EPA Response to Comments regarding Proposed Order to Enbridge Energy, Limited Partnership

March 14, 2013

On October 3, 2012, the United States Environmental Protection Agency (U.S. EPA) transmitted a proposed Order to Enbridge Energy, Limited Partnership and its affiliates (Enbridge) pursuant to the authority vested in the President of the United States by Section 311(c) of the Federal Water Pollution Control Act, 33 U.S.C. § 1321(c), as amended (commonly referred to as the Clean Water Act (CWA)). The proposed Order would require Enbridge to carry out additional work in the areas of the Kalamazoo River in Michigan affected by the Enbridge Line 6B oil discharge reported on July 27, 2010.[1]

In the cover letter transmitting the proposed Order, U.S. EPA invited Enbridge to submit written comments or other information that it believed U.S. EPA should consider prior to issuing the Order. Two additional technical studies (AR 1597, 1277) became final after the proposed Order was received by Enbridge and the U.S. EPA allowed Enbridge extensions to the deadline for comments regarding those reports.

Enbridge submitted written comments to U.S. EPA in three installments, which are now part of the final Administrative Record (AR 1304, 1332, 1341). At its request, Enbridge met with U.S. EPA twice, first on October 23, 2012 and again on December 19, 2012. Although the deadline for Enbridge's comments ended in early November 2012, Enbridge submitted additional comments on the proposed Order to U.S. EPA on February 27, 2013. The majority of those comments were not materially different than those submitted within the comment period. In its discretion, U.S. EPA elected to respond to one new comment in Section I.F.

Sections I through IV of this document present U.S. EPA's responses to Enbridge's comments. Section I addresses Enbridge's comments regarding the need for immediate, additional cleanup work. Section II addresses Enbridge's comments regarding winter containment and Section III addresses Enbridge's comments regarding the Net Environmental Benefit Analysis (NEBA) and active recovery. Finally, Section IV addresses Enbridge's comments about the proposed Order's consistency with the National Contingency Plan (NCP).

The proposed Order and a draft Administrative Record were also made available to the public through a number of media. U.S. EPA received comments from members of the public (AR 1154, 1155, 1156, 1673) and has responded to those comments in Section V.

[1] For a description of the proposed Order's contents, please see the proposed Order (AR 1152).

I. Comments Regarding Need for Immediate, Additional Cleanup Work

Enbridge's comments challenged the validity and interpretation of the data relied upon by U.S. EPA in making its determination that submerged oil is accumulating in the impoundment areas of Ceresco, the Mill Ponds, and the Morrow Lake Delta and needs to be both contained and removed. Enbridge's comments reflected the viewpoint that there is no proven immediate need for either containment or active recovery. Enbridge challenged the validity and reliability of poling data, U.S. EPA's conclusion that the submerged oil is migrating and accumulating at the impoundments, and studies regarding the characteristics of the submerged oil.

A. Poling Data

After the Line 6B oil discharge, it became clear that the Line 6B oil was becoming submerged in the Kalamazoo River. Enbridge proposed using a field technique known as "poling" in order both to locate the submerged oil in the river and to determine the areal extent (i.e., the surface footprint) of the oil. Poling involves manually agitating soft sediments using a pole with an attached disc combined with global positioning system (GPS) technology to record the exact location. When the sediments are agitated, submerged Line 6B oil rises to the surface in the form of oil sheen and/or globules. A team, composed of mostly Enbridge personnel with oversight and direction from U.S. EPA and/or Michigan Department of Environmental Quality (MDEQ) personnel, categorizes the response of the submerged oil to poling at each location as "heavy," "moderate," "light," or "none." EPA and Enbridge agreed on standard definitions for these categories based upon the percent coverage of surface sheen and number of oil globules within a predefined area of observation (AR 1159). Enbridge also developed and implemented a Standard Operating Procedure for poling in order to ensure consistent application (AR 1159).

Enbridge made a number of comments regarding the validity of poling data and U.S. EPA's use of that data in assessing the need for further action at Ceresco, the Mill Ponds, and the Morrow Lake Delta (AR 1304). Enbridge appended a memorandum with additional comments regarding poling prepared by its contractor, AECOM, to its comments (AR 1304A). Collectively, these are referred to as Enbridge comments.

Enbridge Comment: Enbridge commented that it believed U.S. EPA is relying on poling data to assist it in quantifying the volume of submerged oil and to support U.S. EPA's view that submerged oil is migrating downstream (AR 1304). In the AECOM memorandum, Enbridge stated that poling results were not appropriate for either of these purposes (AR 1304A).

Response: U.S. EPA is not relying on poling data to quantify the volume of submerged oil in the Kalamazoo River.[2] Rather, U.S. EPA is relying on poling results (AR 0945, 1056, 1057, 1058)

[2] Poling data played a role, along with other factors such as concentration of Line 6B oil in sediment, bulk density, geomorphology, and depth of contamination, in the development of a quantification algorithm that will be applied as

to locate submerged Line 6B oil, make qualitative assessments regarding the degree of submerged oil accumulation, and/or document the accumulation and/or areal extent of the oil (i.e., the footprint) in portions of the Kalamazoo River affected by the Line 6B release. In fact, Enbridge initially proposed, developed, and supported the use of poling as a method of locating the Line 6B oil, estimating its areal extent, and qualitatively assessing the degree of accumulation, until its letter of November 2, 2012 (AR 1159).

U.S. EPA disagrees with Enbridge that increases in heavy and moderate poling results over time are due to environmental factors rather than migration and accumulation of the submerged Line 6B oil. The results of successive rounds of poling in the same locations, controlling for confounding environmental factors, support U.S. EPA's conclusion that the submerged Line 6B oil is migrating downstream and accumulating in impoundments. U.S. EPA has compiled four examples, illustrated by maps, to support its assessment that poling results can accurately document migration of submerged oil:

- At the start of the Spring 2011 Reassessment, very few areas poled in the Morrow Lake Fan had moderate or heavy poling designations (AR 1700; Figure 1 below). However, following the Memorial Day flood in late May 2011, ninety acres in the Morrow Lake fan had moderate or heavy poling designations (AR 1701, Figure 2 below). U.S. EPA believes the drastic difference in poling results before and after the Memorial Day flood is most likely explained by migration of the submerged oil during the high flows.

part of the currently ongoing Submerged Oil Quantification Study. The results of that study will define the quantity of Line 6B oil remaining in the Kalamazoo River.

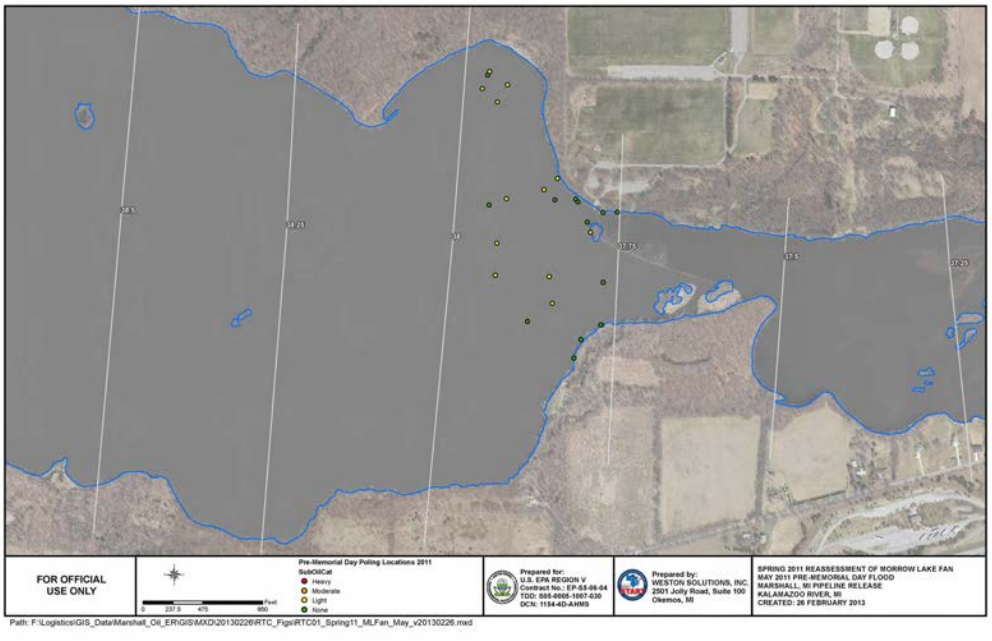

Figure 1 - Poling Results in Morrow Lake Fan - May 2011

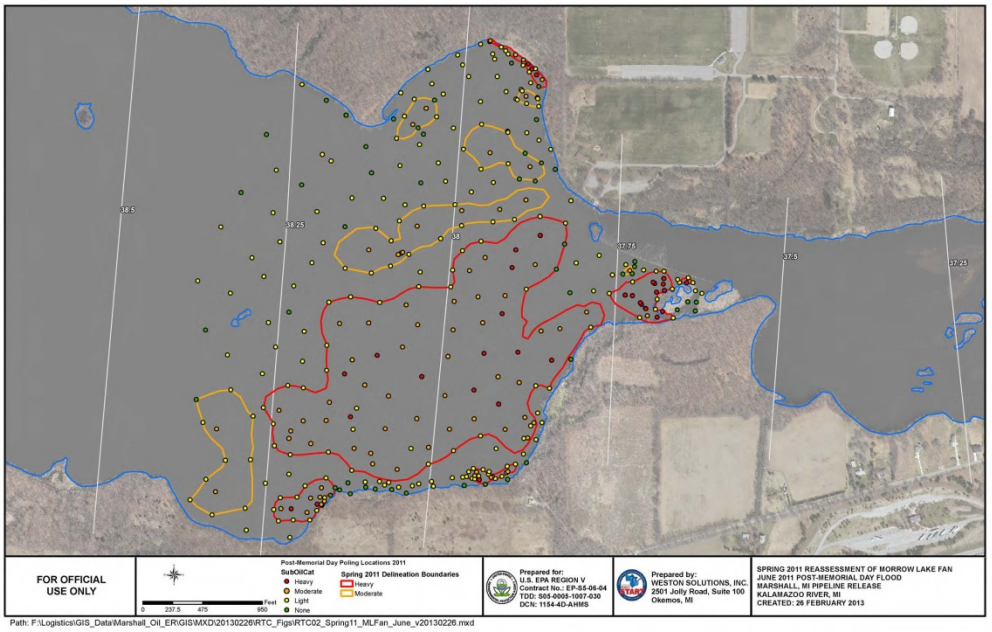

Figure 2 - Poling Results in Morrow Lake Fan - June 2011

- Following the agitation efforts undertaken in 2011, only 25% of poling locations between MP 5.35 and 5.85 (immediately upstream of Ceresco Dam) were classified as heavy or moderate (AR 1702; Figure 3). In contrast, at that same time, the area between MP 4.85 –5.15 (upstream of MP 5.35-5.85) still had areas where the river had moderate/heavy

poling designations from shoreline to shoreline (AR 1702; Figure 3). By Spring 2012, however, that same area (MP 4.85 - 5.15) no longer had any bank to bank moderate or heavy designations and had fewer heavy or moderate designations overall (AR 1703; Figure 4). Yet, MP 5.35 to 5.85, which had previously had only 25% heavy or moderate designations, demonstrated a substantial increase in locations poling as moderate or heavy at that time (AR 2703; Figure 4). The relative patterns demonstrated by two rounds of poling in the same locations, which had just undergone extensive recovery actions, are reliable evidence that submerged oil migrated downstream, rather than the increase simply being a result of environmental factors (which are discussed below).

