Ohmsett Trains Oil Spill Responders

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Abstract

Ohmsett – The National Oil Spill Response Test Facility, located in Leonardo, New Jersey, is dedicated to providing independent and objective performance testing of full-scale oil spill response equipment; improving technologies through research and development; and for providing realistic training to response personnel. The U.S. Minerals Management Service manages the facility as part of its mandated requirements by the Oil Pollution Act (OPA) '90 to ensure that the best and safest technologies are used in offshore oil and gas operations and emergency response.

Ohmsett focuses on technical, classroom, and hands-on training for spill response personnel and prepares responders with the most realistic full-scale training before an actual spill. In partnership with the United States Coast Guard (USCG), Texas A&M University National Spill Control School, and SL Ross Environmental Research Ltd., Ohmsett has developed a comprehensive course program that includes: USCG Class C Response Technician training, Oil Spill Response and Strategies Training (in English and Spanish), and Dispersant Training for the Oil Spill Responder.

Each course emphasizes classroom exercises and practical hands-on use of the oil spill equipment and technologies in realistic conditions. Classroom exercises are performed under the direction of certified industrial hygienists and experienced emergency responders. The program also incorporates the National Incident Management Systems (NIMS) Incident Command Systems (ICS) training.

Following classroom instruction, students receive hands-on training in the tank where they practice recovering real oil, with full-scale spill equipment used in the field, under conditions that simulate an actual oil spill. During all tank exercises, students train with a variety of oils ranging from light and medium fuel oils, to heavy viscosity refined oils, as well as crudes and emulsified oils.

At the completion of the tank exercises, students review their oil recovery efficiencies and critique their videotaped performances. Recovered oil is evaluated in terms of Oil Recovery Efficiency (ORE) and Throughput Efficiency (TE). A high ORE score is good and indicates that the skimmer and the operator have recovered mostly oil, as compared to water. A high TE score is good and indicates that the skimmer and the operator have recovered most of the oil spilled.

These factors are used throughout the week to measure the student's increase in proficiency and to determine the overall effectiveness of the training course.

Key words: Oil Spill, Training, Response, Incident Command Systems (ICS)

Background

Ohmsett – The National Oil Spill Response Test Facility, located in Leonardo, New Jersey, is dedicated to providing independent and objective performance testing of full-scale oil spill response equipment; improving technologies through research and development; and for providing realistic training to response personnel. Ohmsett is a large above ground concrete test tank which measures 203 meters long (the approximate length of two football fields) by 20 meters wide by 3.4 meters deep. It is filled with 10 million gallons of crystal clear salt water.

The U.S. Minerals Management Service (MMS) manages the facility as part of its mandated requirements by the Oil Pollution Act (OPA) '90 to ensure that the best and safest technologies are used

in offshore oil and gas operations. (OPA ’90, Section 2671 (a)(2)).

In Accordance with OPA ’90, agencies represented on the Interagency Committee are to ensure the long-term use and operation Ohmsett for oil pollution technology testing and evaluations. In addition, training should be conducted in consultation with the National Response Team, to improve industry's and the government's ability to quickly and effectively remove an oil discharge, including the long-term use, as appropriate, of the National Spill Control School in Corpus Christi, Texas.

In partnership with the United States Coast Guard (USCG), Texas A&M University National Spill Control School, and SL Ross Environmental Research Ltd., Ohmsett has developed a comprehensive course program that includes: USCG Class C Response Technician training, Oil Spill Response and Strategies Training (in English and Spanish), and Dispersant Training for the Oil Spill Responder.

Training emphasizes classroom exercises and practical hands-on use of the oil spill equipment in realistic marine conditions. Classroom exercises are performed under the direction of certified industrial hygienists and instructors experienced in the field of environmental emergency spill response. Following classroom instruction, students receive hands-on training in the tank. There they practice recovering oil with actual spill equipment used in the field under conditions that simulate an actual oil spill – generating “waves” and “chop”. During all tank exercises students train using a variety of oils ranging from light fuel oils, medium and heavy viscosity refined oils, as well as crudes and emulsified oils. Following tank exercises students review their oil recovery efficiencies and critique performances.

