Deepwater Horizon Mechanical Recovery System Evaluation

Interim Report

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Deepwater Horizon Mechanical Recovery System Evaluation
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Background

During the response to the April 20, 2010 Deepwater Horizon (DWH) well blowout a number of mechanical recovery (skimming) systems and devices were used to recover floating oil from the surface of the Gulf of Mexico. Effectiveness of the systems and devices varied depending on the thickness and viscosity (degree of weathering) of the oil as well as wind and waves and a variety of other factors.

Following the establishment of the API Joint Industry Task Force (JITF) in June of 2010, the JITF identified the need to evaluate the various mechanical recovery systems, devices and technologies utilized during the DWH to ascertain which were most effective and what were the associated environmental and oil conditions that had the greatest influence on the effectiveness. Based on the results of the evaluation, the JITF would evaluate opportunities for supplemental research and development (R&D) to further enhance their effectiveness. To that end, the API JITF Mechanical Recovery Workgroup was formed to conduct the evaluation and identify R&D opportunities.

Introduction

On January 17, 2012 the API JITF Mechanical Recovery Workgroup convened for its initial meeting. The Workgroup consisted of spill response practitioners from the oil and gas industry who have experience in, or knowledge of mechanical recovery operations as well as representatives of O'Brien's Response Management (contractor) who were contracted by API to lead this effort. The project scope was developed at the initial meeting which included:

- Prepare a survey form for the collection of DWH mechanical recovery data and anecdotal information.
- Identify key individuals and organizations that were intimately involved in the DWH mechanical recovery operations.
- Distribute the survey electronically to the above individuals and organizations.
- Compile the survey results and identify the most knowledgeable individuals.
- Conduct interviews of the selected individuals to obtain more detailed information.
- Determine the most effective mechanical recovery systems/technologies and identify R&D opportunities to further enhance their effectiveness.
- Prepare a report summarizing the results.

Survey Implementation

Confidentiality

Strict confidentiality was deemed critical to this project as a means of facilitating broader participation from the survey recipients. Consequently, API entered into a confidentiality agreement with the contractor such that survey and interview results would be blinded with respect to which participant provided specific information. Even the Workgroup members were not provided the identities of the survey and interview participants.

Electronic Survey Form

The Workgroup and the contractor worked together to develop the electronic survey questions and format as well as the list of target recipients. A copy of the survey form is provided in Attachment A. Specifically, these questions focused on the following:

- Role of the survey respondent in conducting actual mechanical recovery operations.
- Systems/devices they used for mechanical recovery.
- Relative effectiveness of the systems/devices.
- Different operating environments experienced and their effects on system performance.
- Characteristics of the recovered oil.
- Adequacy of work platforms used for deployment of systems/devices
- Product storage and transfer capability and adequacy.
- Surveillance systems/technology used for directing recovery operations.
- Other comments on tactical deployment aspects and their impact on system performance/effectiveness.
- Overall impression of mechanical recovery operations.

The draft survey questionnaire was created by the contractor and vetted by the Workgroup for content and format. Confidentiality was prominently discussed in the introduction to better ensure open and honest participation. The survey was created electronically and constructed with two built-in security stops. First the survey was keyed to specific names of requested participants, meaning only that person could take the survey. Then, upon completion and submittal, the finished survey would sit in a database that only the contractor had access.

Once the questionnaire was finalized a list of potential respondents was developed by the Workgroup and contractor. To provide valid and valuable feedback the personnel targeted for the survey were individuals from the oil and gas industry, response contractors, subject matter experts, and government representatives (primarily U.S. Coast Guard) who served in or supervised mechanical recovery operational positions during the DWH response.

Survey Process

The electronic survey was conducted via the Survey Monkey web application. An email was sent to the list of potential respondents explaining the program and containing a link to the online questionnaire. An option was included to allow individuals to respond verbally through a phone conversation with the contractor.

