Submerged Oil Working Group

May 16, 2017

IOSC, Long Beach, CA

Meeting Notes

Participants: Chris Barker (NOAA), Matt Horn (RPS), Michel Boufadel (NJIT), Kurt Hansen (USCG R&D), Randy Imai (CDFW-OSPR), Chris Pfieffer (CARDNO), Ellen Faurot-Daniels (CDFW-OSPR), Nancy Kinner, Melissa Gloekler, Jesse Ross and Kathy Mandsager (UNH-CRRC).

I. Overview and Introductions
II. Review of notes from last meeting held at Clean Gulf, November 2016
III. Chris Pfieffer (CARDNO) – no report
IV. Randy Imai (CDFW-OSPR) – geographic response plans for priority waterways
V. Kurt Hansen (USCG R&D)
    - Detection in the water column using sonar and fluorometers completed in 2014. Approaches were inconsistent due to the difficulty in creating am oil droplet field and keeping the droplets from rising too fast. It was difficult in getting LSST data simultaneously with other data.
    - To address mitigation, RDC awarded 2 contracts:
        - Dynaflow – unique way to create bubbles by mixing, acoustics and cavitation to get broader range of bubble sizes and bring to surface for typical response. Tested at Ohmsett did not show significant improvements over baseline tests.
        - Dept. of Energy lab (Argonne National Lab) came up with way to absorb up to 40 times its weight in fresh water in laboratory, RDC tested at Ohmsett to see whether oil was impinging on that and to see if it works in both freshwater and not saltwater. Towed it through the water column and it did not do as well as in lab. Operational issue of then squeezing it out and reusing, but this may be difficult during a response. Argonne released save had some great press releases on this but were too optimistic.
    - Dilbit from Canada pipeline spill in Kalamazoo, MI in 2010 was detected with poles in the water to stir up any oil on the bottom or a full sample analysis. Both approaches had drawbacks as efficacy of the poling was questioned and the amount of time for a sample to be processed was long. Trying to use a fluorimeter to detect oil in silt. But issues are: collaboration for oil, weather and sand. Wants to be used in Kalamazoo situation as well as tar mats for offshore spills. Too many issues with sampling and experiment design to be of major use. Need larger containers if probe is being inserted multiple times.
    - Can you corral the submerged oil on the bottom in order to move it towards collection? Responders should not redesign the systems each time for every situation as is done now. CG seeks a better documented approach that can be used for better guidance. RDC awarded 1 contract for offshore/large lakes and 2 for inland rivers.
        - Offshore, lakes based on bargeDBL-152 that oil bounced off the bottom. Contract awarded to 1 contractor to design a system to corral or redirect oil in 50 feet of water. Tests scheduled for Spring 2018.

- Two contracts awarded for design of inland system to work in 2-7 knots and less than 10 feet of water. One system to be tested in Spring 2018. Follow-on contract for second system in early 2018.

VI. Michel Boufadel (NJIT)

- EPA-funded Kalamazoo spill. Develop model to incorporate both high viscosity oil and …??
- Fisheries and Ocean Canada – dispersant and Dilbit tests in the wave tank. Results found that dispersants do work on Dilbit maybe at 40 – 60 %. Fresh Dilbit, Corexit. Using wave action. Conducting experiment and …??
- Modeling the slant. Report is available. Shear stress at the bottom with water pass that causes water transport and sediment. OPA instead of sand and convoluted shapes and strings. Fractis?? Not spherical and sediments are not directly proportional to the area. More sediment you can get more on it because it can go inside. Testing it on regular oil, but Dilbit goes inside and then falls on itself.

VII. Ellen Faurot-Daniels (CDFW-OSPR) – no report

- Ellen shared about a presentation by Jeff Wynn, USGS out of UW. Working on suspended oil in rivers. Interesting results. (For more information: https://www.usgs.gov/staff-profiles/jeff-wynn?qt-staff_profile_science_products=3#qt-staff_profile_science_products).
- **Name: Rapid and Efficient Mapping of Sub-Seafloor Placer Mineral Deposits, as well as Dispersed Oil from Well Blowouts Drifting Through the Open Ocean**. **Citation:** Wynn, Jeff, Williamson, Mike, and Fleming, John, 2012, Induced polarization for sub-seafloor, deep-ocean mapping: Sea Technology Magazine (invited feature article), September 2012, p. 47-50. **Summary:** A new, USGS-patented technology utilizing the physical property of induced polarization, has been successfully used at sea to map large buried tracts of placer heavy minerals, including titanium oxides frequently associated with gold, platinum, and diamonds. Recent laboratory experiments suggest the technology can also be used to map Combined Stormwater Overflow of urban and industrial waste into Puget and Long Island Sounds. **Download:** (File size 5.4 MB): https://profile.usgs.gov/myscience/upload_folder/ci2012Nov0914332834998Sea-Technology_Sept2012.pdf

