Keepers of the Water
STEWARDS OF OUR GREAT ARCTIC OCEAN BASIN

Workshop Title: **Simulated Oil Spill and Clean-up**
Part of the **Keepers of the Water IX Gathering** at Bushe River
Friday, August 28, 2015
Developed by Jule Asterisk, for Keepers of the Water
Presented by Jule Asterisk, with assistance from Satoko Nakajima of Green Circles Salons, Mandy Dumanski of the Alberta Energy Regulator, and Boss Services (oilfield waste management provided by Husky Energy),
Materials provided by Baptiste Metchooyeah, Acting Lands Director for Dene Tha' First Nation, Green Circles Salons, Boss Services (courtesy of Husky Energy), Hair FX Salon, Magic Scissors Salon, and Keepers of the Athabasca.

Statement of the Problem:

When oil spills from pipeline breaks contaminate the landscape, residues are left which must be cleaned up.

What is the best method of removing oil from water?

We have seen that the oily residues have not been completely removed by conventional methods. Even years later, residues remain and impact the landscape, contaminating medicinal plants and traditionally hunted animals.

Commercial booms are made with synthetic polymers with oil/gas as the base. Other booms made from different materials are available, although not certified. Traditional Knowledge suggests the use of certain natural materials. A proprietary Human Hair boom has been developed and tested by Green Circles Salons.

Hypothesis:

It is possible that other materials may work as well or better than commercial booms for cleaning oil out of water?
If other materials clean as much oil out of water as commercial booms, then work can be done to promote the use of these materials.

In testing various materials placed into nylon booms, we will observe how well they pick up oil from water (oil adsorption), whether the oil is released back into the water on removal from the test container (boom becomes a source), and how saturated the boom becomes (capacity).

Materials:

For the purpose of this workshop, we utilized the following materials:

- Peat bog moss (Traditional Knowledge for diapers/pads)*
- Poplar sawdust (from wood chopping yard)*
- Grass clippings*
- March grasses*
- Cat tail tops* (seeds removed from the heads): Note: this material was an addition to our workshop, as suggested by an Elder who participated
- Human hair (Green Circle Salons)
- Human hair (handmade) **
- Commercial boom (provided by Boss Services)

All materials except Human hair (Green Circle Salons), and the commercial boom were encased in donated nylon stockings. These two booms have a proprietary and specially developed casing. The casing for Human hair (Green Circle Salons) is nylon net with very small holes, while the casing for the commercial boom is a polymer material.

* provided by Baptiste Metchooyeah, Acting Lands Director for Dene Tha' First Nation

** special thanks to Hair FX and Magic Scissors Salons in Slave Lake

Procedure:

1. A 40 L plastic bin was filled half full of water for each material
2. One litre of used motor oil[1] was added to the water for each material (approximately – see notes)
3. Each boom was moved through the surface of the water to adsorb oil for exactly three minutes
4. When, at the end of three minutes the boom was lifted from the water, we observed whether the boom released oil back into the water. A small squeeze was applied to each boom after about five seconds natural dripping.
5. After the experiment, booms were cut open to reveal how much of the material was soaked/saturated with oil and water.

Results:

Material	Observations: Absorbs? :Size, # of booms	Score 1 - 10	Recommendation	Oil re-leased ?	Satur-ation
Peat bog moss	Absorbs well Gets saturated Well absorbed Well absorbed Not good 16" x 3" x 2 booms[2]	5.4	No (all agree): Boom becomes a source too destructive to mine for this purpose[3]	Yes	100%
Popular sawdust	Absorbs well Traps some oil	5.7	No Drips oil (boom	Yes	100%

[1] During the workshop, we learned that the litres of motor oil, donated from Motormania in Slave Lake, were from different vehicles, providing a loss of specific controls for our workshop. Some oils were synthetic, some were not. We used ½ litre of oil for some of the smaller booms (cat tail tops)

[2] The last line under "Observations" reflects the size and number of booms used: length of boom x diameter of boom x number of booms used

[3] We note that one local concern in the Bushe River/High Level area is the municipally assisted destruction of peat bog mosses and wetlands as they are allocated to arriving Mennonite settlers to be drained for farming. These wetland areas are the pharmacies and grocery stores of five local First Nations. Peat bog moss takes thousands of years to regenerate.