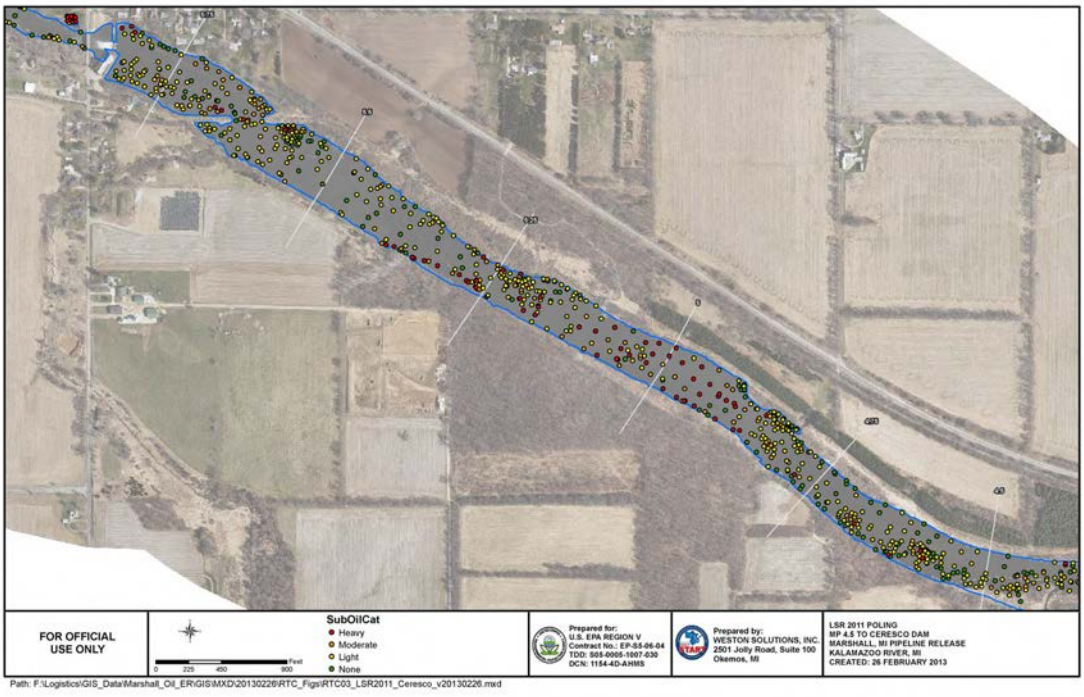

Figure 3 - Poling Results MP 4.8 to Ceresco Dam - Fall 2011

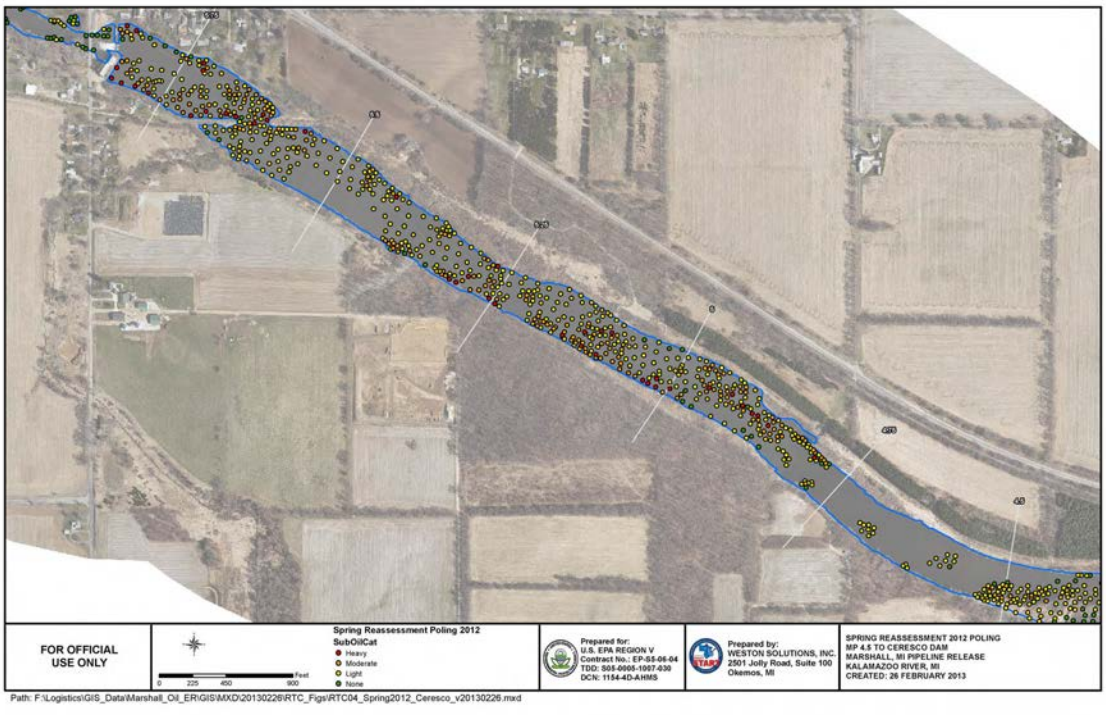

Figure 4 - Poling Results MP 4.8 to Ceresco Dam - Spring 2012

- The poling results in the Ceresco impoundment show an increase in submerged oil when comparing Fall 2012 (59% of the poling locations were classified by Enbridge as heavy or moderate) (AR 1705; Figure 6) and Fall 2011 (25% of poling locations were classified by Enbridge as heavy or moderate in the Late Summer Reassessment) (AR 1704; Figure 5). The average water temperatures for each round were within 1 ^{0}F of each other (AR 1704, 1705).

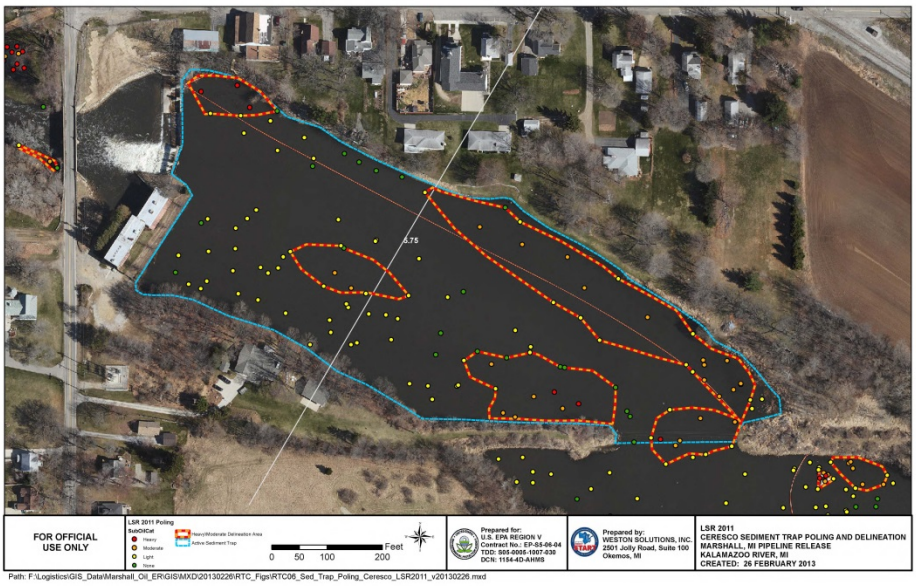

Figure 5 - Poling Results at Ceresco Impoundment - Fall 2011

Figure 6 - Poling Results at Ceresco Impoundment - Fall 2012

- In Fall 2011, following the agitation efforts undertaken during 2011 at the Mill Ponds area, only a few areas had moderate or heavy poling results outside of the North and South Mill Ponds (AR 1706; Figure 7). By Spring 2012, however, the frequency and areas of moderate and heavy poling results had increased significantly, particularly in areas near the main channels outside the North and South Mill Ponds (AR 1707; Figure

8). These results are an indication that submerged oil had accumulated in depositional areas along the Mill Ponds between Fall 2011 and Spring 2012.

Figure 7 – Fall 2011 Mill Ponds

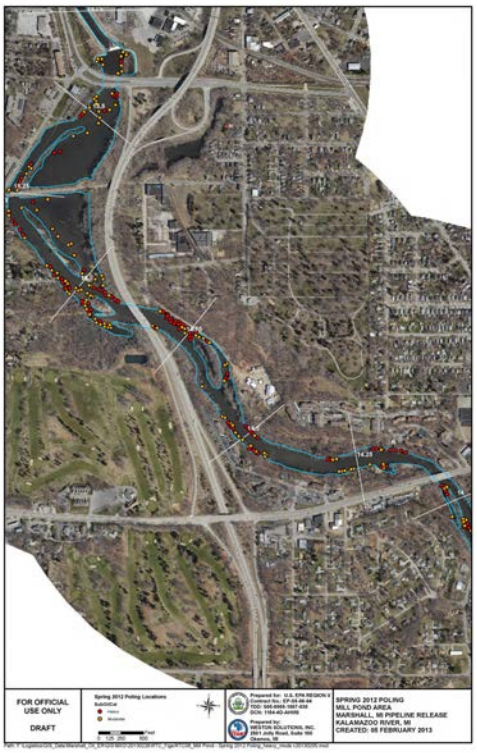

Figure 8 – Spring 2012 Mill Ponds

U.S. EPA believes that these four examples illustrate how, controlling for environmental factors, poling has consistently demonstrated the downstream migration and accumulation of submerged Line 6B oil. Taken with other evidence of migration, U.S. EPA believes the results of successive poling efforts throughout the Kalamazoo River are an important and reliable line of evidence regarding submerged Line 6B oil migration and accumulation.

