

US EPA ARCHIVE DOCUMENT

# **ATTACHMENT 1**

**MEMORANDUM**

**DATE:** October 30, 2012

**TO:** Robert Doherty, Enbridge Energy, Limited Partnership

**FROM:** AECOM, Dave Dryburgh and Debora Periard

**Re:** Poling Results as an Estimate of Submerged Oil Volumes and Migration

During poling, the submerged oil category result, for each poling point, is based on the percentage of sheen cover per square yard and/or a count of globules per square yard. These characterizations do not correlate to a volume estimate of submerged oil as:

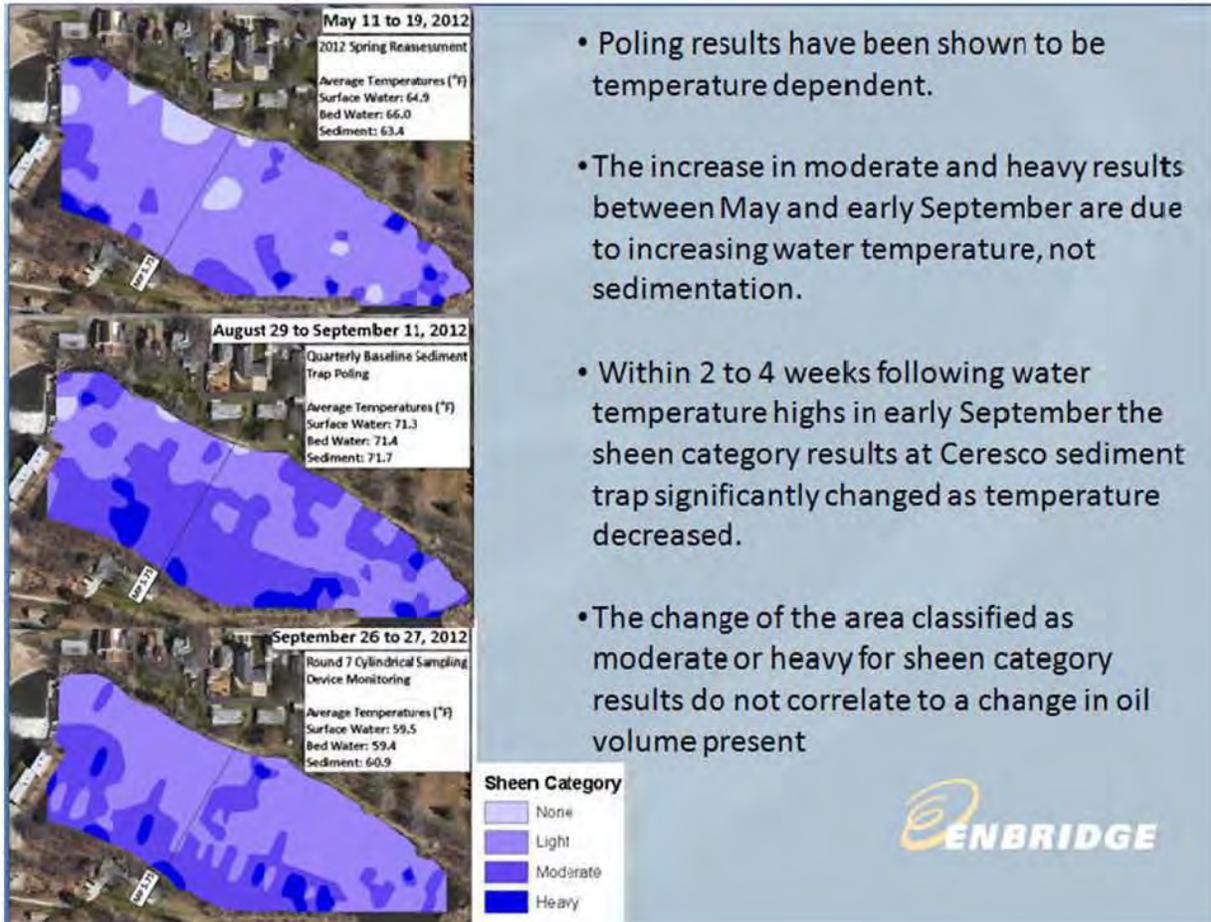
- Only a very minor amount of oil is necessary to create sheen,
- Sheen appearance is not taken into account. Sheen can vary in appearance, including relatively thicker rainbow sheens and metallic sheens. Percentage of sheen cover in an area does not represent the volume of submerged oil in the area. Globule size is not a factor. Globules range in size, and include flecks, which are defined as particles <4 mm. A count of 10 flecks and a count of 10 larger globules do not correlate to the same volume of submerged oil.

Additionally, poling results, specifically the count of globules and percentage of sheen cover, have been shown to be highly temperature dependent.

- Sheen spreads faster and covers a higher percentage of area at higher water temperatures.
- A greater number of globules are liberated from sediment at higher sediment and water temperatures.

