



### Problem Summary & Decision Context

EPA is responsible for assessing environmental releases of oils and fuels.



Releases can potentially affect human health and the environment through their impacts on water quality, or through direct exposure to toxic constituents.

SHC 3.62.1 research addresses the overarching question:

*What management, response and remediation actions are effective for minimizing environmental and human consequences resulting from oil spills?*

Research products provide guidance for OLEM and Regions regarding spill preparedness, response and remediation efforts



### Task Overview

- This task is dedicated to research on the biodegradation, weathering, dispersion, toxicity and behavior of oil and spill agents in support of the EPA Office of Land and Emergency Management (OLEM) and the Regions.
- Research efforts improve the understanding of oil fate & transport; establish appropriate response, remediation and restoration methods; and enhance spill preparedness by determining potential impacts of mitigation technologies to communities and ecosystems
- Ecological and human health impacts associated with spilled oil and mitigation technologies (e.g. dispersants) are of concern for or impacted communities.
- Awareness by emergency responders and scientists has been heightened on the capabilities and limitations of spill response methods in use today, particularly for atypical spills (deep-water, high pressure, jet release, prolonged, under-the-ice spills).
- Unconventional oils (diluted and synthetic bitumen from oil sands formations) are particularly difficult to remediate and exhibit chemical and physical behavior, requiring better characterization of these oils.

### Accomplishments

#### Deepwater Horizon Field Sensor Evaluation

- A novel approach for evaluating *Deepwater Horizon (DWH)* oil spill field sensors was developed using wave tank oil plume simulations. Conmy *et al.*, 2014 is a citation within the 40 CFR § 300.900-920 proposed decision-rule and was used as testimony material during the DWH trial.

#### Wave tank Oil Plume Simulations

- ORD has completed an EPA 600 series report (Conmy *et al.*, 2016) for Interagency Agreement research with Dept. of Interior and the Canadian government to conduct high-pressure jet release simulations for various oil type, dispersant concentrations, and water temperature.

#### Oil Biodegradation

- SHC 3.62 conducts various oil and spill agent biodegradation experiments. Recent publications include Deshpande *et al.*, 2017 (in prep); Zhuang *et al.*, 2016; Campo-Moreno *et al.*, 2013

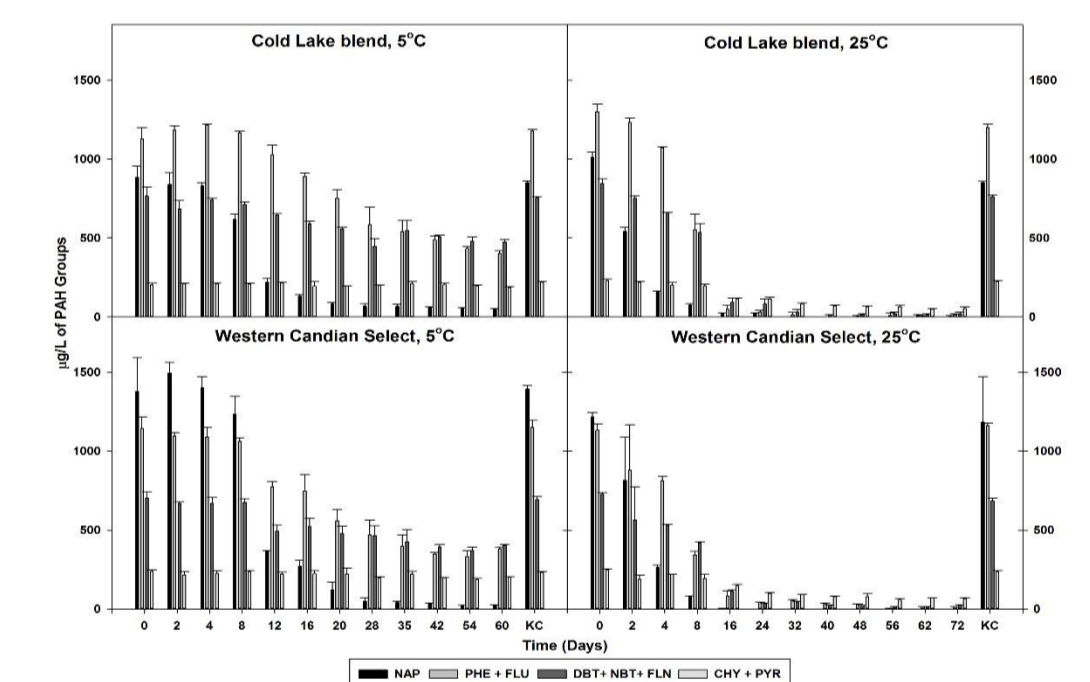
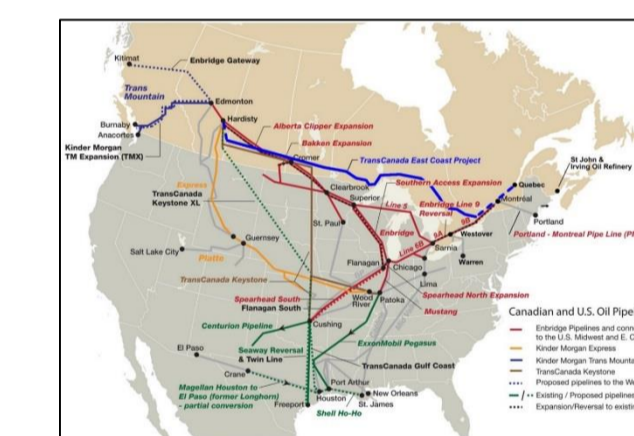
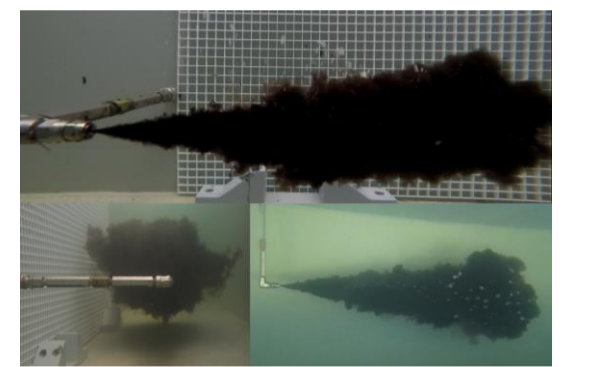
#### Spill Response Oil Mapping

- Collaborative perspective journal article on DWH technologies White *et al.*, 2016.

### Future Directions

SHC 3.62 has planned for the following deliverables under Task 1 in support of OLEM and the Regions:

- Conduct oil dispersion experiments at the DFO Canada wave tank facility to evaluate the influence of hypersaline waters on plume formation. Report due to the Department of Interior in FY17.
- Continue with biodegradation and toxicity of diluted bitumen experiments. A summary report is due to OLEM program office in FY17, with a manuscript in prep (Deshpande *et al.*, 2016).



- Complete the biodegradation and metagenomic analyses of Alaskan crude oils exposed to two dispersants. This research highlights how biodegradation rates vary as a function of microbial consortia. This has critical implications for understanding fate and transport of oil. Two manuscripts are in prep: Zhang *et al.*, 2017 and SantoDomingo *et al.*, 2017).