The original approach was to compile the raw data from the questionnaire responses, then collate and compare the data to identify potential gaps. The initial survey was sent to approximately 30 individuals but only a few responses were received. The questionnaire was then modified somewhat to be more self-explanatory and enable participants to provide narrative responses in addition to specific answers to questions in an effort in increase participation. The new questionnaire was re-submitted to many of the original recipients as well as approximately 50 additional individuals involved in the mechanical recovery

operations. Key individuals were also contacted and encouraged to participate and complete the electronic surveys.

Following the electronic survey, the contractor then identified a sub-set of 10 respondents who appeared most knowledgeable and attempted to conduct phone interviews to fill in any gaps and obtain additional data on the recovery operations. This report was then prepared to summarize the survey process and results.

Survey Results

Electronic Survey Responses

A total of 83 persons received the first and/or second electronic survey via email, representing a cross-section of DWH responders from private industry, state, and federal entities. Factoring in a number of extensions, in total respondents were given roughly 10 weeks to respond to the survey. Despite frequent prompting and several extensions, only about 25 responses to the survey were received.

It is possible that at least some of the targeted individuals were reluctant to participate on any DWH studies due to ongoing litigation or concerns of violating confidentiality agreements that many responders signed with their employers. Another possible contributing factor is the survey required an hour or so to complete and many people may not have wanted to volunteer that much time.

The responses received did not represent an adequate cross section of mechanical recovery operations. The raw data represented individuals who worked only on the weir-skimming systems in field capacities. Their responses capture a narrow perspective of the value of their efforts, many of which were limited to recovered liquids transfer and storage operations which did identify the need for suitable platforms/floating docks offshore to better facilitate offloading of recovered oil from floating bladder tanks or skimmer tanks. Similarly there were several comments regarding insufficient recovered oil storage capacity offshore which negatively affected recovery volumes. It should be noted, however, that this observation is contrary to presentations at the 2011 Clean Gulf Conference which indicated interim storage was not an issue. No useable data on the effectiveness of the recovery equipment/systems were provided in the responses to the electronic survey.

Verbal Survey Responses

There were three participants who did not complete the electronic survey but did agree to speak to the contractor under confidentiality terms. Due to the interactive nature of the discussions, the conversations generally resulted in better and more relevant information being obtained than through the electronic surveys. Consequently, this information is highlighted in this report. The verbal feedback is summarized below.

One responder who served in a very active mechanical recovery capacity evaluated the use of the skimming systems and indicated:

- "Weir systems offered better value (*assume performance over other skimmer types was the intended message*) in offshore areas when waves were < 1 to 3 foot chop and in confused sea states but vegetative debris did cause numerous delays to skimming operations."

- "Ocean buster systems were great pieces of equipment." (*Assume intended to convey they had superior performance to other skimmers.)*

- "Oleophillic skimmers offered more forgiveness (*Assume meant flexibility in different oils and conditions.*) than weir skimmers."

- "Super HOSS oceangoing systems were most effective." (*Although not stated, assume this is relative to other large skimming systems.*)

- "AWhale not properly configured for deepwater skimming and no feedback was sought on how to best engage the equipment."

Another responder indicated:

- "Big Gulp barges were best utilized to capture debris released by skimming vessels."

The most useful feedback obtained involved training and alignment with aerial surveillance and offloading capabilities including:

- **Training**- Vessels of opportunity used for mechanical recovery needed to be configured properly and members needed advanced training on operation, recovery, maintenance and evaluation of their skimming systems in order to maximize effectiveness prior to being put in theater.

- **Alignment-** Offshore recovery systems need to align with fixed-wing aerial surveillance support capable of direct communication with boat captains to maximize recovery and good offshore support platforms are needed for efficient offloading of filled bladders/tanks.

One survey participant who was involved in other operations had also observed numerous mechanical recovery operations and provided valuable feedback. The individual identified the need for a solid communications plan between aerial surveillance platforms and mechanical recovery vessels to ensure the aircraft can effectively direct the vessels to the heavier oil. He indicated there were instances where there was limited direct communications between the persons on the boat and the observer in the aircraft. Additionally, helicopters were periodically used, perhaps out of necessity, for offshore aerial surveillance and direction of mechanical recovery vessels but could not remain on station for more than 30-45 minutes, due to the lack of an offshore fueling station. This was not enough time to set up and implement an effective mechanical recovery activity. It should be a priority to use fixed wing aircraft to guide or direct mechanical recovery operations located more than 40 miles offshore.