Enbridge Comment: Enbridge submitted a number of comments regarding the effect of temperature on poling results. Enbridge's comments reflected its position that the increase in heavy and/or moderate poling delineations between Spring and Late Summer 2012 is due to the increase in temperature (AR 1304, 1304A). As evidence to support its position, Enbridge contractor AECOM noted that within two to four weeks following temperature highs in early September, sheen category results at Ceresco significantly changed as the temperature decreased (AR 1304A).

Response: U.S EPA agrees that poling results have been shown to be temperature related. However, U.S EPA does not believe this interferes with the use of poling results to demonstrate the migration and accumulation of oiled sediments**.**

Enbridge and U.S. EPA have taken numerous steps to control for temperature in assessing poling results. First, following the results of the temperature effects study carried out by Enbridge (AR 0444), U.S. EPA established a minimum acceptable water/sediment temperature of 60 ^{0}F for poling in Spring 2012 (AR 0157, 0293, 1159). Second, U.S. EPA and Enbridge have recorded the temperature along with results during each poling event, allowing comparison of successive rounds of poling performed at the same or similar temperature (AR 1159). At Ceresco, the difference in average water temperatures for the Fall 2011 and Fall 2012 poling rounds was only 1^{0}F, yet there was a significant increase (25% to 59%) in locations poling as heavy and moderate (AR 1704, 1705).

Enbridge noted that in 2012 there was a decrease in the number of poling points classified as moderate or heavy from early September (79%) to late September (59%) (AR 1304). However, 15% of the poling points collected in late September were below 60^{0}F, the minimum temperature for poling, thereby making it difficult to compare these results to the early September round, in which all of the poling points were above 60^{0}F. Additionally, as noted above, the late September 2012 results still showed a significant increase in moderate or heavy poling results from Fall 2011 (AR 1704, 1705).

U.S. EPA and Enbridge have also documented moderate and heavy poling result increases at the Ceresco impoundment despite a decrease in average water temperature. Enbridge's AECOM memo includes maps that display submerged oil delineations for Spring 2012 (average water temp 64.9^{0}F), August 29 to September 11, 2012 (average water temp 71.3^{0}F), and September 26 to 27, 2012 (average water temp 59.5^{0}F) (AR 1304A). Comparison of the submerged oil footprint in the first map (Spring 2012) with that in the last map (September 26 to 27, 2012) demonstrates that the moderate/heavy submerged oil footprint increased despite the decrease in average water temperatures between these two periods (64.9^{0}F down to 59.5^{0}F) **(**AR 1304A**)**. This evidence contradicts Enbridge's contention that any increase in moderate/heavy poling results is due to temperature or other environmental factors, rather than migration and accumulation.

Given the steps taken to account for the effect of temperature on poling results as well as the poling results themselves, U.S. EPA does not believe that the effect of temperature on poling negates or significantly impacts the reliability of poling results.

Enbridge Comment: In addition to temperature, Enbridge commented that poling results are affected by weather (wind, rain, sun/clouds), personnel making observations, channel velocities, and changes in oil density over time (AR 1304, 1304A).

Response: U.S. EPA agrees that all of these factors can affect poling results. However, U.S. EPA does not believe that these factors have influenced or undermined poling results so as to

change its assessment regarding the location and areal extent of submerged Line 6B oil in the Kalamazoo River.

The standard poling procedures minimized the impact that personnel differences could have on poling results (AR 1159). For each round of poling, numerous teams, consisting of three to four Enbridge employees (including a team leader), one U.S. EPA representative, and sometimes an MDEQ representative, carried out poling. For every location poled, the U.S. EPA representative, the Enbridge team leader, and the MDEQ representative (if present) agreed on the category result. If there were disagreements, the team repeated the poling. Disagreements that could not be resolved through repeated poling were extremely rare, and were recorded in a logbook. For each round of poling, Enbridge and U.S. EPA made an effort to staff teams with experienced personnel, many of whom worked throughout the duration of the project, and ensured all team members were familiar with the Enbridge Standard Operating Procedures and had a checklist for category definitions (AR 1159). Therefore, U.S. EPA does not believe that varying personnel making observations affected poling results.

Field teams were trained and instructed to use common field practices to minimize potential issues arising from both sun and wind. Measures taken to mitigate effects from sun included using the shade of the boat or an object on hand to create shade, procedures such as changing the angle of observation or getting a common consensus from observers based on views from different angles. Common field practices to address wind issues including poling on the downwind side of the boat, adjusting the area of observation to slightly downwind of the poling location, and suspending poling activities when wind conditions prevented teams from making accurate observations. Poling was also suspended during heavy rain conditions. Therefore, U.S. EPA does not believe differing weather conditions significantly affected poling results.

Similarly, field teams were trained to adjust observations based on channel velocity. Moreover, areas that have high channel velocities are not depositional in nature and, therefore, have not been focus areas for assessing submerged oil. Therefore, U.S. EPA does not consider that channel velocities undermine the reliability of poling results.

U.S. EPA has no evidence that the density of submerged Line 6B oil has changed over time. Since submerged Line 6B oil still readily rises to the surface in response to poling and results in moderate and heavy categories in some places, U.S. EPA does not believe changes in oil density over time, if present, have affected poling results.

Enbridge Comment: The AECOM memorandum made a number of comments relating to the definition of the submerged oil categories currently in use (1304A). In particular, Enbridge observed that these categories do not correlate to volume and are not reliable for quantifying the amount of oil present. Enbridge also commented that these categories do not take into account

the appearance of the sheen or globule size. Furthermore, Enbridge noted that only a small amount of oil is necessary to create sheen.

Response: As discussed in detail above, U.S. EPA recognizes that the submerged oil category results do not necessarily correlate to the volume of submerged oil. In some instances, globules observed during poling in 2012 may be smaller in size than those observed in 2010. Turbulent forces in the river, mechanical agitation (intentional or unintentional) of sediments, and/or other physical/mechanical mechanisms could have been contributing factors in reduced globule size. However, because poling is not used to determine the quantity of oil, change in globule size or the amount of oil required to create sheen does not affect U.S. EPA's use of the data.

Enbridge Comment: The AECOM memo included a comment that there was no significant change in poling delineations in the Mill Ponds or Morrow Coves (AR 1304A).

Response: U.S. EPA assumes that the reference to Morrow Coves refers to the North and South Coves in the Morrow Lake fan. The North and South Coves in Morrow Lake fan showed a significant increase in moderate or heavy poling results between the Spring 2012 Reassessment and the Late Summer 2012 Reassessment (AR 1708, 1709). In fact, U.S. EPA expanded the scope of the Late Summer 2012 Reassessment to include the North and South Coves of the Morrow Lake fan as a result of significant spontaneous oil sheening and globule manifestation observed in those areas throughout the Summer of 2012. The results of the Late Summer 2012 Reassessment showed that the area of moderate/heavy poling in the North Cove was 2.8 acres and the area of moderate/heavy poling in the South Cove was 5 acres (AR 1709). In comparison, in the Spring 2012 Reassessment, only 0.34 acres in the North Cove and 0.71 acres in the South Cove poled as moderate/heavy (AR 1708). The average water temperature differential during these two rounds of poling was less than 1^0F (AR 1708, 1709).

Poling results for the Battle Creek Mill Ponds also show a substantial increase between the Late Summer 2011 and the Spring 2012 poling rounds (AR 1706, 1707). Although there was not a significant difference between Spring 2012 and Late Summer 2012 results in the Mill Ponds, the initial increase is enough to suggest increased accumulation of submerged oil. In addition, there was a repeated need for sheen management throughout the summer of 2012 in the area.

B. Migration of Submerged Oil/Transport - Hydrodynamic Modeling

Transport and re-suspension of the Line 6B submerged oil appears to be similar to the transport of sediment throughout the Kalamazoo River. In order to better understand how the sediment, with the submerged Line 6B oil, is moving in the river, U.S. EPA required Enbridge to develop a hydrodynamic model (HDM), which would include both a hydrodynamic component and a sediment transport component to simulate sediment transport as part of the 2012 Consolidated Work Plan (CWP) (AR 0059, 0065) with the underlying assumption that erosion,

transport, and deposition of the submerged oil would be similar to that of silt-sized sediment. Enbridge developed and partially calibrated the HDM and applied it to the Kalamazoo River to estimate patterns of net erosion and deposition rates in proposed sediment traps and to evaluate the potential for Line 6B submerged oil to migrate past Morrow Lake Dam. Enbridge submitted the results of those model runs to U.S. EPA in the April 2012 Hydrodynamic Model Calibration Report (AR 280, 281, 282) and the May 2012 HDM Report Addendum (AR 343) (together HDM Report). The Order requires Enbridge to carry out additional scientific data collection in support of further modeling work, which will be performed by U.S. EPA.

In its comments (AR 1304), Enbridge relied on the HDM in order to challenge U.S. EPA's conclusion that submerged oil in the Kalamazoo River is migrating and accumulating at the three impoundments. Enbridge contended that there is no need for the additional hydrodynamic modeling tasks provided for in the proposed Order and the existing model is sufficient to understand submerged oil fate and transport in the Kalamazoo River. U.S. EPA has responded to those comments below.[3]

Enbridge Comment: Enbridge commented that the Administrative Record reflects no operational rationale for or benefit from future modeling activities.

Response: The Administrative Record demonstrates that Line 6B oil became submerged in the Kalamazoo River soon after the discharge and now is mixed with sediment. This has made it difficult to predict how it is resuspended and deposited downstream.

U.S. EPA believes that a fully calibrated HDM is necessary and required to help understand the fate and transport of remaining Line 6B submerged oil over a broad range of flow conditions once active recovery at the three main impoundments is completed. A calibrated HDM will be used to predict the hydraulic stability of the remaining Line 6B submerged oil and oiled sediment after active recovery, evaluate future submerged oil migration scenarios and management strategies, and to develop and ensure compliance with response end points required by U.S. EPA and MDEQ.

Enbridge Comment: Enbridge's comments further reflected the view that the modeling done by Enbridge to date is sufficient to serve the purpose of an HDM for recovery efforts. Enbridge noted that it believed the modeling done to date fully satisfied the intent expressed in the CWP.