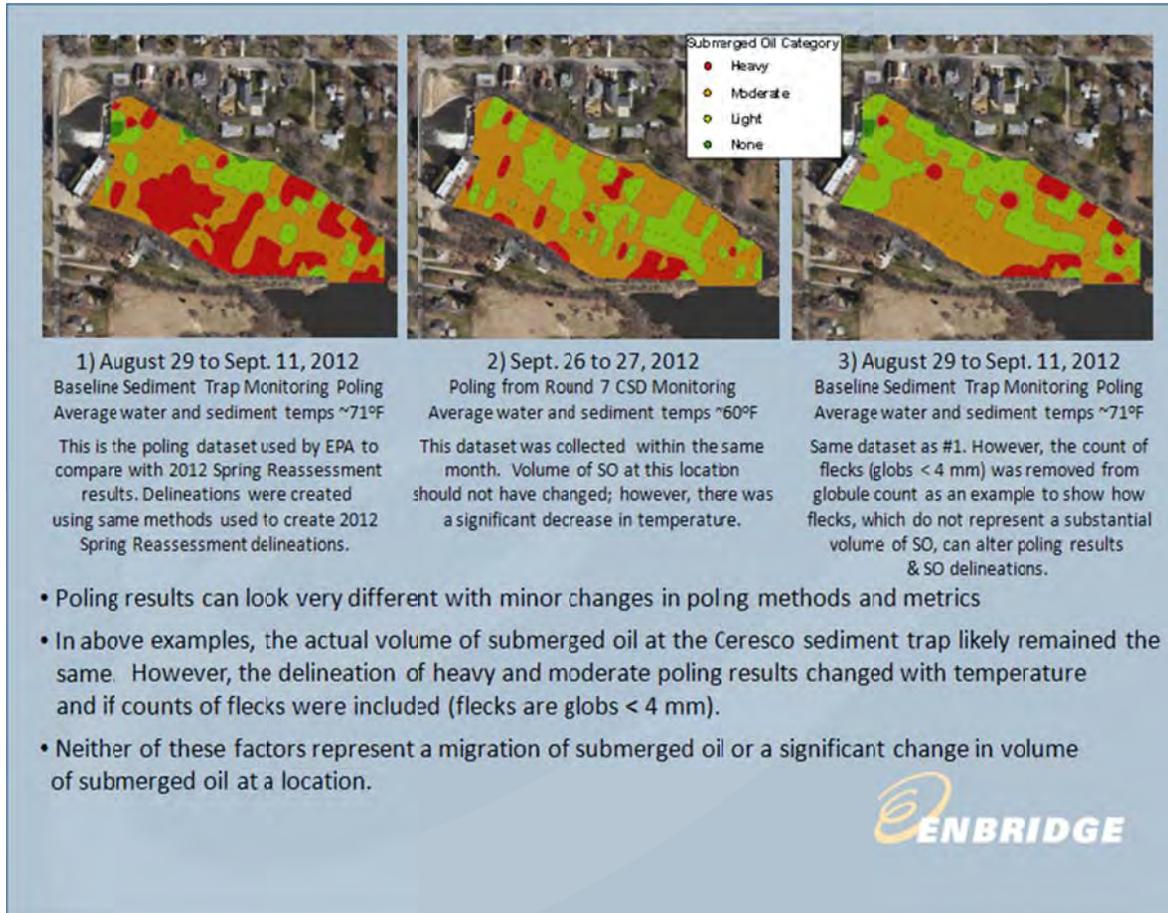
Poling results are not reliable for quantification of submerged oil volume, nor do differences in poling results over time equate to migration of submerged oil.

The below slide demonstrates the effect of temperatures on sheen results during poling activities.



- Poling results have been shown to be temperature dependent.
- The increase in moderate and heavy results between May and early September are due to increasing water temperature, not sedimentation.
- Within 2 to 4 weeks following water temperature highs in early September the sheen category results at Ceresco sediment trap significantly changed as temperature decreased.
- The change of the area classified as moderate or heavy for sheen category results do not correlate to a change in oil volume present

The below slide demonstrates the effect of temperature and fleck count on submerged oil category results and delineations.



Shifts in the distribution of heavy and moderate poling points likely reflect a correlation with water and sediment temperature rather than a correlation to a significant volume of submerged oil moving into or out of an area.

The *Technical Review* by Fitzpatrick states that the extent of heavy and moderate submerged oil increased and accumulated upstream of Ceresco Dam. While the poling results indicate an increase in heavy and moderate delineations between Spring and Late Summer 2012, these changes likely do not indicate a significant volume of submerged oil moving into (or accumulating within) these areas. The following alternative explanations are more likely:

- A significant increase in water and sediment temperatures between Spring and Late Summer 2012 increased the heavy and moderate poling delineations rather than submerged oil movement. This is further supported by a significant decrease at the Ceresco sediment trap in

delineated heavy and moderate results as the sediment and water temperatures cooled following the Late Summer delineations.

- Ambient temperatures also affect the amount of sheen observed. Poling is a rough, subjective method to determine the general location of submerged oil without accounting for volume, source of oil, or potential for migration. Furthermore, besides temperature, poling results are affected by weather (wind, rain, sun/clouds), the personnel making the observations, channel velocities, and changes in oil density over time.

The *Technical Review* by Fitzpatrick states that “It is unlikely that the designated sediment trap at SO 5.84C and SO 5.84D will be able to effectively capture the amount of submerged oil in SO 5.84A, SO 5.84B, and SO 5.15 mobilized during a high-flow event since the lower area of the impoundment is much smaller and the northern half of this reach is in transport or erosional mode during high flows”. The below slides depict the erosional and depositional areas of sediment for three runs of the hydrodynamic model. Most of the heavy and moderate submerged oil poling points are located in areas that are modeled as depositional even during high-flow events, including 100-year flows.





As stated and shown in figures within the *Technical Review* by Fitzpatrick, late summer 2012 poling results in the Mill Ponds showed comparable results to Spring 2012, and in some areas had decreased heavy and moderate submerged oil delineations compared to Spring 2012. There are some small expansions of the heavy and moderate delineations at the Morrow Coves; however, these poling results do not indicate a significant change in either of these areas.