Oil Spill Response Research & Renewable Energy Test Facility

The Ohmsett Gazette

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Norlense Oiltrawl Takes on the Tank

NorLense AS of Norway has designed and developed an Oiltrawl system to recover oil at relative speeds ranging from 1 to 4 knots. It is suitable for rivers, areas with strong currents, and open waters. The intention of the passive system is to recover small patches or sheens of oil that are spread over a large area by being able to move rapidly and encounter spilled oil from a large area quickly. The system was previously evaluated in varying surface conditions, oil types and advancing speeds at Ohmsett in early 2012.

The Oiltrawl incorporates a guiding boom, oil/water splitter, and final collection bag to collect the recovered oil. The guiding boom is designed to provide a wide encounter width while minimizing towing forces and maintaining smooth sweep legs to funnel the oil into the oil/water splitter segment. Located at the end of the splitter segment is an attachment cross beam in which the collection bag mouth "drops" into. The distinctive design allows for the removal and installation of collection bags by merely lifting the collar from the cross beam; this allows for exchanges of storage

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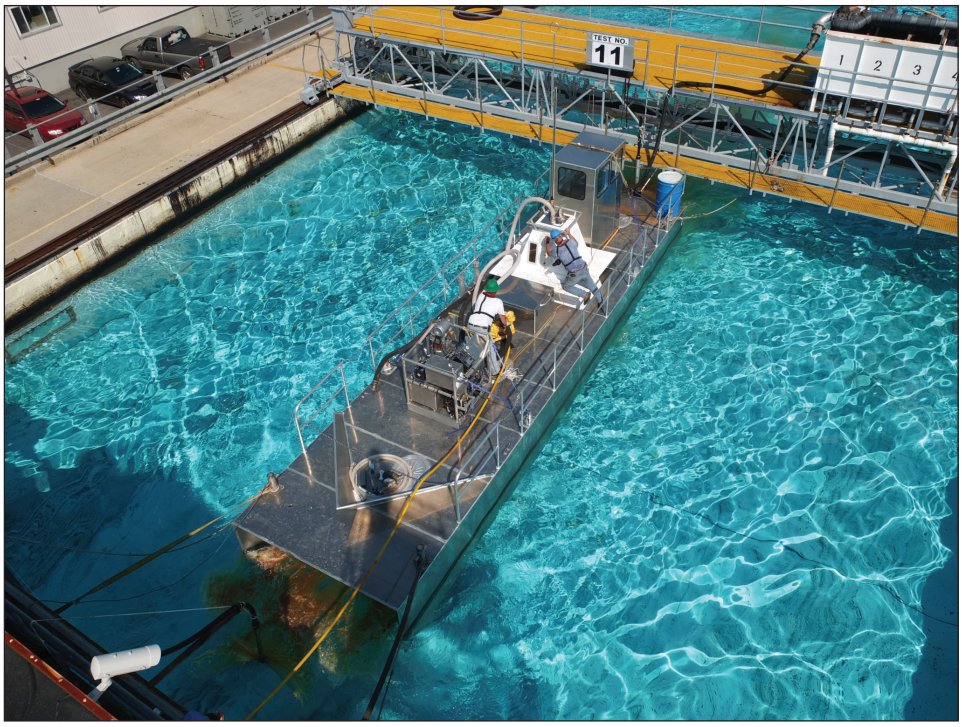
What's Inside

Unique Skimming Vessel Tested



Extreme Spill Technologies designed a new type of oil spill response technology that uses a vessel equipped with a pump system that takes advantage of the oil and water densities to separate the fluids.

Extreme Spill Technology (EST) of Halifax, Nova Scotia, Canada was started in 2005 with the goal of improving oil recovery technology. After six years of intensive research and prototype development, EST has built an oil skimmer system that is capable of removing floating oil from the water. It is a catamaran-style vessel that advances through oil slicks and channels the oil between the integrated pontoons for recovery by taking advantage of the differences in oil and water densities.

This unique technology uses a vacuum pump system which causes the oil collection tower to fill with water. Once oil reaches the tower entrance, it rises to the top of the tower due to the difference in specific gravities. As the oil remains in the tower further gravity separation occurs over time, which increases the recovery efficiency. This system allows the operator to see how much fluid has collected and determine when to offload the product. A second pump system is used to offload the product to storage.