[3] On February 13, 2013, after the time period for submitting comments had closed, Enbridge submitted to U.S. EPA a technical memorandum that responded to an August 2012 U.S. EPA/USGS review of the Enbridge HDM (AR 1160, 1674). As Enbridge's memorandum was received well after the deadline for comments and did not directly address the proposed Order, U.S. EPA has not responded to those modeling comments in this document, but will respond separately. U.S. EPA does not believe that any of the information in the February 13th memorandum changes any responses in this document.

Response: U.S. EPA disagrees that the existing model fully addresses the intent expressed in the CWP. The CWP sets forth the following objectives for the hydrodynamic modeling required: (1) determine the spatial and temporal distributions of velocities, shear stresses, and sediment entrainment of sediment and submerged oil; (2) gain understanding of submerged oil transport under different flow conditions; (3) simulate containment, collection, and recovery of submerged oil and oil-laden sediments; (4) document how the model worked for future river monitoring and management (AR 0059, 0065). U.S. EPA believes that, as a result of substantial deficiencies in the Enbridge HDM, the model in its current form has not met any of these objectives and only relative spatial patterns in the hydrodynamic component of the HDM can be used to inform future response actions in a limited and careful manner for certain areas of the river. Neither of the two 2-D HDM component outputs for spatial patterns or sediment movement over the dam can be used with any certainty in Morrow Lake because of deficiencies with the dam configuration in the model.

The CWP anticipated that additional model improvements and refinements would be needed to address and rectify potential deficiencies in the initial calibrations (AR 0065). These improvements were never made and a U.S. EPA and United States Geological Survey (USGS) review of the partially calibrated Enbridge model revealed multiple deficiencies with data inputs and model assumptions (AR 1160). The results of this review were transmitted to Enbridge on August 22, 2012 and were subsequently discussed by U.S. EPA and Enbridge modeling experts. Specific data gaps pertaining to the model and model calibration that were identified include: inadequate bathymetry data in selected river segments; oversimplification of the configuration and operation of dams located in the modeled area; insufficient water velocity data for selected river segments; insufficient sediment erodibility and bulk density data; insufficient suspended sediment concentration and composition data; and incomplete data regarding the properties of submerged oil. Despite receiving the U.S. EPA/USGS review in August, Enbridge has taken no steps to resolve these deficiencies and only recently responded to the review, as noted in Footnote 3 above. All these data gaps must be addressed in order to develop an acceptable HDM and to address the intent expressed in the CWP. U.S. EPA is now requiring Enbridge to carry out additional scientific data collection in support of further modeling work that will be performed by U.S. EPA.

A comparison of simulated sediment loads over Morrow Dam for the May 2011 flood illustrates that the model is insufficient for determining if submerged oil has migrated over Morrow Dam. The model output shows silt-sized particles transported over Morrow Dam in early May, when flows were low (under 2,000 ft^3/s), but only smaller clay-sized particles over Memorial Day weekend when there was heavy flooding and elevated flows (from 2,000 to 4,000 ft^3/s) (AR 0281). The model output is contrary to well-established and documented evidence about how sediment generally is transported, as well as observational data obtained from portions of the Kalamazoo River affected by the Line 6B release. This inaccuracy is strong

evidence that the sediment transport component of the HDM in its current form is unstable and needs further refinement.

The unreliability of the Enbridge HDM is further supported by the failure of model sensitivity tests, which indicated that variations in inputs of roughness, settling velocities, sediment concentrations, and silt composition resulted in unacceptable ranges of variation in model outputs of velocity, shear stress, sediment particle size distribution, sediment mass, and sediment loading (AR 1160). All of these outputs have important links to interpreting the migration potential of submerged oil, and the overall fate of the remaining oil in the Kalamazoo River.

Additionally, the existing Enbridge HDM includes an inaccurate configuration of Morrow Dam. Preliminary data from summer 2012 indicates that the power plant withdrawals affect velocities in Morrow Lake and water levels in the Morrow Lake Delta, especially during low flow (AR 1160). However, the effects of the subsurface intakes were not included in the existing HDM. The influence of subsurface gates and intakes for hydroelectric power generation at Morrow Dam requires a 3-D model to realistically simulate potential sediment transport along the bottom of the Lake and past Morrow Dam.

U.S. EPA does believe that the velocity results of the partially calibrated hydrodynamic component of the HDM can be used selectively to interpret broad areas of erosion and deposition of submerged oil and oiled sediments. The relative spatial patterns of slow and fast velocities produced by the hydrodynamic component of the HDM, supported by separate evidence of mapped geomorphic units and poling data, are evidence of the location of depositional areas.

Enbridge Comment: Enbridge commented that depositional and erosional areas already have been identified, delineated and mapped using the existing model. Furthermore, it noted the existing model was used to select the locations of sediment traps in the river and was calibrated using inputs collected from the river.

Response: The identification, delineation, and mapping of depositional areas should allow the U.S. EPA to know: (1) where the sediment (and submerged oil) is likely to accumulate and remain without future re-suspension and transportation; and (2) in which locations and under what conditions the submerged oil is likely to move further downstream. Although approximate information regarding the identification and delineation of depositional areas has been estimated for many locations in the Kalamazoo River, this has been done through observational data (i.e., poling) as much as model results. What remains to be satisfactorily modeled is the expected stability, or lack thereof, of the sediments and submerged oil found in the depositional areas under the range of conditions typically found in the river, and over a range of time frames, which cannot be documented using observational data alone. As described above, because the existing model is unstable and unreliable, it cannot perform this function without further calibration.

Therefore, a fully calibrated model that correctly represents the full range of sediment types (including submerged oil) and river conditions (including high flows and winter conditions) is essential in defining end points for the recovery effort after additional recovery is performed. As stated above, the existing model is not fully calibrated. While data inputs from the river are necessary for calibration, they alone are not sufficient for acceptance of the model. The data must also be of an acceptable quantity and quality, which the U.S. EPA/USGS review determined was not the case with the data used to calibrate the existing model (AR 1160).

Enbridge Comment: Enbridge commented that additional modeling tasks, such as 3-D modeling of Morrow Lake, refinement of sediment transport, and modeling of submerged oil and other variables, would not add value to the ongoing response efforts on the Kalamazoo River.

Response: Given the numerous deficiencies with the existing HDM, U.S. EPA believes the additional modeling tasks specifically mentioned by Enbridge will add value by providing accurate information about submerged oil movements throughout the river. Additional modeling of Morrow Lake will allow the definition of the downstream limits of the Line 6B affected area, and/or the assessment of the potential for further downstream migration of Line 6B submerged oil. Due to the depth and size of Morrow Lake, it is difficult to assess this information by direct observation alone. This information cannot be obtained through analysis of the existing 2-D model due to the numerous deficiencies pertaining to Morrow Lake described above. A 3-D representation of Morrow Lake specifically allows for accurate representation of the subsurface intakes for Morrow Dam and the associated flows in the vicinity of the dam. The 3-D model is vital to help understand the contribution of wind and waves for submerged oil accumulations in the North and South Coves of the Morrow Lake fan. Therefore, a 3-D model will add significant value to the ongoing response efforts on the Kalamazoo River.

Enbridge Comment: Enbridge commented that the existing model shows submerged oil migration is unlikely. It noted that model analysis shows a minimal amount of submerged oil movement even during high flows, arguing that most heavy and moderate poling points are located in areas modeled as depositional even during high flow events, including 100 year flows. Enbridge further commented that model analysis concluded that most of the remaining submerged oil has settled in long-term depositional areas and remobilization is unlikely.

Response: Enbridge's comments reference a remobilization analysis included in the HDM Report (AR 0280) in order to suggest that there would be only a minimal amount of submerged oil movement during high flow events. However, as was identified in the U.S. EPA/USGS review of the HDM (AR 1160), the conclusions of the remobilization analysis appear to be based on an erroneous interpretation of model results and a reliance on erroneous data. Enbridge has interpreted model data showing no net change in erosion and deposition to indicate that no sediment entrainment or transport occurred. The net change in sediment characteristics and sedimentation or erosion rates over a range of flows during a flood event is not an appropriate

indicator of the potential for submerged oil migration. This is because actual flow events typically exhibit both sediment erosion and deposition, both of which require sediment to move. Erosion usually occurs during the early period of increasing flows after thresholds of critical shear stress are exceeded and deposition occurs during later decreasing flows. Thus, if erosion and deposition rates are approximately equal, it is possible to have significant sediment movement without any net change in silt and clay mass. Furthermore, no net change in silt and clay mass for an area of stream bottom may also mean any oil or sediment resuspended from upstream areas is transported through that reach and continues to migrate downstream. Areas with simulated average velocities greater than 1 ft/s were interpreted to be too swift for submerged oil to settle out of suspension based on the calibration runs of the HDM (AR 0343). U.S. EPA believes that to determine sediment mobilization, it is more appropriate to selectively use the relative differences in velocity magnitudes and spatial patterns from the hydrodynamic component, as was done in the Fitzpatrick Letter (AR 1151), rather than the end result of net erosion/deposition rates after a flood or over a period of time from the sediment transport component.

In order to conclusively demonstrate that no sediment or submerged oil movement has occurred, a more complete evaluation of the maximum velocities during flood events that cause mobilization would be required. In the absence of this information, the conclusions presented in the remobilization analysis regarding sediment movement during various flow events cannot be validated and cannot be used to inform response actions.

C. Biodegradability of the Line 6B Oil

U.S. EPA's Environmental Response Team (ERT) performed a limited bench-scale study on the biodegradability of Line 6B oil (AR 1597). The purpose of the study was to observe biodegradation of Line 6B in optimum conditions for a limited period (28 days) in order to determine an upper end of the amount of Line 6B oil that could be degraded via natural attenuation processes in optimum conditions conducive to natural biodegradation. The purpose of the study was not to determine actual biodegradation rates and/or biodegradability in the sub-optimal conditions typically found in sediment of the Kalamazoo River.

The Line 6B Biodegradation Study Report (Biodegradation Report) (AR 1597) arrived at the following conclusions:

- Even under optimum biodegradation conditions, only approximately 25% of the Line 6B oil was degraded.

- Under induced optimum conditions, the majority of the Line 6B oil that was degraded over the 28 day test period was degraded by day 14 (biodegradation continued after day 14, but at a greatly decreased rate).

- Under actual river conditions, biodegradation of residual Line 6B oil in the Kalamazoo River would have the potential to continue but at a slower rate than that observed in the test conditions, with the absolute maximum amount of oil removed via biodegradation limited to roughly 25% of the current residual mass.