	Bad Not much Not much Absorbs, but let it go 16” x 3” x 2		becomes source) Not good		
Grass clippings	Does not absorb well Bad Ok Ok Bad, very oily 24” x 4” x 1	4.3	No (all agree) Boom becomes source	Yes	95%
Marsh grasses	Not very well Good Not good Not good Not the best Still full of oil 16” x 3” x 2	4.1	No[4] (all agree) Boom becomes source	Yes	100%
Cat Tail tops (seeds)	Boom was too small Bad Lots of oil left Nothing spilled out[5] 1’ x 2” x 2	5.3	Maybe (received no other comments, neither yes or no)	No[6]	100%
Human hair – GC	Absorbed all (except residues on container) Fair/good Picked up oil better Works better Only water drips out Isolated droplets when squeezed 16” x 6” x 1	8.3	Yes The best –recyclable Yes Yes	No[7]	60% (still has lots of capacity)
Human hair – (hand made)	Absorbed all oil Fair Picks up oil Got a lot out, but still have	7.7	Yes Need a second boom Yes No	Yes	100%

[4] An observer from Boss Services stated that when there is an oil spill in the environment, oil creeps up inside marsh grasses, likely due to the long cellular structure in their stems.

[5] It was noted by many that even though the cat tail tops (seeds) boom was very small and underperformed all other booms, that nothing dripped out when the boom was removed from the water and squeezed. Neither oil nor water was released from the cat tail tops (seeds) boom

[6] We were astonished to note that neither oil nor water was released from the cat tail tops booms, even when they were squeezed.

[7] Observing the clean water running from the GC human hair boom provided GC representative Satoko with an opportunity to describe how well their boom contains oil. When AER representative Mandy questioned whether Satoko would drink the water, she put out her hand and did so.

	residues Absorbed oil up to its saturation point 16” x 3” x 2		Yes – recyclable Boom becomes source		
Commercial boom	Absorbed all but residues Fair Picks up oil Oil still evident Mostly absorbed Floats then sinks – looks pretty dirty + BTEX 4’ x 3” x 1	7.8	GC Hair boom is better Need a second boom Yes Yes No	Yes	100%

- All of the statements on the table, above, are from 10 citizen scientists who filled out the Observations sheet offered to participants in this workshop
- Scores are averaged over all those received, and all statements received are included. Not all Observations sheets were completely filled out.
- Some citizen scientists preferred to measure items that were not on the list of Observations. This provided us with additional information, for example the approximate size of each boom, the percentage saturation.
- Other relevant details that were brought up verbally during the workshop are noted in the footnotes.
- Further comments on the Observation sheets not noted above are:
    - More controls are needed: use the same oil for all booms
    - Can you use horse hair?
    - Can you use fur or animal hair?
    - Take into consideration if nylon adsorbs any water. Measure the weight before and after. Keep same volume of each material.
    - More controls. Feathers?

Conclusions:

We accept the hypothesis that some other materials perform equally as well as commercial booms for removing oil from water, and some appear to perform better.

Factors for performance include environmental affects over and above the observed reactions at this workshop. Participants added background information, for example, the inadvisability of using peat moss, as it takes so long to grow. Concerns were brought to the workshop about the draining of local peat moss bogs, in use by five local First Nations as their 'pharmacy and grocery store', so that this land can be used for farming by a newly arrived Mennonite community.

A factor that was extremely relevant to our participants is the fact that human hair booms are reusable, with the patented 'squeeze machine' (not available for our demonstration). When the boom is squeezed out, oil can be recovered, and the boom is able to be reused again, instead of being landfilled like commercial booms currently are. **The use of reusable Human Hair booms from Green Circle Salons would greatly cut down on waste to landfill, provide enhanced oil recovery, and save money while protecting the environment.**

While the commercial boom did function to pick up oil, it quickly became saturated and wanted to sink (in under three minutes). The commercial boom, made of a synthetic polymer, appeared to absorb oil and water equally. The Human Hair boom by Green Circles Salons was just over one half saturated after three minutes and did not appear to release oil when lightly squeezed. This suggests that it has a much higher capacity than the commercial booms currently in use.

At the conclusion of our "Simulated oil spill and clean-up workshop", It appears that the Human Hair boom by Green Circles Salons performed better, however a more controlled experiment needs to be completed in order to substantiate this hypothesis.