effectiveness estimates and to determine if researchers could predict dispersant performance at sea.

News Briefs

Visit Our Updated Web Site

We've updated our web site with more information and a fresh new look. It features dynamic new testing capabilities, a searchable database of activity summaries, scientific articles, and a library of publications, as well as other helpful details about Ohmsett.

Our updated website, www.ohmsett.com, will provide the information you need about Ohmsett's staff, services, capabilities, and experience. It's your one-stop resource to connect with Ohmsett, learn more about us, and make informed decisions about ways we can help with your current and upcoming testing, training, and research.

The Ohmsett Gazette is published by Ohmsett -The National Oil Spill Response Research & Renewable Energy Test Facility to update our readers on activities at the facility.

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U.S. Coast Guard Trains at Ohmsett

The United States Coast Guard (USCG), in partnership with Ohmsett, continues their comprehensive oil spill responder training (OSRT) program. Several times a year Ohmsett hosts a five-day training course that provides Coast Guard personnel with both classroom and hands-on training using state-of-the-art response equipment currently in use by the Coast Guard. The curriculum includes actual oil spill recovery techniques and procedures used on a variety of Coast Guard oil recovery and ancillary systems. The training is conducted using the test tank and other Ohmsett facilities.

In March 2010 members of the Coast Guard attended classroom training which focused on general Coast Guard oil spill response fundamentals, safety, and specific VOSS/SORS oil spill response equipment systems. They also participated in hands-on practical training where students were divided into groups and rotated through five equipment stations.

At one of the stations, students were required to complete hands-on oil recovery training in the Ohmsett tank. There they practice recovering oil with spill equipment used in the field under conditions that simulate an actual oil spill.

The teams practiced with two wave types; calm and harbor chop. As the students became more proficient in skimming techniques, the training exercises took on a competitive nature to see who recovered the most oil.

Ohmsett is recognized by the USCG as a premier training facility for providing outstanding hands-on instruction on full-scale equipment in real oil for their OSRT course to train their personnel.

Paper Presented at the Clean Gulf Conference & Exhibition

Ohmsett's staff met with professionals from regulatory agencies, federal and state government, and the private sector regarding our services at the 19th Annual Clean Gulf Conference & Exhibition in New Orleans, LA.

Ohmsett Mechanical Engineer Paul Meyer and the U.S. Coast Guard National Strike Coordination Center Logistics Management Specialist Mike Crickard presented a technical paper entitled, *Development of an ASTM Stationary Skimmer Test Protocol - Phase 3: Application*.

Ohmsett's exhibit on the conference floor, showcased the latest skimmer protocol testing, full-scale dispersant effectiveness testing, training, and research conducted at the facility.

Ohmsett's Paul Meyer (left) and U.S. Coast Guard's Mike Crickard (right) presented, *Development of an ASTM Stationary Skimmer Test Protocol - Phase 3: Application.*

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For more information call (732) 866-7183
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