The vessel underwent a series of demanding tests at Ohmsett during the week of September 10, 2012 to determine how well the vessel performs in collecting oil. The whole concept of a vacuum tower and pumping system has proven to be a viable oil recovery technology. This is the first time

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Motion of Sea Barrier Studied

HALO Maritime Defense Systems, based in Andover, Massachusetts, has designed the Maritime Sea Barrier for securing critical waterside assets vulnerable to a fast boat or diver attack. The barrier was tested at Ohmsett in June 2012 to observe the motion of the structure and quantify loads within the barrier as it was subjected to various wave and current conditions.

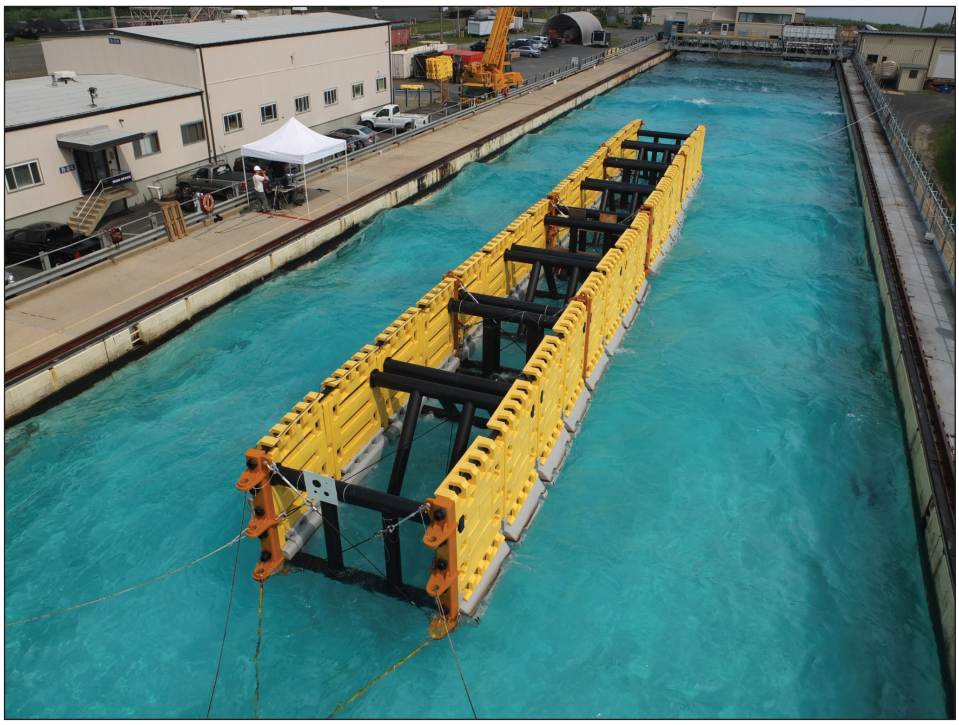
The Maritime Sea Barrier is built in modular units 60 feet long and the barriers are connected to each other with vertical pins. By linking multiple barriers together, a structure of almost unlimited length can be constructed. During the June test, two barrier modules were tested in two ways: stationary and towed. In the stationary mode, concrete anchors were deployed in the test tank, allowing the test engineers to change the orientation (knife-edge, angled, and broadside) of the barrier with respect to the waves. While being towed in the tank, the barrier was tested in two orientations, knife-edge and broadside, in calm conditions and in waves.

These tests enabled HALO engineers to identify areas for further development. HALO made a number of improvements to the barrier and returned to Ohmsett in August 2012 to repeat the tests and to observe the effectiveness of the modifications.

"I think that testing at Ohmsett was critical to understanding the hydrodynamics of the structure," said Justin Bishop, founder and chief technology officer of HALO. "It's important to see the equipment in a controlled environment and make changes in-situ, whereas you can't do that in the real world environment - the open ocean - safely; and it would be cost prohibitive. At Ohmsett we could do the modifications quickly and in a safe environment."