U.S. EPA does not believe there is any need for further biodegradation study. Enbridge agreed with that view at the December 19, 2012 meeting with U.S. EPA. U.S. EPA has nonetheless responded to Enbridge's comments on the study, which were in the form of a contractor review (AR 1332), by subject matter.

Missing Information

In a number of places Enbridge commented that information, such as laboratory data or procedures, was not included in the Biodegradation Report. On February 7, 2013, ERT supplied this information in the form of further attachments to the Biodegradation Report. These attachments included laboratory data, methodologies, and a literature review on anaerobic degradation. U.S. EPA has added the attachments to the administrative record and they are included as AR 1598, 1599, 1600, and 1601.

Enbridge Comment: "No original laboratory analytical data are included in the report. The source data from which the chromatogram exhibits were created are not presented."

Response: The "original data" (the chromatograms) is now available and on the record in AR 1598, 1599, 1600, and 1601.

Enbridge Comment: "The report concludes that '35-40% of the mass of the oil which remains from the Enbridge Oil Discharge is not quantifiable using GC [Gas Chromatography] or GC/MS [Gas Chromatography/Mass Spectrometry] techniques,' but the data to support this are not clearly identified."

Response: The 35 – 40% estimate of non – GC quantifiable oil is an estimate based upon the discrepancy between the total mass of oil placed into the flasks, the GC-MS data generated from the extracted material in the flask at the end of the tests (day 7 and/or day 28), and gravimetric determinations on splits samples from the same extracts used for GC analyses.

Enbridge Comment: "The mass of oil not quantified by Gas Chromatogram methods is very dependent on the instrumentation and conditions. The referenced Standard Operating Procedure (SERAS GC/MS SOP 1841) and complete details of the calibration procedure and premise of Total Petroleum Hydrocarbon (TPH) quantification should be provided to fully understand the basis of the report conclusions. The composition of the crude oil itself can also make a dramatic difference, and it is not clear in the study exactly which of the oils analyzed this statement is based on."

Response: ERT finalized the three analytical reports for all of the chemical analyses conducted, which are attachments to Biodegradation Report, on February 7, 2013. These reports are in the Administrative Record (AR 1598, 1599, and 1601).

Enbridge Comment: Enbridge expressed concerns about the accuracy of the TPH and the GC/MS chromatograms, the scales used on the chromatograms, and the quantifying data regarding peaks. In addition, Enbridge identified that the first five minutes of the TPH fingerprints (GCs) and the first five minutes of the hopane fingerprints (GCs) were not provided for review. Enbridge noted that an analytical standard was not provided for the chromatograms.

Response: The chromatograms were only intended to be a visual aid in the presentation of the results of the data generated in the studies, not as the only detailed means of data presentation. Therefore, the Biodegradability Report did not identify or label all the peaks or detail all the GC raw data or reference the varying scales of the chromatograms. The raw GC data is now available in AR 1598, 1599, and 1601. Although it is not clear which analytical standard Enbridge is suggesting, the data generated is GC/MS data and the GC operating conditions are provided in AR 1598, 1599, and 1601.

Enbridge Comment: Enbridge queried whether samples were extracted for gas chromatography analysis.

Response: Analytical samples were extracted for gas chromatography. Extraction and analytical procedures followed the laboratory SOPs where available. The laboratory SOPs are now available and on the record (AR 1598, 1599, 1601).

Selection and Use of Source Oil Samples

Enbridge made a number of comments questioning the selection and use of source oil samples in the study. Those comments are addressed below:

Enbridge Comment: Enbridge noted that background organics were not collected or analyzed despite being identified as present in samples collected from MP 10.75.

Response: The scope of the biodegradation study did not include a quantitative evaluation of "background" organic compounds. The study only identified the presence of the background organic compounds in that sample to explain why it was not a viable source of residual Line 6B oil for use in the biodegradation study.

Enbridge Comment: Enbridge commented that a sufficient volume of residual oil was not collected from the river sediment samples for the purposes of the degradation test, given that the residual oil within the river sediment has undergone mechanical weathering. Enbridge noted that the characteristics of the oil used in the study are not fully representative of the oil remaining

within the river sediments, because globule size of oil within the sediment is smaller and offers additional surface area for access by microbes.

Response: Enbridge's comments are not relevant to the biodegradation study, because the test was not conducted on field sediments or as a solid phase study. Rather, the study was a simple swirl flask (AR 1597). While there are limitations to the interpretation of the swirl flask approach, the advantage is that it eliminates globule size and surface area issues as confounding factors.

U.S. EPA acknowledges the differences between the qualitative composition of "globule oil" within the Kalamazoo River sediments and the "recovered weathered oil" (0004). However, the available forensic chemistry data indicates that the 0004 oil was less weathered than the globule oil and therefore the biodegradation tests should, if anything, overestimate the biodegradation potential of the oil entrained within the Kalamazoo River sediments.

Enbridge Comment: Enbridge observed that although the majority of the hydrocarbons present in the oil extracted from the sediments collected from MP 10.75 were from naturally occurring background organic material, the study concluded that hopane fingerprints could be used as evidence that Line 6B oil was present in the sediment. Enbridge commented that hopane fingerprints cannot be used as conclusive evidence of source, citing a 2007 study, and that using hopane compounds could overestimate the impact of the Line 6B discharge.

Response: U.S. EPA acknowledges the issues identified, and the complexity of the oil identification and quantification. Oil sources known to be residual Line 6B oil were used in the study on the biodegradation potential of residual Line 6B oil in the Kalamazoo River. The intent of the study was not to quantify Line 6B oil in sediment samples or estimate its impact.

Enbridge Comment: Enbridge noted that although Samples 0003 and 0004 appeared to be from the same source, the limited fingerprint data for source determination was problematic. Enbridge suggested that U.S. EPA should also consider using other biomarkers, such as steranes and aromatic steroids, to identify the source of the samples. Enbridge further questioned whether Sample 0000 correlated to Samples 0003 and 0004, because of naturally occurring hydrocarbon or non-Line 6B hydrocarbon sources.

Response: There is no question that samples 0003 and 0004 are Line 6B oil. As noted in the Biodegradation Report (AR 1597), sample 0003 was a sample of the oil recovered during initial recovery efforts following the Enbridge Line 6B discharge. Sample 0004 was oil recovered from a void in a river bank, which was being removed as part of the Line 6B oil response. It is also improbable that Sample 0000 did not originate from the Line 6B discharge, because it was taken from oil globules released from MP 10.75 sediments. Independent studies have documented conclusively that oil globules released from discharge zone sediments are Line 6B oil (AR 1540).

Enbridge Comment: "The partially weathered oil in Sample 0004 used for the study is also significantly different than the highly weathered residual oil in Sample 0000 derived from real residual oil sheen/globules in Kalamazoo River sediment. The absence of dominant n-alkanes in Sample 0000 clearly indicates advanced biodegradation in sheen/globules derived from the sediment has already occurred, so the relevance of the study using much less weathered Sample 0004 is unclear."

Response: The goal of the study was to find the maximum biodegradation potential for the residual Line 6B oil in the Kalamazoo River under optimum laboratory conditions (AR 1597). Using the 0004 sample, which is less weathered than the 0000 sample, as a point of comparison achieves that goal. The 0000 sample, which is more weathered than the 0004 sample, may be more representative of much of the residual Line 6B oil currently within the river. However, using 0004 sample oil could only overestimate the potential biodegradation. The study conclusions do not underestimate the potential for biodegradation of residual Line 6B oil within the Kalamazoo River.

Enbridge Comment: "A case study example of a 'similar oil' sample and resulting chromatographic signature is presented in EX06A as an analog for degradation of Line 6B oil over an 84 Day Degradation Study. However, the exhibit does not show the source of the oil or note whether the oil was original bitumen in this sample."

Response: The oil used in the study that produced EX06A was not bitumen in origin. The exhibit was placed into the Biodegradation Report only to illustrate biodegradation.

Objectives of the Study

Enbridge made a number of comments that reflected confusion regarding the objectives and scope of the study. The purpose of the study was to determine an upper end of the amount of Line 6B oil that could be degraded via natural attenuation processes by observing biodegradation of Line 6B oil in optimum conditions for a limited period of time (28 days) (AR 1597). The purpose was not to determine the actual biodegradation rate of Line 6B oil in the Kalamazoo River or to quantify the amount of Line 6B oil in the Kalamazoo River. U.S. EPA has responded to comments of this nature below.

Enbridge Comment: Enbridge commented that the visual similarity of hopane fingerprints and other terpane patterns alone could not be used for confirmation of the presence of Line 6B oil, because other crude oils might display similar patterns. Enbridge noted that specific diagnostic ratio data and target compound analysis were required to confirm the presence of Line 6B oil and the interferences of non-Line 6B oil sources and that quantitative removal of interfering compounds must be addressed in order to calculate the actual allocation of Line 6B oil as a source to sediment hydrocarbons.

Response: U.S. EPA forensic chemists continue to develop protocols for quantifying Line 6B oil within the sediments of the Kalamazoo River. Hopane fingerprints were only used as evidence that Line 6B oil was present in the sediment. The Biodegradation Report did not intend to indicate that Line 6B had been quantified in Kalamazoo River sediments, much less using hopane fingerprints.

Enbridge Comment: Enbridge noted that the study did not include an assessment of the potential degraders present in the sediments evaluated. Enbridge observed that field sampling and storage can reduce the viability of microbes in the sediment and reduce the population available for biodegradation. Finally, Enbridge noted that it may take greater than 28 days for different types of degraders to establish.

Response: Since it was not possible to inoculate with a native culture, a sample of the 0004 oil was inoculated with a culture known to contain active oil degraders from another oil biodegradation study being conducted concurrently in the laboratory. This was done in order to determine whether Line 6B oil was degradable even if the sediment inoculums from the Kalamazoo River were not active, although the results of the study indicate that hydrocarbon degrading organisms were present (AR 1597). The data indicated that the most active degradation occurred within the first 7 days and that degradation activity decreased substantially in the subsequent 14 days (AR 1597). Although there is the potential for increased or altered biodegradation after 28 days, the decline in activity after 7 days suggests that it is unlikely that extending the experiment would change the conclusions.

Enbridge Comment: Enbridge commented that third-party reviewers agree that hydrocarbons, including a majority of the petrogenic and pyrogenic hydrocarbons, in most Kalamazoo River sediments are not related to the Line 6B oil discharge. However, more detailed quantitative information should be provided in the biodegradation study to support this conclusion since there may be very low contributions to the PAHs from Line 6B oil after accounting for natural, pyrogenic and other petrogenic PAH signatures.