Follow-Up Interview Requests

A sub-set of 10 individuals with key roles in the DWH mechanical recovery operations, but not necessarily respondents to the electronic survey, were identified as candidates for follow-up interviews to obtain additional and perhaps more useful data. Unfortunately, none responded to the request to be interviewed.

Additional Data Sources

Both BP and the US Coast Guard have conducted evaluations of DWH mechanical recovery operations but neither were able to share their reports or data due to the ongoing litigation.

BP Deepwater Horizon Incident Specific Preparedness Review (ISPR)

Although fairly high level, there were several findings in the ISPR that are related to mechanical recovery and relevant to this effort. Key findings include:

- Mechanical recovery was negatively impacted by moderate sea states, poor encounter rates, oil compositions that were incompatible with offshore skimming systems, and an inability of skimmers to stay within the confines of the largest and thickest patches of fresh crude oil close to the site of the well.

- European/Norwegian state-of-the-art skimming systems (*assume the reference is to the Buster systems)* were superior in the ability to operate in rough weather and recover higher percentages of oil.

- Many skimmers could not be used in seas >3 feet.

- The efficiency of offshore skimmers is difficult to measure.

- Most skimmers designed for nearshore/inshore use and could not be used offshore and the focus on numeric goals for skimming equipment overran the consideration of their applicability.

- Much of the oil that reached nearshore/inshore areas contained large amounts of debris and was tar-like rendering it "non-skimmable" for the equipment that was available. Manual methods involving nets and sorbents were more effective.

Summary and Conclusions

The limited participation (25 respondents) in the electronic and verbal surveys as well as the general lack of mechanical recovery information in the responses received has limited the ability of the project team to conduct a meaningful evaluation of the DWH mechanical recovery operations. Given these limitations, the project team is not able to offer a definitive assessment of which tools performed best under which conditions or suggest a roadmap for future R&D at this point. However, the project team offers the following DWH-specific observations from the survey and ISPR which may be relevant to ongoing discussions regarding mechanical recovery equipment effectiveness including:

- The efficiency of offshore skimmers is difficult to measure under actual conditions/events.

- Weir skimmers were effective provided wave chop was less than 3 ft and vegetative debris was not present.

- Recovery was negatively impacted by wave heights greater than 3 ft, poor encounter rates/inability to stay in thicker oil and oil compositions that were incompatible with certain skimming systems.

- Oleophillic skimmers provided more flexibility than other skimmers in different operating conditions.

- Ocean Buster skimming systems worked well and recovered higher percentages of oil and operated in rougher conditions than other systems.

- Super HOSS ocean going skimming systems performed well.

- Manual recovery methods such as nets and sorbents were more effective than skimmers in nearshore/inshore areas due to the tar-like consistency of, and large amounts of debris mixed into, the oil.

- Floating docks or a suitable platform close to the water surface facilitated safe and efficient recovered oil offloading of floating bladder tanks and skimmer or small vessel storage tanks.

- Fixed wing aircraft (versus helicopters) are a necessity for aerial surveillance and direction of mechanical recovery operations located more than 40 miles offshore unless there is access to an offshore, nearby fueling facility.

- Direct communication between surveillance aircraft and mechanical recovery vessels must be provided to effectively direct the vessels to the heavier oil concentrations.

- Robust training of vessel of opportunity and recovered oil offloading crews is necessary to maximize effectiveness of those operations.

In conclusion, mechanical recovery system effectiveness could not be adequately evaluated in this effort primarily due to ongoing litigation associated with the DWH incident and response operations. Consequently, a determination of what systems, devices or technologies were most effective could not be made and, as such, opportunities for additional research and development could not be identified at this time.