With the new components in place, a barrier was anchored in the tank and subjected to waves in a broadside orientation. Following these tests, two barriers were linked together and anchored so they were subjected to waves in a knife-edge orientation. For the final series of tests, a single barrier was towed broadside to the direction of the tow, simulating the barrier in a current, and the tows were conducted in both calm conditions and in waves.

"With the observations during the tests, we were able to refine the system to adjust to various ocean conditions," Bishop explained. "The next phase will be more testing. We will be coming back to Ohmsett in May or June with another system we want to test."



The HALO Sea Barrier was tested in various waves in the Ohmsett tank to study the hydrodynamics of the structure.

Dispersant Research on Oil Emulsions

In their ongoing research for the use dispersants on oil spills, ExxonMobil Upstream Research of Houston, Texas and S.L. Ross Environmental Research, Ltd. of Ottawa Canada conducted a study of the dispersability of oil emulsions at Ohmsett from August 13-24, 2012. The objectives of the two week study were to determine if oil emulsions could be dispersed and if they could be dispersed, which of the two dispersants used during the study was more effective.

The emulsion samples used during this study were created in the Ohmsett test tank during previous work funded by the Bureau of Safety and Environmental Enforcement (BSEE) and conducted by S.L. Ross.

A series of two test runs were conducted each day to compare the effectiveness of each dispersant; Corexit 9500 and a gel dispersant. Using Ohmsett's standard test method for dispersant effectiveness, the emulsions were placed on the water's surface as the waves were building to a breaking state; then dispersant was applied (prior to the actual breaking waves). "We used the same oil emulsions for each dispersant," said Tim Nedwed, engineering associate for ExxonMobil Upstream Research Company. "We conducted these parallel tests runs to determine which dispersant worked better."

The results from this study are propriety and the property of ExxonMobil and S.L. Ross Environmental Research, Ltd.

National Strike Teams Test and Train with New Equipment

Subsequent to responding to Deep Water Horizon oil spill, and due to the age and condition of the U.S. Coast Guard National Strike Force (USCG NSF) equipment, replacement DOP Dual helix brush skimmer systems were purchased for each Strike Team. The helix brush drive mechanism rotates on a curved stainless steel shaft enabling the brushes to "grab" the oil from any side of the skimmer and pull it into the DOP Dual pump. "The DOP Dual is the latest generation of Desmi skimmer which with the helix brush adaptor makes it a much more efficient brush-type skimmer," commented Mike Crickard, logistics management specialist, USCG, NSFCC.

During the week of September 17, 2012, the USCG introduced the system to a cadre of more than 20 students comprised of six to seven members from each of the three NSF Strike Teams (Atlantic-AST, Gulf-GST, Pacific-PST), providing them with hands-on training operating the DOP Dual Helix Brush adaptor skimmer. "The session beta tested the overall performance of the system as well as provided a nucleus of NSF end-users operational stick-time skimming oil. The training was specifically targeted to the three teams because during the upcoming year they will receive the system in their inventory," stated Crickard.

In addition to the students, members from the USCG Research and Development Center, Strike Force Coordination Center, USCG Headquarters Offices of Marine Environmental Response (CG-MER-1), and the Ocean Engineering Pollution Response Team (CG-432-C) came to the facility to participate and observe the equipment testing and Strike Team member training. "The event provided a great opportunity for all offices currently engaged in the Coast Guard's environmental protection oil spill response mission to see our new more efficient skimming system in action. This is always a positive!" stated Crickard.

The first day was a demonstration of the equipment beta tested to the ASTM F2709 Standard Test Method for Determining Nameplate Recovery Rate of Stationary Oil Skimmer Systems. "We showed the students what the Ohmsett standard test consists of: three runs in the tank; taking samples of the recovered fluids; and running a lab analysis," explained Crickard. "The skimmer itself, operated in ideal conditions, was 89 to 90% efficient per the test standard."

Even with a threatening hurricane and heavy rains all week, the group was able continue with the program by condensing the training into three days. During the training program, students received hands-on training in the Ohmsett tank with the DOP Dual system. There they participated in the recovery of oil released into the tank which enabled them to become more proficient with the new equipment.

Crickard remarked, "This type of introduction of the equipment with the hands-on training worked well when we introduced the flourometers to the NSF two years ago, we decided to try it with the Desmi Helix Brush Skimmers. If the budget will allow, we want to do the same type of beta testing and training in the near future as we deliver newly designed Temporary Storage Devices to the Strike Teams."