Training Facility: Ohmsett Test Tank

- 665 feet long by 65 feet wide (203 meters long by 20 meters wide)
- 11 feet deep (3.4 meters deep)
- 2.6 million gallons of salt water
- 3 Movable bridges with tow speeds up to 6.5 knots
- Wave maker capable of wave heights up to 3 feet
- Tank windows for underwater observation
- Conference/Training Room
- Control Tower

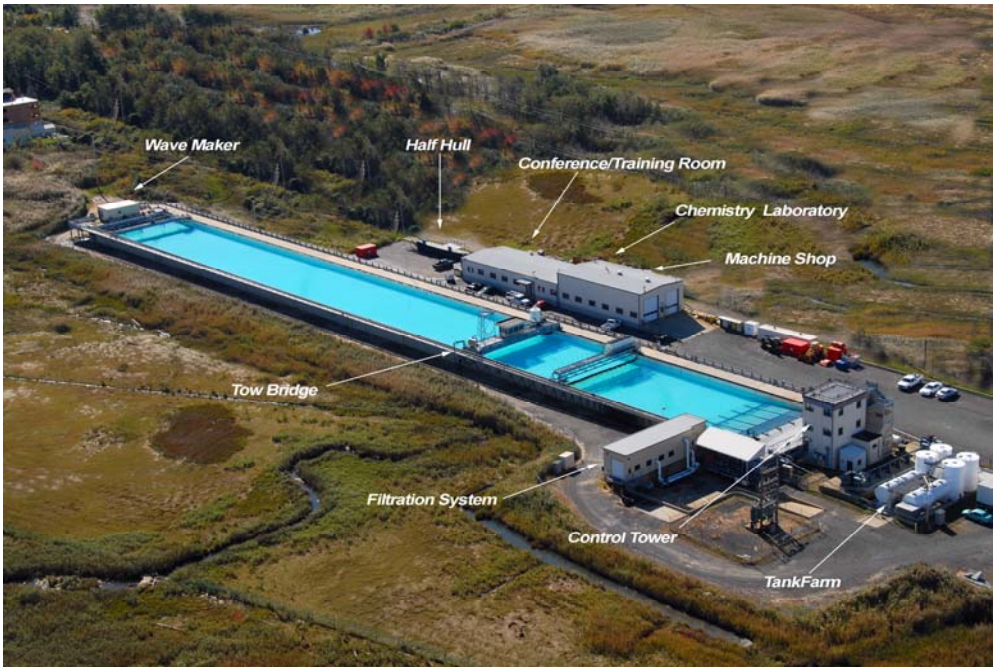

Figure 1: The Ohmsett Facility

Training Oil Recovery Parameters

Training performance is determined through a facility video recording of each tank training session and by the measured oil collected for each run. At the end of all training courses, students are provided a review of their performance.

Recovered oil is evaluated in terms of Oil Recovery Efficiency (ORE) and Troughput Efficiency (TE) defined as:

$$\text{Oil Recovery Efficiency \%} = \frac{\text{Volume of oil recovered}}{\text{Volume of fluid recovered}} \times 100$$

$$\text{Troughput Efficiency \%} = \frac{\text{Volume of oil recovered}}{\text{Volume of oil encountered}} \times 100$$

A high ORE score is good and indicates that the skimmer and the operator have recovered mostly oil, as compared to water. A high TE score is good and indicates that the skimmer and the operator have recovered most of the oil spilled.

These factors are used throughout the week to measure the student's increased proficiency and to determine the overall effectiveness of the training course.

Typical Training Oils

Oil Type	Specific Gravity	Interfacial Tension (dynes/cm^2)	Surface Tension (dynes/cm^2)	Viscosity @ 25°C (cPs)
Calsol 8240	0.932	32.5	36.5	1,375
Sundex 8600T	0.95	27-32	30-36	10,000
Hydrocal 300	0.88	26-28	29-32	150

Typical Training Waves

Wave Type	Stroke (in.)	CPM	Type	Nominal $H^{1/3}$ (in.)	Wave Length (ft.)	Period (sec)
#1	6	19	Sinusoidal	16.5	42	2.9
#2	3	35	Sinusoidal	12.0	14	1.7
#3	3	30	Harbor Chop	15.0	n/a	n/a

United States Coast Guard: Oil Spill Recovery Technician Course (ORST)

In the OPA '90, the United States Coast Guard (USCG) was included as one of the 12 agencies that make up the Interagency Committee tasked with providing for research, development, and demonstration of new or improved technologies which are effective in preventing or mitigating oil discharges (OPA '90, Section. 2671 (c)(2)(G)).