Response: The presence of hydrocarbons other than those whose origin was the Line 6B release, as well as numerous field hydrodynamic factors, river conditions and settings, may affect the actual degradation of the Line 6B oil in the river. The separation of origin/source of the potentially numerous hydrocarbons present in the sediments of the Kalamazoo River was outside the scope of the biodegradation study, which only focused on establishing the biodegradation rate of Line 6B oil under optimum conditions. Additional studies to evaluate the other factors are unlikely to substantively change the conclusions of the biodegradation potential of the residual Line 6B oil within the Kalamazoo River, since they are unlikely to increase the rate or extent of Line 6B biodegradation beyond that observed under optimal conditions.

Enbridge Comment: Anaerobic and aerobic analysis would provide a more complete assessment of the overall potential for biodegradation. The study notes that the sediments trapping the oils rapidly become anaerobic. The study further notes that the lack of oxygen prevents further biodegradation. If ferric iron, sulfate, and nitrate are available in the sediments, these alternative electron acceptors can facilitate anaerobic biodegradation, which can be more significant than aerobic biodegradation. However, anaerobic degradation was not considered in the study.

Response: Since the goal of the study was to evaluate Line 6B biodegradation under optimal/ideal conditions, and not to estimate the actual biodegradation rate, the study focused on inducing ideal, aerobic conditions. However, in response to Enbridge's comment, ERT reviewed the available literature on the potential for anaerobic oil degradation and empirical evidence evaluating anaerobic degradation of oil at discharge sites (AR 1600). Based on that review, ERT concludes that although anaerobic degradation of hydrocarbons has been shown to occur in laboratory studies and/or in solution, those studies used light compounds (e.g. BTX) as opposed to crude oil (AR 1600). There is currently little evidence that anaerobic degradation could be applied in a response context to an oil discharge.

Enbridge Comment: Enbridge observed that the study used an open culture broth to evaluate biodegradation with a small addition of sediment to inoculate the plate. Enbridge commented that the oil that is in the Kalamazoo River sediment will be in contact with sediment that contains a larger population of microbes and concentration of electron acceptors and use of more of that sediment would provide a more realistic assessment of how degradable the oils are in the environment.

Response: As discussed above, the goal of the study was not to provide a "realistic assessment" of the degradation rate of Line 6B oil in the Kalamazoo River, rather the goal was to evaluate Line 6B biodegradation under optimum conditions. The inoculation used field sediments/soils containing residual Line 6B oil. This method has been empirically justified at numerous oil discharge sites (AR 1597). Although a more active culture could be found, given the forensic information on the residual Line 6B oil in the Kalamazoo River and the data generated in this study, it is unlikely that a demonstrably greater biodegradation potential would be obtained through using more realistic conditions.

Enbridge Comment: Enbridge commented that the degradation study based on solutions with added surfactant in flasks on an orbital shaker under toxic conditions at 30˚C did not simulate the degradation of oil globules under anoxic conditions buried in Kalamazoo River sediment or the degradation of oil in the suspended sediment where no surfactant is present.

Response: The stated objective of the biodegradation tests conducted was to estimate the maximum potential for degradation, not to simulate the actual biodegradation conditions (AR

1597). The actual biodegradation of residual Line 6B oil within the Kalamazoo River sediment will be slower and of a lower magnitude than that seen in the laboratory study.

Miscellaneous Comments

Enbridge Comment: Enbridge observed that Table 3a of the study presents data indicating the Day 0 value for total mg/flask calculated by GC/MS actually exceeds the gravimetric calculated mass in the same sample at Day 0.

Response: The study was intended to be a screening level biodegradation evaluation. Therefore, the gravimetric mass determinations were not the focus of the data interpretation. However, the discrepancy observed in the data is within the measurement error range for the instrumentation/technique used (three decimal place balance and GC/MS calculations) and does not negate conclusions made about the data.

Enbridge Comment: Enbridge commented that the quantitative TPH analysis was not used to assess the extent of biodegradation because, according to the report, previous studies have shown that there is a discrepancy between quantitative TPH analysis and gravimetric analysis. However, Enbridge noted that the paper cited (Yang et al., 2011; AR 1597, Attachment 4) did not provide an assessment of a comparison between gravimetric and quantitative TPH measurements.

Response: Although TPH measurements were performed, they were not used to quantify biodegradation. In the biodegradation tests conducted, the issue of interference of naturally occurring compounds with TPH quantification was not an issue, as oil contaminated sediments were not used in the test design (with the minor exception of the inoculum). The reason for the reliance on the gravimetric determinations was the apparent inability of GC techniques to quantify the residual oil, at least in part because of qualitative changes to the oil. The discrepancy between TPH and gravimetric analysis has been noted previously for Alberta oil sands petroleum products (Yang et al., 2011; AR 1597, Attachment 4).

Enbridge Comment: Enbridge noted that no description is provided of the gravimetric analyses, particularly whether the samples were taken to constant weight after the solvent evaporated.

Response: The original study design did not anticipate the need for the use of gravimetric analyses. When initial study results were being interpreted, the calculated portion of the degraded Line 6B oil was contrary to ERT's knowledge of the Line 6B oil composition. In order to validate the initial analytical data through an alternate procedure, ERT conducted limited gravimetric determinations. While limited in number, the gravimetric data contradicts the GC/MS data conducted on the same samples (sample extracts). Thus, it appears that, because

qualitative changes in the Line 6B oil occur during degradation, standard procedures for GC quantification of oil mass underestimate the mass of the residual Line 6B oil.

Enbridge Comment: Enbridge posited that it may be more accurate to report the quantitative TPH measurement of mass removal and the gravimetric results as two different ranges of potential biodegradation occurring.

Response: The literature on oils of similar origin as Line 6B demonstrates that these crude oils are highly "degraded," having already lost most of the lighter and more biodegradable components (Yang et al., 2011, AR 1597, Attachment 4). Given these circumstances and the data generated within the biodegradation study, it is clear the standard TPH – GC oil quantification approach does not result in an accurate estimate the degradation potential. Therefore, the presentation of the TPH approach data to "bound" the biodegradation potential range would be misleading.

Enbridge Comment: Enbridge observed that the Biodegradation Report concludes that "the absolute amount of oil which may be removed via degradation is limited to roughly 25% of the current residual oil mass," but Table 7 data seems to indicate a removal rate between 57% and 65% on Day 14 of the study, which seems to contradict this conclusion. Enbridge requested an explanation of the basis for the conclusion.

Response: As noted in the Biodegradation Report, the quantification of the residual oil post biodegradation by GC techniques was determined to be erroneous (AR 1597). The data referred to in Table 7 is the data determined to be erroneous. Despite this, the data was presented in the report for transparency.

D. UV-Epifluorescence Microscopy

Under the direction of Dr. Kenneth Lee, the Centre for Offshore Oil, Gas and Energy Research (COOGER; a division of Fisheries and Oceans Canada's Bedford Institute of Oceanography) performed an evaluation of the viability of ultraviolet (UV) detection of Kalamazoo River sediment containing Line 6B oil. The study also included inspection of the sediment samples using epifluorescence. Findings of the study were included in a report (UV-Epifluorescence Report) (AR 1277) dated October 24, 2012. On November 8, 2012, Enbridge submitted a review conducted by an Enbridge contractor) of Dr. Lee's study (AR 1351).

The UV-Epifluoresence study yielded the following conclusions:

- Oil Mineral Aggregates (OMA) can be formed when Line 6B is combined with Kalamazoo River sediment and agitated. OMA consist of small droplets of oil enveloped in fine mineral particles, and have been observed by Dr. Lee and other researchers at many oil discharge sites. The OMA formed appears to be stable in the environment.

- OMA, presumably created from a combination of turbulent river flows and Enbridge's sediment agitation efforts to recover Line 6B oil, were observed in Kalamazoo River sediment samples.

- Line 6B oil fluoresces when excited by UV light, a property common to oils. However, Line 6B oil contains constituents that quench, or mask, the fluorescence. Fluorescence is a property that is expected to increase with oil concentration. The UV-Epifluorescence study found that fluorescence decreased with increased Line 6B oil concentrations, and was able to demonstrate that the fluorescence quenching was due to constituents contained in the Line 6B oil. The report noted that "[t]hese results suggest that UV-fluorescence analysis of sediments in field samples could underestimate the petroleum that is present, or even generate false non-detectable levels of petroleum." (AR 1277).

Based on the findings of the UV-Epifluorescence study, U.S. EPA has concluded that UV illumination is not a useful tool for the detection of Line 6B oil in site sediment samples.

Enbridge Comment: Samples evaluated by COOGER were not evaluated for Total Organic Carbon (TOC).

Response: U.S. EPA agrees that samples evaluated by COOGER were not evaluated for TOC.

Enbridge Comment: UV fluorescence and/or epifluorescence was intended to quantify oil in sediment.

Response: UV fluorescence and/or epifluorescence was not intended to quantify oil in sediments. One of the purposes of the UV-Epifluorescence study was to determine if UV fluorescence/epifluorescence could be used as a screening tool to aid in the selection of sediment core sample intervals for detailed chemical analyses, after which forensic chemists would evaluate chemical analytical results to determine Line 6B oil concentrations (AR 1277). Therefore, given the unreliability of UV fluorescence to screen samples in their current weathered condition, the absence of UV fluorescence cannot be reliably used to screen samples for the presence of Line 6B oil.

Enbridge Comment: "…[T]he UV Microscopy Report nonetheless shows that the volume of oil was very small…" and "[T]he study reaffirms that any remaining oil in the sediments is at trace concentrations…."

Response: The UV-Epifluorescence Report did not, and was not intended to, quantify the amount of Line 6B oil; rather, it evaluated diagnostic tools for selecting samples for detailed chemical analyses and forensic interpretation. The use of chemical results in the UV-Epifluorescence study was for qualitative purposes only and does not quantify the amount of Line 6B submerged oil in the Kalamazoo River.

Enbridge Comment: Alpha is not capable of distinguishing between Line 6B oil and other sources.

Response: U.S. EPA concurs that Alpha Labs does not distinguish Line 6B oil. However, U.S. EPA's forensic chemist (Dr. Gregg Douglas of NewFields) is able to distinguish Line 6B oil using analytical data from Alpha Labs and detailed forensic diagnostic methods (AR 1540).

