DHR Spill Response Technologies

LCDR Octavia Ashburn

U.S. Coast Guard

Acquisition Directorate

Research & Development Center

Background and Agenda

Background

This presentation will cover the following *Deepwater Horizon* Response topics as presented to the Coast Guard Research and Development Center (RDC) by on-scene respondersduring the RDC Surface Oil Symposium held in October 2011. Photo credits can be obtained by request to the RDC Commanding Officer.

Presentation Agenda

1. Oil containment
    a. Offshore
    b. Inshore

2. Oil collection
    a. Skimmers
    b. *In situ* burn
    c. Shoreline operations

Oil Containment – Offshore

Most popularly used technology was containment boom

- Foam float/inflatable/rigid
- Different materials and coatings
  - poly vinyl chloride (PVC)/rubber/ ultraviolet (UV)
  - booms without coating risk dry rot after long exposure in the sun

Benefits

- stored in a variety of locations throughout the U.S.
- can be deployed using a variety of methods
  - vessel, beach

Vessel deployment of boom

Beach deployment of boom

Oil Containment – Offshore

What worked well

- U- boom configuration teams
  - Can use many types of vessels from maritime professionals to volunteer vessels of opportunity (VOO).
- U-boom funnel tactic with chain located in the middle of the U-boom tow
  - Allows oil to be funneled to a smaller swath to reach skimming vessel
- Ocean Busters
  - New to responders; some systems damaged early in response because responders were not sure how to handle them.
  - Skim at faster speeds (3-4 knots) than traditional skimming systems (.75-1kt)
- Oil Spill Response Organizations (OSRO)/agency training
  - Clean Gulf Associates
  - National Response Center
  - US Navy Supervisor of Salvage
  - USCG Spilled Oil Response System
  - Marine Spill Response Corporation
- J-boom configurations teams
- Fire boom

U-boom configuration

Oil Containment – Offshore

Gaps indentified during the RDC Surface Oil Symposium for Offshore Oil Containment include

- Trained/qualified operators/vessel masters (regular mariners vs. trained oil responders)
  - Need to recognize that vessels need to train with boom they are most likely to use
  - Consider training with smaller boom and then working their way up
- Location, type, and amount of pre-staged equipment
  - Air inflatable takes up less space
  - Need to be careful about laminates in bladders
- Need more lifting points on the boom when they try to retrieve them as most of the damage occurs to boom during retrieval
  - Expertise in shock loading of cranes – this is a problem when lifting skimmers filled with water
  - Tension meters for booms? A lot of failures – systems have a weak link – need to identify – avoid taking unnecessary chances with personal safety and/or risk damaging equipment
- Decontaminate the boom before it is brought ashore
  - Prevents contamination of clean water when bringing boom in
  - In boom design, chain pockets create a problem in decontamination

Oil Containment – Near Shore

Shoreline goals of containment were

- Diversion/deflection
- Protection/exclusion
- Containment
- Corralling

Shoreline assessment is critical to indentify and prioritize sensitive areas

Need knowledge of waterways and currents

Different types of boom used

- Traditional
- Hard-pipe
- Diversion boom barges

Hard-pipe boom

Diversion boom barges

Oil Containment – Near Shore

Issues with boom deployment near shore included

- Wildlife interference, natural waste, maritime growth

Public access to boom

- Public access to boom
  - hard for the operators to deny water/beach access to the public
  - interference with operations; the public not wearing personal
  - protective equipment (PPE), boom being cut, and anchors and boom being stolen
- Inclement weather – i.e. Hesko basket was destroyed by hurricane winds. It was not effective in severe weather or high tide

Hesco baskets after hurricane

Oil Containment – Near Shore

Gaps indentified during the RDC Surface Oil Symposium for Near Shore Oil Containment include

- Training personnel
  - in 3 years personnel will be gone – need to maintain expertise; companies, OSROs, USCG
- Fishing vessel training
  - tactical manual to standardize general efforts across different geographical areas
- Access methods to remote areas
- Improve ability of aerial spotters to identify oil (training)
- Decrease time lapse between information collection and dissemination
  - sometimes took up to 3 days to get aircraft-collected information to ground responders. Moving boom took additional time
- Create procedures for night operations
- Pre-identify sensitive areas and develop short-term contingency plan until responders arrive