Path Forward

This Workgroup will consider another attempt at gathering and evaluating data on DWH mechanical recovery operations once key legal issues have been resolved. Despite challenges associated with formally evaluating and documenting mechanical recovery technologies/approaches utilized during DWH, evidence suggests that less formal information sharing on those technologies that worked well under particular circumstances (as well as those technologies that did not work well) has occurred. This knowledge sharing has helped inform response planning and equipment augmentation/replacement decisions by operators and OSROs.

Attachment A

Electronic Survey Form

API Mechanical Recovery Task Force - Skimming Equipment Survey

Introduction

***1. For this survey, users should provide data on each mechanical recovery system used while deployed in theater during MC252 in 2010. If numerous systems were used, please complete Questions 1-22 for each of your most notable systems, whether good or bad, and include examples.**

PLEASE NOTE:
Please enter your data for one skimmer at a time. If you have additional information to provide, please complete a separate survey. Once you complete your first survey, the form will recycle to the beginning allowing you to enter your additional data.

Once a form is completed for all systems that you encountered, please submit the survey. Please submit your feedback before Friday, March 2, 2012.

- ○ Yes, I'll take the survey
- ○ Please call me

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API Mechanical Recovery Task Force - Skimming Equipment Survey

2. Please provide your contact information:

Name:

Email Address:

Phone Number:

API Mechanical Recovery Task Force - Skimming Equipment Survey

Contact Information

3. Contact Information

Name:

Company:

Email Address:

Phone Number:

API Mechanical Recovery Task Force - Skimming Equipment Survey

Equipment Description

***4. Skimmer Category:**

Please select only one skimmer category identified. If selecting "other," please provide a detailed description.

Comments

5. General Description

6. Equipment Name

7. Plate Specifications

API Mechanical Recovery Task Force - Skimming Equipment Survey

Description of Oil; Area of Operation

8. Color

Comments

9. Description of Oil

Comments

10. Percent Coverage:

Please provide a estimated percent coverage in containment boom or skimmer operating area.

	Percent Coverage
Open Water	
Near-shore	
Marsh	
Intra-coastal	
Other	

Comments

11. Collection System and Method of Collection:

Describe the collection system used (e.g., boom vane, boom arms, outrigger, 'V' booms, swath width, speed of system), the operational configuration, and method of collection below.

Comments

12. Area of Operation

Comments

API Mechanical Recovery Task Force - Skimming Equipment Survey

13. Please provide a detailed description of the area of operations below:

14. External Conditions for Weather/Seas:

Please provide a detailed description of the external operating conditions if possible. Provide weather including: wind, temperature, visibility, storm systems and seas (wave height, chop) below:

15. Please provide any additional description of the oil or area of operation below:

API Mechanical Recovery Task Force - Skimming Equipment Survey

Section 4 - Concept and Tactical Deployment

16. Work Platform/Delivery Device: Describe the work platform and/or delivery device (e.g. vessel, barge, self-propelled, towed). Please include if the skimming system was integrated, over the side, etc. below.

Comments

17. Provide specifications for the identified work platform and/or delivery device (e.g. platform size, crew required, sea keeping ability, fuel, potable water, living quarters/berthing space, stores) below.

18. Product Storage and/or Transfer Capability
Describe storage and/or transfer capability with specifications (e.g. temporary storage capacity, pump offload capability).

19. Surveillance:
Describe the skimming system surveillance capability for detecting oil (e.g. radar, remote sensing, eye).

Comments

20. Comments:Please provide any additional concept and tactical deployment comments below.

API Mechanical Recovery Task Force - Skimming Equipment Survey

Section 5 - Evaluation Results

21. Efficacy: Describe the skimming system efficacy based on the operating conditions identified above. Provide a description of the volume recovered if possible, including oil vs. water ratio and decanting if necessary. Please include any specific observations including limitations, operating constraints, operating adjustments and successful skimming operations below.

22. Suggestions:
Provide any suggestions, ideas for improvement, or successful modifications below.

23. Summary: Please provide any additional comments on what worked well and what did not below.

API Mechanical Recovery Task Force - Skimming Equipment Survey

24. We appreciate your participation. Please use the space below to provide any additional feedback.

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