The DOP Dual Helix Brush skimmer was tested for overall performance using the ASTM F2709 Standard Test Method for Determining Nameplate Recovery Rate of Stationary Oil Skimmer Systems . The U.S. Coast Guard recently aquired the latest generation of the Desmi skimmer.

U.S. Coast Guard National Stike Force Team members train with the new Desmi Helix brush skimmers. Each NSF team will receive the new skimmers in the upcoming year.

Validating the Window of Opportunity for Dispersant Use Model

Recent large scale use of dispersants during the BP Deepwater Horizon spill has heightened interest in the concerns associated with chemical dispersants. In an effort to gather more data, and to promote a better understanding of the potential benefits and issues associated with dispersant use, the U.S. Department of the Interior's Bureau of Safety and Environmental Enforcement (BSEE) has funded an on-going program for research and testing of dispersants.

Part of this program was conducted in 2007 by S.L. Ross Environmental Research, Ltd. of Ottawa, Canada to evaluate the potential time window for dispersant use on Gulf of Mexico crude oils. This resulted in two recommendations:

1. Complete additional correlations using oil property data from sources outside of the U.S. Gulf of Mexico (US GOM) or from new analyses of additional oils from the US GOM to verify the models developed in the study; and
2. Collect data on oil behavior and dispersibility of oils from large tank tests or field spills to validate both the spill modeling results and the oil dispersibility criteria used in the study.

BSEE addressed the first recommendation by a contract with Environment Canada to evaluate and improve the correlations originally developed using data for additional oils present in Environment Canada's worldwide oil property database. The second recommendation was addressed by BSEE with tank testing conducted at Ohmsett in late May and early June 2012,

"The research during this project involved the long-term weathering of several crude oils under simulated open water conditions on the Ohmsett test tank," explained Randy Belore of S.L. Ross. "Depending on the crude oil used, the weathering took place over continuous periods ranging from 3.5 to 61 hours."

As the oils weathered, they were monitored over time by testing samples using an accepted laboratory scale dispersion effectiveness test in the Ohmsett oil/water laboratory. Changes in oil properties such as density, water content, viscosity, and microscopic water droplet distribution, were also determined in the lab.

"Additional Ohmsett tank testing with oils spanning a broader range of properties and compositions would improve the confidence in the dispersant time window model building and validation process," commented Belore.

Lab Tests vs. Tank Tests

The question of the relative effectiveness of different dispersants was a major issue during the BP Deepwater Horizon spill response in 2010. One of the tasks facing responders during the clean-up was the need to justify the dispersant product they used. These questions about the use of large amounts of dispersant and the toxicity lead to demands that a more effective and less toxic product be identified.

During the emergent conditions of the Gulf spill, researchers had to rely on small-scale test methods to address the effectiveness question. In addition, they looked to previous Bureau of Safety and Environmental Enforcement-sponsored work which studied the relationship between bench-scale dispersant effectiveness test methods and Ohmsett testing for a wide range of U.S. outer continental shelf (OCS) crude oils and Corexit 9500.

From this research, effectiveness rankings of different dispersant products have been known to vary widely from method to method for reasons that are still not clearly understood. S.L. Ross Environmental Research, Ltd. of Ottawa, Canada sought to build on this work to establish the strengths of existing bench-scale test methods for assessing the performance of different dispersant products.

During the week of July 9, 2012, dispersant tests were conducted at Ohmsett using three commercially available dispersants

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Ken Trudel of S.L. Ross Environmental Research, Ltd. tests the dispersed oil/water samples in the Ohmsett laboratory.