Enbridge Comment: "Figure 18 does not adequately differentiate Line 6B oil from all other sources of oil in the river."

Response: The data presented in Figure 18 identify, in principle, that river sediments at the discharge site contain Line 6B oil and residual background hydrocarbons (AR 1277). At the time the UV-Epifluorescence Report was prepared, Dr. Douglas' methods for identifying Line 6B oil in sediments (in the presence of residual background hydrocarbons) were not fully developed. Nevertheless, the results presented in Figure 18 are based upon unique characteristics of Line 6B oil.

Enbridge Comment: OMA is an integral part of natural attenuation process.

Response: OMA increases the surface area of oil, which could be beneficial to natural attenuation processes if other conditions conducive to biodegradation for Line 6B oil were present and if the oil were fully biodegradable. However, the UV-Epifluorescence Report does not address these other factors (i.e., nutrients, organisms, etc.) or the ability of Line 6B to biodegrade. Given the results of the biodegradation study (AR 1597), it does not appear the Line 6B oil degrades significantly even in induced optimum conditions and, therefore, OMA creation cannot be an integral part of the natural attenuation process.

Enbridge Comment: "The inability to observe the oil in the sediment cores is attributable to the cleanup operations that have been performed along with the weathering of the small amounts of remaining oil."

Response: U.S. EPA agrees that previous Enbridge oil recovery actions have likely created OMA, which has then dispersed remaining Line 6B oil. U.S. EPA disagrees with the statement that there are "small amounts of remaining oil," as this can only be determined through the ongoing quantification study being carried out by Enbridge and U.S. EPA forensic chemists.

Enbridge Comment: There may be oil from sources other than Line 6B in Kalamazoo River sediments.

Response: U.S. EPA acknowledges that there may be other sources of residual background hydrocarbons in portions of the Kalamazoo River. The forensic chemistry evaluation methods developed by Dr. Douglas are addressing that issue to ensure residual background hydrocarbons are segregated from Line 6B oil considerations.

E. Air Monitoring

Paragraph 41 of the proposed Order (AR 1153) required Enbridge to develop a work plan that included a detailed description and schedule of tasks to be performed, including "performance of air monitoring and/or sampling."

Enbridge Comment: "Any future decisions regarding when and how air monitoring is performed should be made in accordance with the HASP and the approved site specific Sampling and Analysis Plan based on conditions in the field."

Response: U.S. EPA agrees with Enbridge's comment. The requirement in the Order for "Performance of air monitoring and/or sampling" is not intended to indicate that ongoing community or worker air monitoring and/or sampling is always necessary; rather it is intended as a potential requirement should future activities and/or observed conditions (for instance during any future submerged oil recovery/dredging activities) indicate the need for additional air monitoring and/or sampling.

F. February 27, 2013 Comment

Enbridge submitted an additional letter with comments regarding the proposed Order to U.S. EPA on February 27, 2013 after the period for comments had closed (AR 1713). Although the majority of the comments were not substantively different than Enbridge's original comment, there was one new substantive comment. U.S. EPA has addressed that comment below.

Enbridge Comment: "A significant number of samples [from the ongoing quantification study] show that potential contributions from Line 6B are below detectable limits with concentrations generally ranging from <48 ppm to approximately 6,000 ppm."

Response: U.S. EPA has determined that Line 6B oil was positively detected in approximately 75% of the sediment samples taken from portions of the Kalamazoo River affected by the Line 6B oil spill for the quantification study (AR 1717). U.S. EPA disagrees that a significant number of samples showed that potential Line 6B contributions were below detectable limits.

II. Proposed Winter Containment

The proposed Order included a requirement that Enbridge install and maintain containment structures in each of the three impoundments within 15 days of the effective date of the Order. Given that the proposed Order was issued in October 2012, Enbridge made a number of comments regarding the need for winter containment, the feasibility of designing and implementing winter containment given the ice formation and behavior in the impounded areas, and issues related to permitting for such containment (AR 1304, 1304B, 1304C).

U.S. EPA has considered Enbridge's comments on this issue and obtained an assessment of winter containment on the Kalamazoo River by a contractor (AR 1319). Given the time required to obtain a permit and the onset of freezing conditions in the Kalamazoo River, U.S. EPA did not require containment for the winter of 2012 – 2013. However, U.S. EPA believes that a feasible design for winter containment is possible and it may require the development of such containment in the future.

III. Active Recovery

A. Net Environmental Benefits Analysis and Fitzpatrick Letter

In January 2012, U.S. EPA's Federal On-Scene Coordinator (OSC) requested that individuals from the Scientific Support Coordination Group (SSCG)[4] identify and evaluate viable procedures for assessing the toxicity of the remaining submerged oil and provide a recommendation for the best procedure to accomplish this goal. In response to this request, individuals from the SSCG, with input from Enbridge, developed the Line 6B NEBA Relative Risk Ranking Conceptual Design (NEBA Conceptual Design). The NEBA Conceptual Design was preliminarily issued in Spring 2012 and finalized in August 2012 (AR 0963). The purpose of the NEBA was to assist U.S. EPA in weighing the environmental risks associated with leaving the residual submerged oil in place as opposed to habitat disturbance associated with active recovery options.

The NEBA Conceptual Design contains relative risk matrices for eight recovery actions (e.g., monitored natural attenuation, agitation toolbox, dredging), eight habitats found in the affected area of the Kalamazoo River (e.g, impoundments, flowing channels), and six resource categories (e.g. plants, mammals, fish) (AR 0963). Considering all existing information, the relative risk matrices rank the risks of different recovery actions for each habitat type, considering the resources of those habitats and exposure pathways.

Individuals in the SSCG then applied these risk matrices to the submerged oil tactical areas as monitoring and assessment data were generated. The applications each identify a recommended course of action or possible courses of action for each tactical area based on the generalized relative risk rankings in the NEBA Conceptual Design, the site-specific oil recovery history, the degree of remaining submerged oil, the proximity to previously identified sensitive habitats, the potential for oil remobilization, the distance to the nearest sediment trap, and/or the failure of existing measures to stop the manifestation of Line 6B oil/sheen. Individuals in the SSCG initially generated two applications of the NEBA Conceptual Design to the tactical areas in May and June 2012 (issued August 8, 2012) (AR 0321, 0963).

[4] The SSCG included scientists and specialists from U.S. EPA; Research Planning, Inc; U.S. Fish and Wildlife Service; Michigan Department of Environmental Quality; Weston Solutions; Great Lakes Environmental Center; U.S. Geological Survey; Kalamazoo River Watershed Council; and Michigan State University.

In its November 2012 comments, Enbridge challenged U.S. EPA's contention that the NEBA applications support active recovery in the three impoundments. U.S. EPA has responded to those comments below. After Enbridge submitted its comments, U.S. EPA requested that the individuals of the SSCG reapply the relative risk matrices to the three impoundments. That effort resulted in the December 2012 NEBA application, which recommends "evaluat[ion of] future recovery (dredging)" for Ceresco, the Mill Ponds, and the Morrow Lake Delta and noted that "there is expected to be no net ecological harm from active recovery and likely some ecological benefit" (AR 1710).

Purpose and Role of the NEBA

Enbridge Comment: Enbridge's comments reflected a belief that the role of the NEBA is to identify the most suitable or best cleanup method. Enbridge noted that "[t]he U.S. EPA established completion of a NEBA as a central element in evaluating the necessity and appropriateness of different response techniques" (AR 1304).

Response: The NEBA is one line of evidence for U.S. EPA to consider when identifying the course of action for the cleanup of Line 6B oil in the Kalamazoo River that is "most protective of the environment," consistent with the NCP. 40 C.F.R. §300.320(b). The Federal OSC has considered the recommendations identified by the NEBA applications along with other evidence in determining the necessary active recovery (dredging) for the impoundments (AR 1719).

Enbridge Comment: Enbridge commented that "[t]he SSCG provided detailed conclusions in the NEBA regarding environmental impacts likely to be suffered by various resources" (AR 1304). It also noted in various places that the NEBA ranked courses of action for each habitat. (AR 1304, 1304E)

Response: The SSCG did not provide any "detailed conclusions" in the NEBA. Rather, in the NEBA Conceptual Design, individuals from the SSCG identified general risk rankings for different recovery actions for habitat types. Then, in the three applications, the individuals from the SSCG considered the existing conditions and information for each tactical area and identified tactical areas where active recovery would result in no net environmental harm, and likely some ecological benefit.

NEBA Conclusions

Enbridge Comment: Enbridge commented several times that the NEBA or the SSCG had "concluded that sheen collection is environmentally preferable when compared to agitation or dredging under conditions presently found in the river" (AR 1304, 1304E). Enbridge commented that the NEBA essentially concluded that "the active recovery methods required to be undertaken by Enbridge are more harmful to the organisms and their habitat than other available recovery methods" (AR 1304)

Response: U.S. EPA disagrees with Enbridge's characterization of the NEBA's conclusions. It appears that Enbridge is not acknowledging the NEBA application recommendations and is, instead, focusing on the relative risk matrices in the NEBA Conceptual Design. The relative risk matrices are generalized by habitat and do not take into account the existing conditions at individual tactical areas. The NEBA applications consider the conditions and history of each tactical area in weighing the benefits and risks of recovery actions for each area. The June and December 2012 applications specifically recommend evaluation of active recovery in the impoundments, including Ceresco, Mill Ponds, and the Morrow Lake Delta (AR 0963, 1710). For most tactical areas, monitored natural attenuation and sheen management were recommended, but the three impoundments, which have many moderate and heavy poling results, are important exceptions. Moreover, a major assumption in the NEBA Conceptual Design is that the designated sediment traps would likely require active recovery approximately every six months (AR 0963).

In several places in its comments, Enbridge equated the agitation toolbox with dredging (AR 1304, 1304D, 1304E). These are two different active recovery methods and are treated separately in the NEBA. The NEBA applications do not recommend agitation toolbox for any of the tactical areas and U.S. EPA is not currently considering use of the agitation toolbox as an active recovery method in the future.

Enbridge Comment: Enbridge repeatedly stated that the NEBA Conceptual Design (referred to as the August 8, 2012 NEBA) concluded that dredging or active recovery had a negative net environmental benefit (AR 1304E).