VIII. Matt Horn (RPS)

- Not directly involved in research
- Synthesizes the research that is out there
  - NAS results, Government Canada (EC-ESTC, DFO-COOGER, NRCan), PHMSA etc. - the documents have results that may not align and may not apply to real world situations (e.g. characterization of crudes, units on sediment concentrations in water)

IX. Fate and weathering of oil: is it OMA or weathering?

- Elliott Taylor (Polaris Applied Science)
- Randy Belore (S.L. Ross Environmental Research Limited)
- Bruce Hollebone (ECCC)
- Currently working on EIS for Enbridge L3RP US portion. Completed an EHHRA for Enbridge L3RP for the Canadian portion, which was approved by the NEB. Previously conducted EHHRA for Northern Gateway Pipeline. Now in the US is modeling the entrainment of oil with height of waterfall, to figure out how much could potentially become submerged oil (Enbridge, but also other pipeline projects)

- No lab work. Synthesis & algorithms (ongoing research on studies for the next few years)

X. Chris Barker (NOAA)

- No research
- NOAA experiences a sinking oil every couple years
- Not in Adios

XI. BSEE project – get status from BSEE Submerged oil detection following up Kurt's sonar & underwater laser (look on BSEE website for this report: https://www.bsee.gov/what-we-do/oil-spill-preparedness/oil-spill-response-research/master-list-of-oil-spill-research, unable to access the reports)

XII. Challenge

- Fewer spills
- Sediment load in water column is not really studied well
- Realistic concentrations – oil to sediment interaction not in the environment
- Spill pipeline, rand downhill to collect sediment and then falls into water – how much then gets absorbed.
- Dilbit oil testing in lab with differing ratios so it would help in understanding sinking for Matt to add to model. Time history and concentration. General position is moving to the conclusion that oil sinks because it has sediment. Freshwater it won't sink until sediments. Weathering will cause higher viscosity and mixing.

XIII. Jesse Ross (UNH, CRRC)

- Designed 3 experiments with snares, bitumen in water column and how much was coming off as snare moved. Video determined that 1 ½ knots and to keep it off the bottom and before it begins to peel off. Pompom for detection to characterize more than just detecting oil but at cold temperature less adsorption, but then drops off. (Steve Lehmann). Difference between snare (looped) and pompom.

XIV. Melissa Gloekler (UNH, CRRC)

- Analyzing results from last 2 thesis on Alberta bitumen at a range of temperatures (15-33 degrees C) and velocities (0-1 kt), in the CRRC/CSE annular flume. The oil was submerged on a laminated sheet of graph paper and secured to the bottom; an Acoustic Doppler Velocimeter (ADV) was used to measured the temperature and velocity in X, Y and Z directions over the 60 minute run time. The results indicated that migration of oil (i.e., lengthening along the bottom) was function of temperature. Therefore, with higher temperatures increased migration of oil along the bottom would be expected. This is due to the complexities of the chemical and physical properties of the oil itself (e.g., viscosity). There was not enough variation in velocities to create a critical shear stress relationship for the oil; moving forward this is a goal of CRRC. Another research objective is to better understand the different processes driving lengthening of oil as opposed to erosion of oil into the water column. The future experiments will be done on varying types of substrates from fine sediment up to gravel substrate, and on more complex morphologies (e.g., sand dunes). The information found in research will hopefully improve submerged oil fate models and assist with response tactics.

XV. New flume will go up to 4 knots. 10 ft. long before test section, top and bottom circular flume top to bottom with flow straters. Still constructing this summer.

- Kurt wants to come up and see this

- Does the thickness of the oil make a difference?
- MOSSFA study at UNH creating difference snows looking at remobilization
- Next looking at different sediments.

XVI. Meeting adjourned