The Coast Guard and Ohmsett personnel have partnered to develop a comprehensive course program that has led to USCG Class C training. The course is based on National Strike Force (NSF) qualification requirements. It is a five-day training program that provides Coast Guard personnel with both classroom and hands-on training using oil spill response equipment systems onboard the US Coast Guard Cutter JUNIPER Class Buoy Tender's (WLB) and Spilled Oil Recovery System (SORS) and

District Response Advisory Team (DRAT)/NSF Strike Team Vessel of Opportunity Skimming System (VOSS) equipment. The curriculum includes actual oil spill recovery and viscous oil transfer, on a variety of Coast Guard oil recovery and ancillary systems, using the test tank and other facilities at Ohmsett.

Training activities for the week include: classroom training focusing on general Coast Guard oil spill response, safety briefing, and specific SORS/VOSS oil spill response equipment systems; hands-on practical training on specific SORS/VOSS equipment systems; and finally, students are divided into groups and rotated through "engineering" and "deck" equipment stations shown in Figures 2-6.

The Ohmsett facility provides the opportunity for the students to experience real oil spill recovery operations using Coast Guard SORS/VOSS equipment in the test tank. The hands-on training focuses on half-hull, engineering, and deck stations for actual oil spill recovery and ancillary systems operation.

Figure 2: Station 1 – Half Hull Rigging

Figure 3: Station 2 – Pumping/Skimming Station (Fast Tank – 1K gallon)

Figure 4: Station 3 – Boom Deployment

Figure 5: Station 4 – Temporary Storage Devices

Figure 6: Station 5 – Tank Skimming (calm and wave runs)

Texas A&M University Corpus Christi, National Spill Control School: Oil Spill Response and Strategies Training

Since 1977, the National Spill Control School (NSCS) has been conducting oil and hazardous materials/waste spill prevention, and response and safety training both in the United States and abroad. Courses taught include Oil Spill Management, Coastal Oil Spill Response and Safety, Spill Management Systems with Geographic Information Systems-Global Positioning Systems (GIS-GPS), various Hazardous Waste Operations and Emergency Response (HAZWOPER) training required by EPA and OSHA, Hazardous Materials (HAZMAT) Transportation, and GIS-ARCVIEW.

Over the years the program has earned an excellent reputation for its training programs. This was recognized when the National Spill Control School was written into OPA ’90 as a training and research resource for the NATIONAL RESPONSE TEAM (OPA ’90, Section. 2671 (c)(2)(d)).

In 2007 NSCS received the Oil Spill Prevention and Response Award (OSPRA) from the Texas General Land Office for more than 30 years of outstanding performance in training and preparedness planning and exercises.

The responsibility this recognition places on the National Spill Control School is taken seriously and every effort is made to maintain the quality of instruction that has placed them in the position as a leader in training of spill responders.

Because of their shared goals, the NSCS developed an oil spill response training partnership with Ohmsett. Classroom instruction involves a detailed review of oil spill fundamentals and actual implementation of theories during a spill response. This course is designed to assist oil spill management personnel in the development of the decision-making skills necessary to make quick and informed decisions during oil spill incidents; and to provide hands-on spill response equipment handling and oil recovery training using full-scale equipment with real oil in the Ohmsett test tank.

Students start in the Ohmsett classroom, where they learn about contingency plans, operational phases for oil spill response, spill documentation, how to establish a command post and assign roles and responsibilities, environmental fates and effects of oil spills, and spill response technologies and recovery

strategies. The instruction includes over eight hours of safety topics associated with an oil spill incident. The course curriculum covers the NIMS 700 series and ICS 100 series sanctioned by FEMA.

During tank exercises students experience the challenges of recovering different types of spilled oil in currents and waves. They practice collecting and measuring the recovered oil while using several skimmer systems. This provides the students with the opportunity to observe the effectiveness of response equipment in varying water conditions involving currents and wave action (Figures 7 & 8).