Norlense Oiltrawl Takes to the Tank

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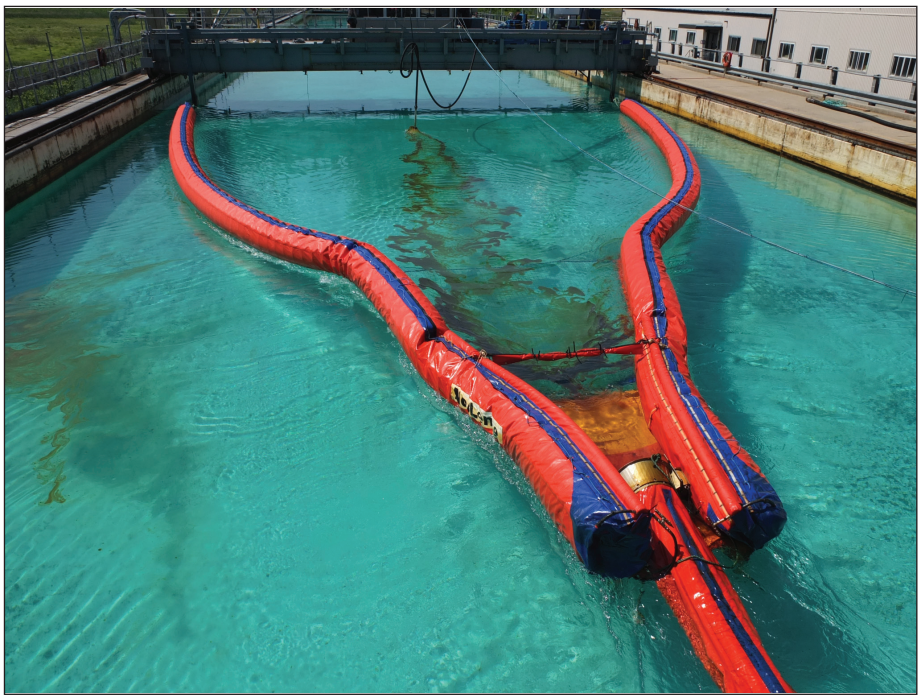
bags while in the field.

"The system is easy to deploy and simple to operate. Short deployment time and the absence of mechanical equipment, makes the system suitable for locations where timeliness is of the essence," explains Hugo Svendsen, research and development manager, NorLense.

Using images captured by the above and underwater cameras during the early 2012 testing at Ohmset, the Oiltrawl's performance was studied and as a result, design modifications were made to the system. These modifications were implemented and evaluated when Norlense returned to Ohmsett the week of June 25, 2012.

"The initial testing showed that the design of the tank itself affected the results, so modifications had to be done to the equipment to ensure that the results were realistic for what we will experience in a real situation on open water," said Svendsen.

During the test in the Ohmsett tank, the Oiltrawl was rigged between the Main Bridge and the Auxiliary Bridge and encountered medium and heavy oils. The system performance was tested in calm and wave conditions. For each test, the system made two passes in the test basin using the same test conditions for each pass. "This technique is often used to increase volumes used per test to minimize the sensitivity to inherent measurement error," said Dave DeVitis, test director at Ohmsett.



The Oiltrawl system recovered an oil slick while being tested in various conditions as it was towed in test tank.

"The results show, as always, that there is room for improvements, and new time for further testing is already booked in 2013," Svendsen stated.

To schedule a test visit
www.ohmsett.com
or call 732-866-7285

Skimming Vessel System

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this type of system has been tested at Ohmsett.

During 16 test runs, the vessel was tethered between the main and auxiliary bridges and towed through oil slicks in calm and wave conditions. Hydrocal 300 and Calsol 8240 were used as test oils. "In calm water, the vessel collected significant quantities of the lighter oil. Testing with the heavier oil revealed that the openings in our debris grid were too small to let the oil flow through easily, thus reducing throughput efficiency," commented David Prior, president of Extreme Spill Technology. "Only by observing the underwater videos at Ohmsett could we understand this problem. It's a small detail but with a big effect."

Four test runs were conducted in two different wave conditions to determine the skimmer's performance in waves. "In waves the vessel recovered oil quite well at low speeds. In higher waves the lively action of the vessel interfered with efficient oil recovery. Future vessels will contain our patented turbulence control system (TCS) which solves this problem. The underwater videos confirmed that our TCS system will work well when installed," explained Prior

At the end of each test run, the recovered oil/water mixture was transferred to the Ohmsett recovery tanks for measurements and allowed to further separate. After the free water was removed from the collection tanks, samples of the recovered oils were taken to determine Throughput Efficiency (TE) performance values. "Several other significant lessons were learned at Ohmsett which will allow us to produce a vessel capable of recovering oil in rough seas. The testing demonstrated that our concept is sound but needs refining."

