Adsorbent Materials for Oil Spill Cleanup

Nicholas Kraaz, Dr. Skip Rochefort; School of Chemical, Biological and Environmental Engineering (CBEE)

Purpose

The purpose of this research is to determine how viable Willamette Valley wool is as an adsorbent material for oil spill cleanup. This research would be used to develop adsorbent booms for oil spill cleanup efforts.

Gulf Oil Spill

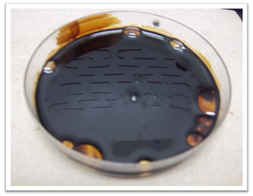
On April 20th, 2010, an explosion on the Deepwater Horizon oil rig caused an oil spill that released 205,800,000 gallons of oil into the Gulf of Mexico. BP responded to the oil spill with skimmers, booms and dispersants. The booms that were used acted as physical barriers to stop the spread of the oil. Semi-permeable booms were also used in clean up efforts. Adsorbent materials (such as human hair) were used in side of the booms, which allowed some of the oil to be recovered.

Materials

- Wool Fleece - unprocessed and untreated wool
- Washed Wool - cleaned and no lanolin
- Wool Blanket – non-woven, compressed scraps
- Hair – donated human hair
- Crude Oil – Deepwater Gulf Region Crude

Methods

- Samples of the different wools and human hair were tested in booms and as loose wool
- Samples were tested to see how much oil could be adsorbed and how much oil could be recovered
- Samples were massed (~1g) and placed in a Petri dish with oil and water
- Oil was then adsorbed by the adsorbent material
- When maximum adsorbency was reached oil was recovered using two methods:
  - The first method consisted of squeezing the oil into an empty Petri dish and massing the dish.



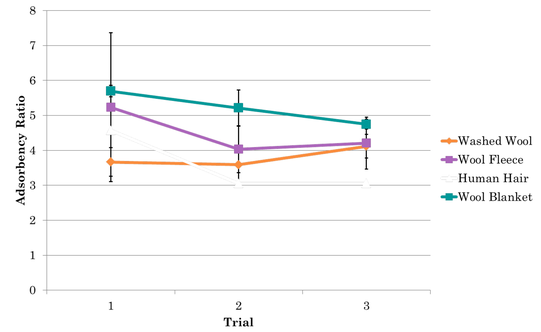
- The second method used a graduated cylinder, which allowed oil and water to separate.

Conclusions

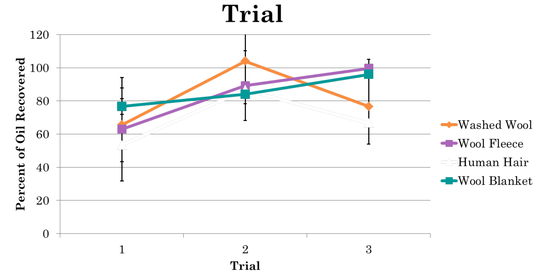
- The Wool Blanket is the best at adsorbing the oil
- Both loose wools have a high recovery of oil
- Wool products consistently performed better than the hair.
- Both loose wool would make excellent fillings for booms for future oil spills
- Adsorbent booms would be more useful than the non-permeable physical barrier booms.

Data

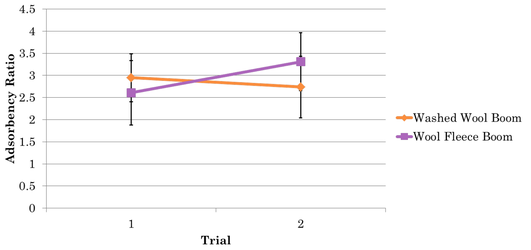
Average Adsorbency Ratio per Trial



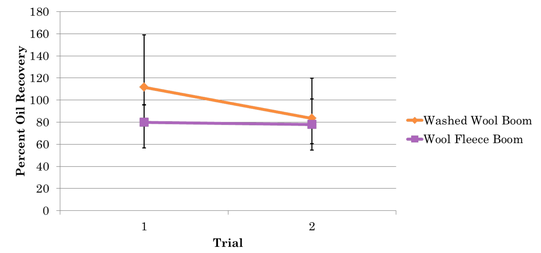
Average Percent Recovery per Trial



Average Absorbency Ratio per Trial



Average Percent Recovery per Trial



Acknowledgements

Dr. Skip Rochefort
Courtney Fisher
Dan Foster
Garrett Jones
Dr. Lewis Semprini