Figure 7: Students observe the mechanical aspects for a skimmer before tank exercises

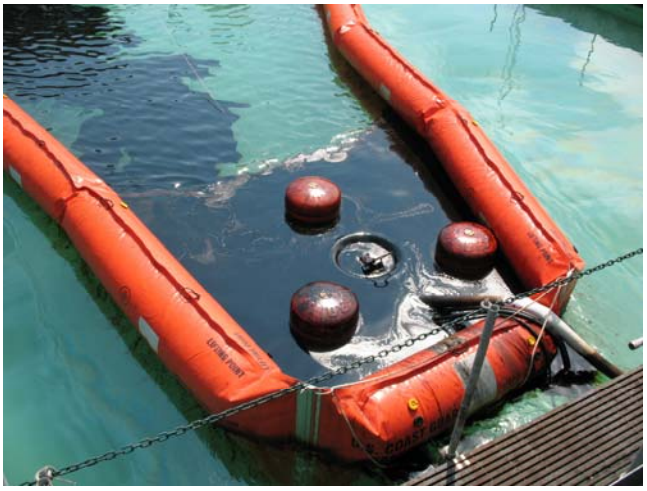

Figure 8: Students skimmer oil in the Ohmsett Tank

In addition, students learn how to use of Geographic Information Systems (GIS) and Global Positioning Systems (GPS) applications in oil spill response. GIS is used to view maps in layers, such as

aerial photos, roads, shoreline types and various resources-at-risk. GPS-linked digital photos are used to provide visual intelligence and are automatically encoded with latitude and longitude location and date/time stamps for each photo. This is useful for pre-event field inventories and damage assessment and documentation after a spill. The results are viewed by clicking on the GIS situational map as shown in Figure 9. This allows for better decisions to be made in the Incident Command Post and provides a record of what, where and when response activities were conducted.

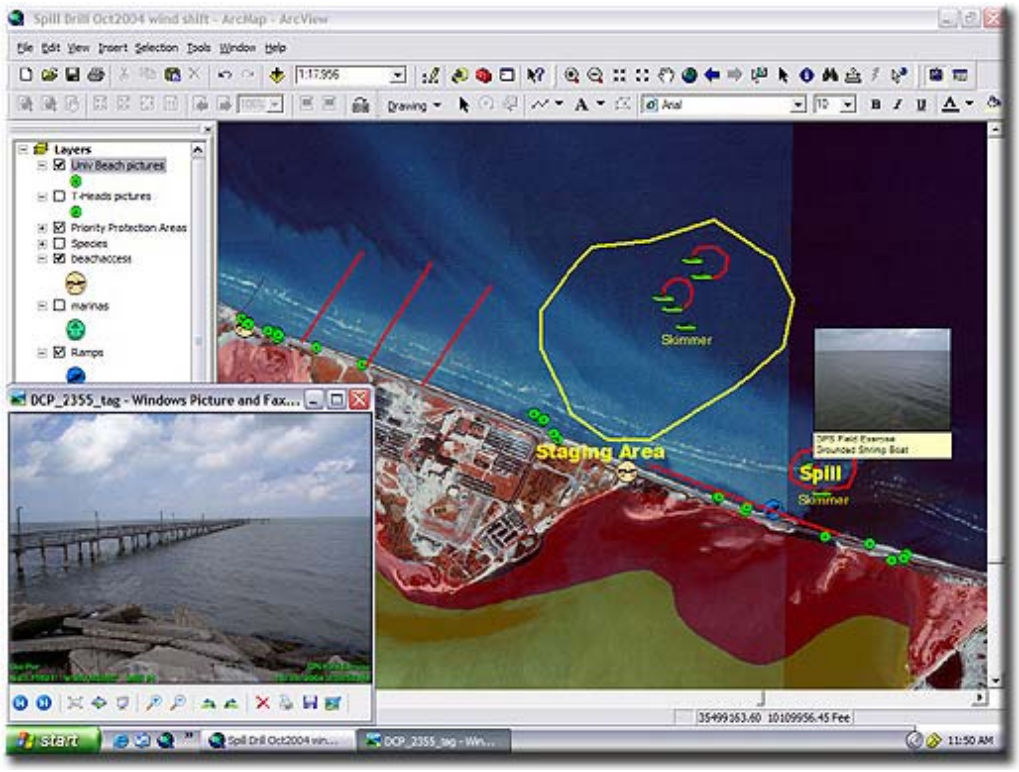

Figure 9: GIS situation map used in the Incident Command Post to represent the current status of the spill response

The last day of training students incorporate everything they learned during the week into a table-top exercise that simulates an oil spill incident. Students manage a mock oil spill in the Sandy Hook Bay, New Jersey, using the NIMS ICS by incorporating oil spill response contingency plans, assigning staff roles, identifying environmental and economic resources at risk and developing a demobilization plan (Figure 10).