"Testing at Ohmsett was a very good experience," said Prior. "The knowledge gained could not be otherwise obtained. It was absolutely essential to our company's R&D efforts."

Training for Arctic Region Responders

With the current expansion of oil exploration, drilling, and transportation activities in the arctic region, it is extremely important to have trained and highly skilled spill responders ready at a moment's notice to tackle any size spill that may occur. Alaska Clean Seas takes this responsibility seriously and offers several types of training for their members during the year. One such training is the hands-on oil spill response course they conduct at Ohmsett.

In October 2012, ACS brought spill responders to Ohmsett for two separate week-long oil spill response training sessions. The programs gave responders the opportunity to practice hands-on oil spill equipment set-up, recovery, maintenance and decontamination.

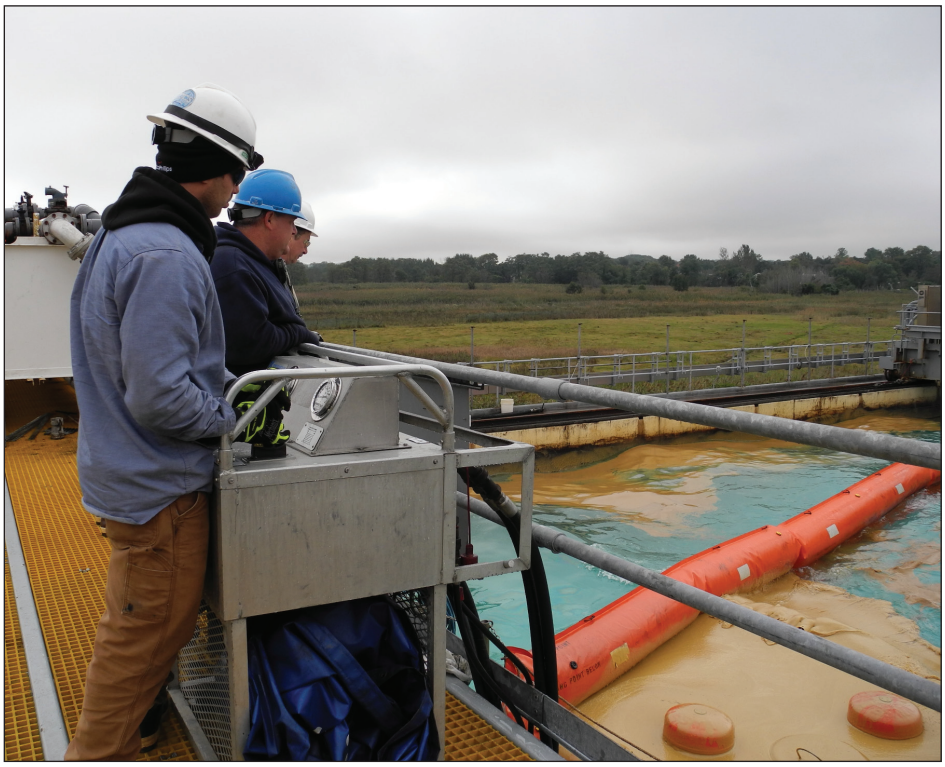
ACS is an oil spill response cooperative whose membership includes oil and pipeline companies engaged in or intend to undertake oil and gas exploration, development, production and pipeline transport activities on the North Slope of Alaska. They provide personnel, training and equipment for support of its members in preparing for and cleaning up oil spills. Personnel from member companies including BP, Conoco Phillips, ENI, and their contractors, attended the October courses.

In this custom-designed training, ACS instructors, Gary Stock and Pat Cosgrove, presented a course curriculum specific to their needs. Each week students participated in classroom time that covered all areas of spill response including fast-water inland spills, delta, offshore, river and land spills.

During three days of skimmer exercises with oil in the Ohmsett tank, emphasis was placed on reinforcing what the students learned in the classroom. In addition to the equipment they brought with them from the North Slope, ACS also used equipment from three vendors: Lamor, Elastec and Crucial, Inc. Each manufactures' equipment exists in the ACS inventories at the North Slope. Students had an opportunity to assemble and operate these skimmers. The tank exercises involved skimming in simulated open-water conditions including calm, harbor chop and regular waves. "The hands-on experience with real oil was invaluable," said Beau Croisant of Pacific Environmental. "We do a lot of training on the Slope, but to see the efficiency of the skimmer and tune it to maximize the oil to water ratio is a good experience."

