Hawaii Takes to the Air for Oil Spill Response

Partnering with the Local Community Increases the Navy's Oil Spill Response Capabilities

PERSONNEL FROM VARIOUS commands within Navy Region Hawaii are training to become aerial observers during major oil spill responses.

Recent catastrophic oil spills, such as those in San Francisco Bay and the Gulf of Mexico, demonstrated serious and long-lasting impacts that a spill can impose on the environment and the community. Dead fish, oiled birds and injured marine mammals are just some of the potential impacts of a large oil spill. People who live, work or play near a spill site can also experience hazardous exposures to petroleum vapors. Economic impacts can devastate the local community when tourists cancel their reservations or loss of important fishing areas results in high unemployment.

Because of these impacts, it is imperative that any response to a spill be as effective and efficient as possible. Navy facilities with oil spill response plans have already identified their response organizations, equipment, oil recovery tactics and disposal facilities. During an actual response, the spill management team can use oil spill trajectory models to predict where the oil might go, enabling responders to preposition crews and equipment to clean up the oil. However, knowing exactly where the oil is located can be challenging. Standing on the beach can only tell you so much. Even if you send someone up in a helicopter, he or she can easily mistake cloud cover, channels through the reefs, or schools of fish for an oil slick.

Hawaii's sensitive marine environment and an economy dependent on the preservation of that environment could be threatened by an uncontrolled oil spill. To address these risks, Navy Region Hawaii recognized the need to develop its own cadre of trained aerial observers to engage during a spill response drill or in the event of an actual spill. This need was driven in part by the presence of the Navy's defense fuel support point at Naval Supply Systems Command Fleet Logistics Center Pearl Harbor (NAVSUP FLC Pearl Harbor). This facility is the largest bulk fuel storage and handling facility in the central Pacific Ocean and manages millions of gallons of fuel. Fueling operations for vessels at Pearl Harbor and aircraft at Hickam Field happen almost daily. Although large spills rarely occur, preparedness and compliance with regulations is extremely important.

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To close this critical data gap, federal regulations (specifically "Response plan development and evaluation criteria for facilities that handle, store, or transport Group I through Group IV petroleum oils" (33 CFR 154.1045(j))) were revised in 2011 to address the need for aerial observers. (Note: See our sidebar "Basic Stock Categories" for more insights into the

groupings of petroleum oils.) These regulations require facilities handling, storing, or transporting Group I through Group IV petroleum oils that they "must identify in the response plan, and ensure the availability through contract or other approved means, of response resources necessary to provide aerial oil tracking to support oil spill assessment and cleanup activities." The regulation further describes the minimum training that these aerial observers must receive.

Navy Region Hawaii has a memorandum of agreement for training with the Clean Islands Council—a local oil spill response cooperative. (For more information about the Clean Islands Council, visit http://cleanislands.com.) The aerial observer program is just one of many programs which the Council's general manager Kim Beasley developed to support the many member companies and agencies that make up the council. And, according to Mr. Beasley, even though the aerial observer program has been on the books for a few years, many locales are just beginning to train their aerial observer teams. In addition to organizing classroom and flight training, Beasley developed a process for observers to record their flight—from the actual flight path tracing to linking photographs taken from the air to that flight path track.

The Navy Region Hawaii aerial observer team stands in front of the helicopter that will take them on their training flight. FROM LEFT: Steve Butler, Estra Higa and Cynthia Pang.
Kirk Tomita

A Better Oil Spill Trajectory Model

TO IMPROVE THE science of determining oil spill trajectories in Hawaii and elsewhere, Pei-fang Wang of the Space and Naval Warfare Systems Command, Systems Center Pacific has combined two predictive models under an effort sponsored by the Navy Environmental Sustainability Development to Integration (NESDI) program.