Oil Collection – Skimming

Current methods for skimming

- Weir
- Vacuum
- Oleophillic
  - Including drum, brush, rope, mop and belt
- Fast Water system “Ocean Buster”

Weir skimming device

Skid-mounted vacuum system

Vertical rope mop skimmer

Oil Collection – Skimming

Gaps for research consideration with regards to skimming

- Ability to skim at faster speeds
- Types and amounts of response equipment
- Skilled/trained operators
- Create vessel database
  - identify vessel capability for various oil spill response tasks – important to match boom/skimmer type to vessels
  - commercial offshore supply vessels
  - commercial fishing vessels
- Evaluate “Best Available Technology”
- Fast, maneuverable systems for chasing streamers and windrows
- Increase inventories of (the right) containment and recovery equipment, i.e. ASTM standard for end connectors not standard for boom larger than 42-inch boom.
- Retain skilled operators

Oil Collection – *In Situ* Burn

***In situ* burn summary**

- Very effective response tool for DHR–376 burns
- Can affect more than one burn at a time
- Burn teams could work in close proximity as long as they stay clear of each other
- Advantage – prevents weathered oil from reaching the shoreline
- Disadvantage – smoke and residue
- Important to operations
  - Aerial monitoring
    - One plane to spot oil and direct vessel teams
    - Second plane to advise vessel on ignition, monitor burn and characterize area during/post burn

Oil Collection – *In situ* burn

Areas for potential improvement to *in situ* burn

- Could use larger, more robust fire boom that could be pulled faster and used in higher seas – possibly convert Ocean Buster design into fire boom application
- Damage of fire boom was mainly in the retrieval operations – substandard for reuse; consider developing more lifting points on fire boom sections
- Improve aerial spotting – use satellite imagery more effectively to determine thicker oil, not just extent of sheen. Take advantage of video streaming

Oil Collection – Shoreline

Used Shoreline Cleanup Assessment Teams (SCAT)

- Systematic and calibrated observation and assessment of shoreline conditions
- Been in use for 20 years

SCAT uses 3 stages for establishing removal process and Net Environmental Benefits Analysis (NEBA).

- Stage 1 – Assessment:
  - Go out to shoreline and see what's there
  - Use NEBA to discuss what needs to be done, when/if should you go
- Stage 2 – Gross oil cleaning (because tomorrow you might be back as new oil arrives):
  - Cannot go past gross cleaning until you reach steady state
  - Only do fine cleaning for high amenity or ecological reasons
  - Transition to mainStage 3 – Steady state – do full cleanup
  - Transition to maintain
  - Return next season to reassess

Oil Collection – Shoreline

Areas for potential improvement to shoreline clean-up

- Need readily deployable cleaning/collection technologies for sensitive areas
  - Marsh
  - Rip rap
  - Fine sand beaches
- Establish thresholds for removal action in sensitive areas
- Establish technical working group for each theater to discuss what's available and appropriate for each area (some research in response)

Recap of Oil Collection and Containment

Generalized summary of potential improvements to capabilities for oil collection and containment

- How to manage large amounts of data without disrupting or delaying operations
- Need sufficient numbers of trained personnel for safe, effective, and efficient boom deployment, skimmer operations, vessel support operations, etc. for infrequent, large, long-duration spill response efforts
- Develop fire boom suitable for longer duration/greater number of burns, including development of larger, more robust fire boom that can be pulled faster and collect oil/burn in seas greater than 3 – 6 feet
- Use of satellite technology to effectively and efficiently locate thicker, skimmable, offshore oil, and provide better tactical guidance to offshore skimmer crews
- Improve methods to clear debris from skimmer intakes and the skimmed oil-water mix
- Develop more effective and efficient procedures to decontaminate vessels, booms, skimmers, etc., at sea
- Advance the processes for oil spill response waste stream in geographic areas that do not have extensive capability and expertise in processing petroleum-based products
- Create a monitoring system to direct the adjustment of multi-mile boom deployment configurations with limited personnel in a timely manner

Presentation Notes

Prepared for: BOEMRE Information Transfer Meeting

Presented by: USCG Research and Development Center

Date: March 23, 2011