The use of real oil during the training exercises was a valuable practice for the students. According to Jeff Peck, a contractor for Conoco and a volunteer member of the spill response team, the training they receive on the North Slope includes putting the equipment in the water, hooking up hoses and simulating oil with peat moss. "Up there, you put [the skimmer] in the water and see it turn and spin, but you never know how much oil it can pick up. When you come here to Ohmsett, you can see how much is picked up. It's really surprising. That is why it is so very important to get the visual. A picture is worth a thousand words."

After four days of Ohmsett training, the students traveled to MSRC in Perth Amboy, New Jersey to participate in an open water response equipment deployment exercise on board the New Jersey Responder.



During the Alaska Clean Seas hands-on training exercise, Beau Croisant of Pacific Environmental practices skimming oil which will provide him with the necessary skills for efficient spill response.

Ohmsett provides a venue for private sector and government agencies to train their personnel using their own curriculum and equipment. Hands-on training sessions are available with or without classroom instruction.

For customized classes that meet your specific training needs, call 732-866-7286.

Meet Our Interns

Ohmsett participates in a mentorship program with a nationally recognized Blue Ribbon specialized local high school that focuses on pre-engineering, math and science curriculums. High Technology High School, located in Lincroft, New Jersey is a cooperative between Monmouth County Vocational School District and Brookdale Community College. As part of our mentorship program, we engage a new generation of engineering and environmental students by introducing them to oil spill response technology and remediation efforts.

Since the beginning of the fall 2012 semester, we are fortunate to have the opportunity to mentor two very bright students who are interested in pursuing a career in environmental and chemical engineering. Caitlin Gee is in her senior year at High Technology High School and interested in environmental or chemical engineering. More specifically, she wants to focus on remediation and preventing toxins from entering the environment. "I am grateful for the opportunity at Ohmsett to explore the field of oil cleanups," said Gee. In her spare time, she likes running and playing softball.

Caitlin Miller, also a senior at High Technology High School, wishes to pursue a degree in chemical engineering focused specifically on sustainable energy. She enjoys researching and experimenting with different biofuels and believes the experiences gained at the Ohmsett facility will help her pursue this goal. In her free time she enjoys playing soccer.

The interns' responsibilities vary depending on our schedule and include documenting ongoing tests using digital still and digital video equipment, editing videos, preparing PowerPoint presentations, and performing Internet research and literature searches related to oil spill response activities. This year, Ms. Gee and Ms. Miller will assist their Ohmsett mentor, Paul Meyer, with developing a wave matrix that demonstrates the types of wave capabilities we have to offer. The interns are documenting the wave patterns with still and video photography that will be shown to potential clients of the facility, as well as posted to the Ohmsett website.

Caitlin Gee (back) and Caitlin Miller (front) are participating in the High Technology High School mentorship program. While at Ohmsett, they are helping their mentor, Paul Meyer, prepare for a presentation at a upcoming conference by reviewing test documentation and photos.

The Ohmsett Gazette is published bi-annually 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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Lab Tests vs. Tanks Tests

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and three crude oils. These dispersants were Polychem Dispersit SPC1000, Nokomis 3-AA, and Accell Clean DWD. The three crude oils used in the tests were Plains Exploration and Production Co. PXP-01, Pacific Energy Resources PER-038 (both U.S. west coast crudes), and ExxonMobil Endicott crude (from the Alaskan North Slope). Testing was conducted using the standard Ohmsett Dispersant Test Protocol under similar conditions to other comparable dispersant tests conducted at the facility, including producing a breaking wave field. Throughout the test, researchers conducted in-situ monitoring and performed laboratory analysis as back-up to their monitoring.

The final results and report for this project are still pending.

Testing • Training • Research

Ohmsett is managed by the Bureau of Safety and Environmental Enforcement (BSEE) through a contract with MAR Incorporated.
For more information call (732) 866-7183
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