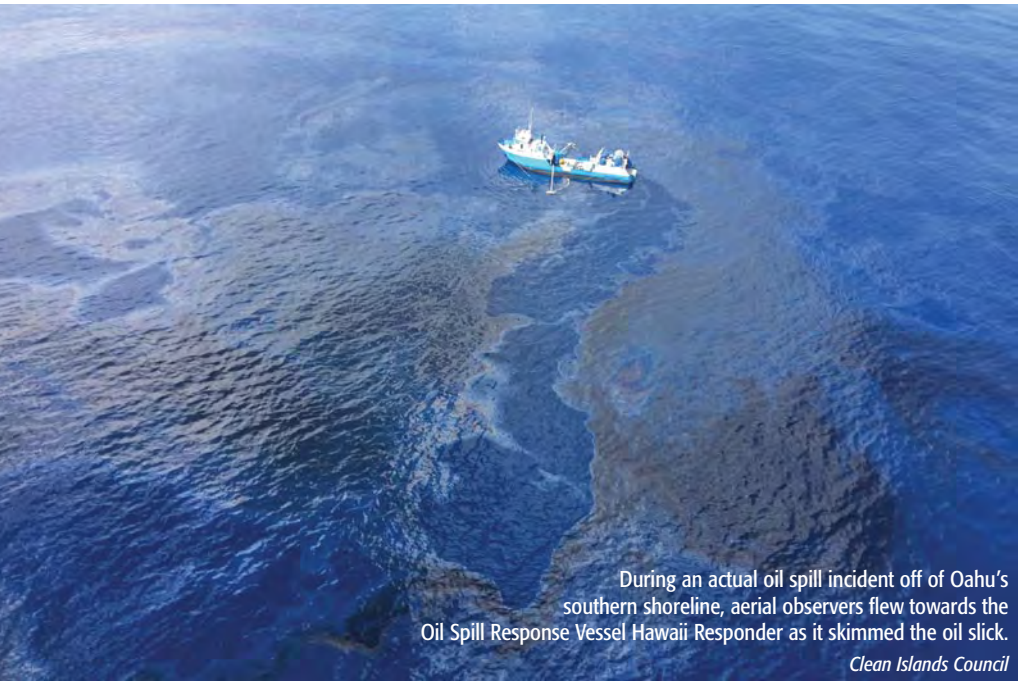
Up until recently, the National Oceanic and Atmospheric Administration's (NOAA) model, known as GNOME (General NOAA Operational Modeling Environment) has been the standard model for use as a first response to an oil spill event. However, GNOME is a transport model and not a hydrodynamic model, meaning that GNOME does not compute currents but relies on data from an external source. To address this deficit, this project team combined the GNOME model with the Navy's Curvilinear Hydrodynamics in 3-dimensions (CH3D).

The linked model uses the best parts of each model, including the oil properties and transport prediction in GNOME and the accurate hydrodynamic calculations, including currents and water mass movement in fine resolutions from CH3D. The linked model has been demonstrated to improve the predictive accuracy of oil spill trajectories for Pearl Harbor and San Diego Bay.

For more information about the NESDI program, visit the program's web site at www.nesdi.navy.mil or contact Ken Kaempffe, the NESDI Program Manager at 805-982-4893, DSN: 551-4893 or ken.kaempffe@navy.mil.

Aerial observers might need to fly close to the shoreline to check for signs of oil. Observers also look for sea turtles, seals and other wildlife along the shore that could be potentially impacted by the oil.
Cynthia Pang

In 2011, Navy Region Hawaii designated three Navy civilians to begin training to become qualified aerial observers. Cynthia Pang (Navy Region Hawaii), Steve Butler (NAVSUP FLC Pearl Harbor), and Estra Higa (Naval Facilities Engineering Command Hawaii) underwent initial training in a commercial helicopter. This was followed by training on using oil spill tracking software to record their flights on maps. Following this initial training, the trio also participated in a joint Navy and private industry worst-case-discharge scenario oil spill exercise. This exercise involved an off-shore oil spill scenario and was used as a practical training exercise for the aerial observers. The team flew in a chartered helicopter over the exercise site and along the shoreline.



During an actual oil spill incident off of Oahu's southern shoreline, aerial observers flew towards the Oil Spill Response Vessel Hawaii Responder as it skimmed the oil slick.
Clean Islands Council

Each aerial observer is expected to spot oil, clean areas and endangered wildlife. They also learn how to work in the command post interpreting data and preparing presentation materials.

Aboard the helicopter, the Navy observers use a laptop computer connected to a global positioning system device to record the complete flight path and perform other tasks, such as charting the exact location of the spill and its boundaries. Hardware aboard the helicopter transmits the information immediately to the incident command post. Once the data are received, another qualified observer estimates the area of the oil slick using software in the command post and quickly prepares briefing material using the overflight track and photos taken during the aerial surveillance. This provides the Unified Command as well as the spill

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–Cynthia Pang

management team with valuable information that can be used to project movement of the oil, develop cleanup plans, send people out to rescue animals, and take other necessary actions.

In the "old days", the helicopter had to land first and someone had to drive to the command post with the data. Using the new process and equipment, Unified Command members can have immediate access to the data and a clear understanding of the situation as soon as changes occur.

With new technology, the program was updated and training was completed in September 2014. At that time, the trio was able to complete their observer training with classroom instruction on the science of oil spills, physical properties of petroleum, aerial oil slick pattern recognition, conversion of raw data into visual presentation materials and other relevant topics. The team also flew in a helicopter as a refresher and to complete that phase of their training while learning additional skills on an iPAD and global positioning software.

As a final part of its training, the Navy observer team participated in a major local industry-led oil spill exercise. They took turns with other observers from industry at the command post and in the air. Using their observations about the oil spill, its location, endangered species in the area and other valuable information, the Unified Command and the spill management team developed tactics to efficiently remove the oil and prevent environmental damage. Without aerial observers, only very limited visual observation from the shore would be available.