Figure 10: Students use NIMS ICS to manage a mock oil spill during the table-top exercise

Ohmsett Dispersant Training

With leading dispersant experts from SL Ross Environmental Research Ltd., Ohmsett now offers Hands-On Dispersant Training for oil spill responders. This two-day course emphasizes practical experience in full-scale dispersant applications using the Ohmsett dispersant testing protocol and dispersant effectiveness monitoring using the U.S. Special Monitoring of Applied Response Technologies (SMART) visual and fluorometry methods. Portions of the training are designed to meet the needs of USCG Strike Force Monitoring Teams.

Training focuses on practical experience dispersing oil slicks of crude oil under near-at-sea conditions in the Ohmsett tank. Included are:

- A full day of experience spilling oil and dispersing the slicks in the large, outdoor wave tank wave under the guidance of an experienced instructor
- Making observations of effectiveness on untreated and dispersed slicks as per the SMART dispersant effectiveness monitoring protocol (Tiers 1 and 2) and attempting to communicate observations to Technical Specialist for interpretation
- Collecting undispersed oil slicks containing dispersant with an oleophilic skimmer
- Familiarization with effectiveness monitoring instruments, including the new Turner C3 fluorometer (submersible fluorometer) and the Turner 10-AU (digital field fluorometer)
- An in-depth discussion of operational issues and decision-making

This is preceded by a brief refresher on dispersants and effectiveness, as well as a discussion of new developments in dispersants. Additional modules on subjects such as net environmental benefit analysis can be added as required.

Part of Day One is spent in the classroom for a dispersant primer/refresher, and becoming familiar with and comparing the different the oil spill monitoring instruments. This includes a refresher on dispersants, effectiveness, operations, decision-making and recent advances.

The remainder Day One and all of Day Two is conducted in the Ohmsett tank where the students spill oil, spray the slicks with dispersants and become familiar with the behavior of untreated and dispersant-treated slicks in waves under simulated, at sea conditions as shown in Figure 11. Students practice

deploying the U.S. SMART effectiveness protocol by making visual (Tier 1) and instrumental (Tier 2) observations, and then attempt to communicate their observations to a distant Technical Specialist for interpretation, using the SMART communications protocol. Instruments used include those used by the USCG Strike Force teams (Turner 10 AU and Turner C3) and those used in other jurisdictions and in research (laser particle-size analyzer).

Figure 11: Students observe the interactions of oil and dispersants in the water with waves

The Ohmsett wave tank offers a unique opportunity to provide oil spill professionals with practical experience with dispersants that would otherwise be available only in actual spills or sea trials. The advantages of Ohmsett are: better observation conditions; better control of the marine environment; and no permit is needed to spill oil.

Customized Venue

Ohmsett also provides a venue for commercial firms to train their personnel using their own curriculum and equipment. Ohmsett's training facility includes a 50-seat classroom with state-of-the-art audio-video equipment where classroom sessions complement the tank exercises.

The tank exercises provide the opportunity to operate a variety of response equipment in the tank to recover oil in real world conditions. Students practice oil spill equipment set-up, recovery, maintenance and decontamination. They are able to operate boom and skimmers to contain and recover spilled oil in the Ohmsett tank.

Several companies that have come to Ohmsett for training to include: CHS Refining conducted Fast Water/River Response training, Alaska Clean Seas (ACS), ConocoPhillips Corporate Oil Spill School Training, and Chevron.

Conclusions

In order to provide training to improve the oil spill response industry's and government's ability to quickly and effectively remove oil discharges, Ohmsett's partnership with the USCG National Strike

Force Coordination Center, Texas A&M National Spill Control School, and SL Ross Environmental Research Ltd., brings training, equipment, spill responders and instructors together to provide a comprehensive training program. This program provides students with the decision-making and hands-on responder skills essential to efficient oil spill response/recovery operations.

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