In October 2014, an actual oil spill occurred south of Barbers Point on the island of Oahu. This was a relatively small spill from a local industry and was less than 2,000 gallons of an oily-water mixture. However, it posed a potential threat to marine life. Pang was able to put her training into actual practice when she partnered with the Clean Islands Council in the response. She was assisted at the command post while other aerial observers from local industry flew over the site. She converted their raw data and overflight photographs into presentation materials for the Unified Command. This helped greatly to

Basic Stock Categories

A BASE STOCK is a lubricant component that is produced by a single manufacturer to the same specifications (independent of feed source or manufacturer's location); that meets the same manufacturer's specification; and that is identified by a unique formula, product identification number, or both.

All base stocks are divided into five general categories:

- Group I base stocks contain less than 90 percent saturates and/or greater than 0.03 percent sulfur and have a viscosity index greater than or equal to 80 and less than 120 using specified test methods.
- Group II base stocks contain greater than or equal to 90 percent saturates and less than or equal to 0.03 percent sulfur and have a viscosity index greater than or equal to 80 and less than 120 using specified test methods.
- Group III base stocks contain greater than or equal to 90 percent saturates and less than or equal to 0.03 percent sulfur and have a viscosity index greater than or equal to 120 using specified test methods.
- Group IV base stocks are polyalphaolefins (PAO). PAOs can be interchanged without additional qualification testing as long as the interchange PAO meets the original PAO manufacturer's specifications in physical and chemical properties.
- Group V base stocks include all other base stocks not included in Group I, II, III, or IV.

Source: The American Petroleum Institute (www.api.org)

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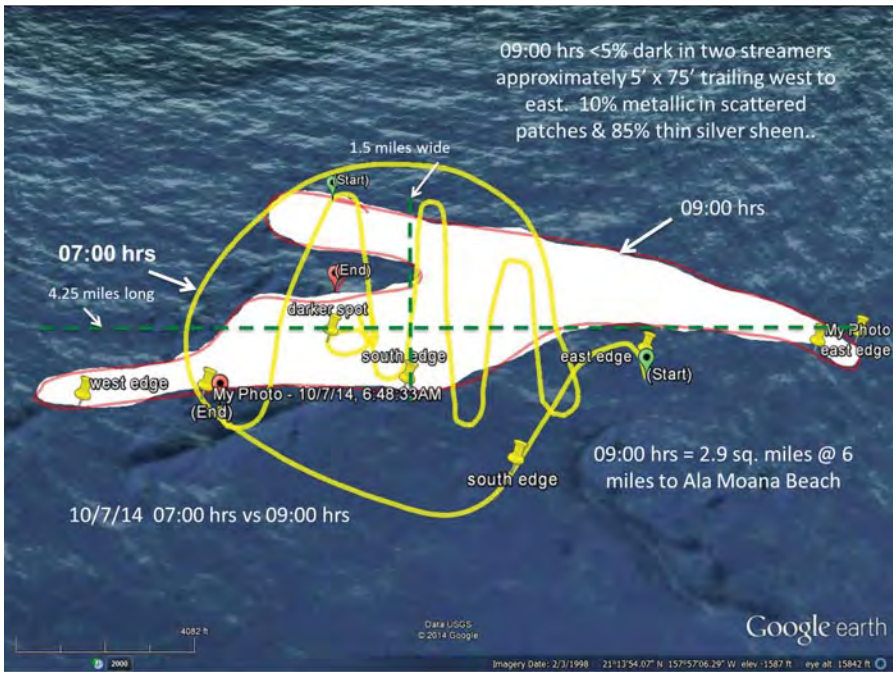
understand the scope and movement of the oil slick. Through this experience, Pang put her "lessons learned" regarding creating situation maps and other data into an aerial observer job aid to assist the others on the Navy team should they be mobilized for an oil spill.

"This has been a great experience," said Pang. "The data obtained by the aerial observers provide much needed information to the Unified Command, enabling them to make the right decisions. The technology improvements allow them and the rest of the spill management team to see what is happening immediately. Without a strong aerial observation team, we would be essentially guessing where the oil is and where the slick is heading."



In this documentation from an actual oil spill, the yellow line represents the oil slick outline during the 7 a.m. overflight. The red line represents the 9 a.m. overflight. The change in shape is very apparent. The white area shows the oil estimated to be 2.9 square miles in size.

Clean Islands Council

Butler said, "In addition to knowing where the oil is, it's also very important to know where it isn't. There may be folks who may later claim that they were impacted by the oil. So these overflights are essential for documenting the boundaries of the spill."

Higa added, "The information being gathered is crucial and very important for an efficient response. We need to know where the oil is, how much is out there and where it's going. I look forward to additional training to become even more proficient."

Due to its location in the middle of the Pacific Ocean and the large quantity of oil stored and handled, oil spill prevention and response preparedness are high priorities for Navy Region Hawaii. The Region's spill management team often attends incident command system training and participates in various exercises. This allows the team members to meet, work and partner with members from the private sector and government officials from federal, state and county level.

To meet the requirement for aerial observers, Navy Region Hawaii was able to draw upon its tenant commands to form its own team. By training with other governments and private industry, Navy Region Hawaii and its partners in the local community ensures that the response is timely, effective and well-coordinated. ⚓

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