Response: As explained above, the NEBA Conceptual Design simply formulated generic relative risk rankings by habitat and did not make recommendations (AR 0963). The NEBA applications make recommendations for each tactical area. The NEBA applications only differentiate between actions that will have a net environmental benefit in a specific tactical area and those that will not. It does not identify actions that will have a negative net environmental benefit. As explained above, the last two NEBA applications identified consideration of active recovery (via dredging) as having no net environmental harm and likely some environmental benefit for the three areas that are subject to the U.S. EPA's order (AR 0963, 1710).

Information Gaps

Enbridge Comment: Enbridge commented that the NEBA process remained conceptual and incomplete due to four information gaps identified in the June 2012 application. Those gaps were (1) additional acute and chronic sediment toxicity data; (2) toxicity and physical smothering data associated with agitation; (3) oil biodegradation rates; and (4) quantification of remaining submerged oil (AR 1304, 1304A). Enbridge requested that the relative risk rankings

in the NEBA Conceptual Document be updated using the information from these and other studies (AR 1304, 1304A**)**.

Response: U.S. EPA and the Scientific Support Coordinators believe that the NEBA process is complete and not merely conceptual. As described above, the NEBA process incorporates and evaluates existing data that results in specific recommendations for each tactical area based on current oiling conditions. The intent of identifying these four pieces of potentially beneficial additional information was not to halt ongoing recovery operations while the information was pursued, but to identify the types of information that might result in the need to update the NEBA Conceptual Design risk rankings or affect the long-term ecological risk assessment. Nonetheless, the December 2012 application states that these data would not alter the NEBA recommendations for the impoundments for the following reasons:

(1) Additional acute and chronic sediment toxicity data: The NEBA Conceptual Design, and therefore the applications, assume that toxicity effects from the submerged oil on aquatic organisms are less than or the same as physical effects from turbidity (AR 0963, 1710). A finding of additional ecological toxicity in the oiled sediment would have the most effect on the "monitored natural attenuation" response action, not on "active recovery." That is, if there is more toxicity than assumed, natural attenuation will be ranked lower as a viable recovery method and active recovery may be ranked higher. If there is less toxicity than assumed, however, the risk rankings will remain the same.

(2) Toxicity and Physical Smothering Data associated with Agitation: U.S. EPA is not considering agitation as a method of active recovery as discussed in the letter transmitting the Order (AR 1719). Currently the NEBA applications do not recommend use of the agitation toolbox. If the agitation effects study showed that the effects from the agitation toolbox were worse than assumed, the NEBA risk rankings, which do not recommend agitation for the impoundments, would not change. However, if it showed that agitation was completely effective at removing oil and turbidity could be controlled, it might get a better ranking than dredging. U.S. EPA believes the latter scenario is unlikely based on operational history and agitation done to date and that the results of this study are therefore not necessary to proceed with dredging in the three impoundments.

(3) Line 6B Oil Biodegradation Rates: As discussed in detail in Section I.C above, U.S. EPA's Biodegradation Study Report was finalized in October 2012 (AR 1597) and found that, under optimum conditions, the maximum expected degree of Line 6B oil degradation is 25%, which suggests that, at a minimum, 75% of the residual oil will remain in the river. The findings suggest that the actual biodegradation amount of Line 6B oil would be lower. The December 2012 application found that the study results did not change the relative risk rankings and that further biodegradation studies would not change them either (AR 1710).

(4) Quantification of Submerged Oil: U.S. EPA asked individuals from the SSCG to clarify the relation of oil quantification to the NEBA process in the December 2012 application. The SSCG individuals stated that the volume of oil remaining in the river is not useful for the NEBA relative risk rankings (AR 1710).

Therefore, U.S. EPA does not believe these information gaps will change the NEBA application recommendations for tactical areas.

Fitzpatrick Letter

Enbridge Comment: Enbridge commented that the Fitzpatrick Letter (AR 1151) does not revise the risk rankings in the NEBA nor does it represent the findings of the SSCG. Enbridge emphasized that Fitzpatrick Letter was not an application of the NEBA (AR 1304, 1304E).

Response: U.S. EPA concurs with Enbridge that the Fitzpatrick Letter is not an application of the NEBA and did not revise the risk rankings in the NEBA. The intent of the Fitzpatrick letter was not to make specific recommendations, but rather to provide detailed information regarding the spatial/temporal patterns of submerged oil in the three impoundment areas. The Fitzpatrick Letter synthesized data from the June 2012 NEBA application and recommendations for tactical areas, sheen management, poling assessments, and preliminary hydrodynamic model results for spatial patterns in velocity.

Enbridge Comment: Enbridge noted that the Fitzpatrick Letter consistently and inappropriately referred to the NEBA application rather than to the Conceptual Design.

Response: The Fitzpatrick Letter examined the spatial/temporal patterns of submerged oil in the impounded tactical areas and the recommendations for those areas. Therefore, it was appropriate for the Fitzpatrick Letter to reference the NEBA application as opposed to the Conceptual Design.

Enbridge Comment: Enbridge observed that the Fitzpatrick Letter did not address the environmental impacts of proposed dredging activities or weigh the beneficial impacts of dredging against environmental costs (AR 1304E). Enbridge commented that the Fitzpatrick Letter did not recommend dredging or make any other specific recommendation for further action (AR 1304E**)**. Therefore, Enbridge contended that U.S. EPA's proposed order could not rely on the Fitzpatrick Letter for support (AR 1304E).

Response: As mentioned above, the Fitzpatrick Letter does not make specific recommendations. The NEBA applications and the Fitzpatrick Letter provide supporting information regarding the need for dredging in Ceresco, the Mill Ponds, and Morrow Lake Delta. However, as demonstrated by the voluminous draft Administrative Record and Ralph Dollhopf's letter transmitting the proposed Order (AR 1152), these documents were not the only evidence considered in the determination that dredging and containment are appropriate.

Enbridge Comment: Enbridge commented that the Fitzpatrick Letter focused on mobility, rather than whether sediment mobility and concentrations of oil in sediment would change relative risk rankings (AR 1304E).

Response: It was not the intent of the Fitzpatrick Letter to update or evaluate the NEBA relative risk rankings based on oiled sediment mobility or oil concentrations in sediment. Instead, the purpose of the Fitzpatrick letter was to compile and describe the NEBA application recommendations for the tactical areas, sheen management history, recent poling results, and the preliminary hydrodynamic model results for velocity distributions for the three impoundments in one document. Maps showing spatial patterns and magnitudes of relative slow and fast velocities from the hydrodynamic model were selected to illustrate areas of the impoundments where oiled sediment has a potential to migrate during high flows. The relative slow and fast velocity values were taken from interpretive statements from Enbridge contractors (Tetra Tech) in the HDM Report Addendum that areas of the river with velocities of less than 1 ft/s were depositional geomorphic units that were associated with accumulated submerged oil (AR 0343). As stated in Section I.B, because of problems with the sediment outputs in the partially calibrated HDM, U.S. EPA has determined that it was more appropriate to use simple relative differences in velocity from the hydrodynamic model that in a general sense matched depositional and non-depositional geomorphic settings instead of the erroneous sediment transport model results.

Enbridge Participation in NEBA Process

Enbridge Comment: Enbridge requested that it be allowed to participate in any and all discussions and revisions related to the NEBA (AR 1304, 1713). In particular, Enbridge requested that it be involved in the requested updating of the relative risk matrices in the NEBA Conceptual Design.

Response: An Enbridge representative was involved with the original Conceptual Design of the NEBA. As discussed above, U.S. EPA does not believe it is necessary to revise the NEBA Conceptual Design or relative risk matrices at this time. The NEBA application process involves the formulation of opinions and recommendations by individual SSCG members based on current scientific evidence. U.S. EPA believes this should be done independent of Enbridge involvement and participation.

B. Sheen Management/Natural Attenuation

Enbridge Comment: Enbridge made a number of comments reflecting its belief that the proper action going forward is continued sheen management or natural attenuation in the impoundment areas.

Response: Given the results of the biodegradation study (discussed in Section I.C) and ongoing observations, U.S. EPA does not believe that natural attenuation is currently an appropriate course of action for any area of the Kalamazoo River affected by the Line 6B oil discharge. U.S. EPA concurs that for the majority of the area affected by the Enbridge Line 6B oil discharge, active sheen management is the appropriate course moving forward at this time. However, U.S. EPA has concluded that sheen management is inadequate as the sole recovery method for Ceresco, the Mill Ponds, and the Morrow Lake Delta. During 2012, oil sheen management was implemented as the primary strategy for oil recovery in all three impoundment areas. As Enbridge noted in a letter to U.S. EPA dated August 24, 2012 (AR 1024), sheen management efforts in 2012 recovered an estimated total of 1.4 gallons of oil throughout the entire affected river system. However, during this same period, poling assessments indicate that the moderate and heavy submerged oil footprints in the impoundment areas have continued to grow (Ceresco and Morrow Lake Fan) or certainly remain similar to the footprints identified during the Spring 2012 Reassessment (Mill Ponds and Morrow Lake Delta) (AR 0945, 1058, 1148, 1703, 1704, 1707, 1708, 1709, 1714).

The location of the remaining oil below the water surface and in the sediments makes sheen management or surface skimming alone an inadequate recovery method. Furthermore, the accumulated submerged oil at these impoundments must be actively recovered to prevent further downstream migration of submerged oil. Therefore, in considering all of these factors described above, U.S. EPA considers sheen management inadequate as the sole method of submerged oil recovery in the three impoundment areas.

C. Stakeholders

Enbridge Comment: Enbridge expressed concern that, in concluding active recovery was necessary, U.S. EPA had not sought input from other stakeholders, particularly the Natural Resource Trustees or other state and local agencies. Enbridge specifically cited concerns of the Trustees regarding agitation during a previous permitting effort.

Response: U.S. EPA has communicated with all affected agencies and has discussed both the proposed and final Orders with the affected agencies. Multi-agency coordination meetings have been regularly conducted for more than two and a half years. Pursuant to its obligations under the National Contingency Plan (NCP) to coordinate with the Natural Resource Trustees (Trustees), EPA has met on multiple occasions with the Trustees and/or the lead Trustee to brief the Trustees on response status. U.S. EPA included representatives from the Trustees and the local Kalamazoo Watershed Council in the SSCG, which developed and applied the NEBA. U.S. EPA has also consulted with the Governor of Michigan and held many meetings with MDEQ to coordinate the selection of appropriate response and recovery actions. MDEQ representatives attended both meetings requested by Enbridge regarding the proposed Order.

U.S. EPA is, however, the lead agency for deciding what cleanup actions are required in the Kalamazoo River.

U.S. EPA acknowledges and shares the Trustees' concerns about the risks associated with agitation. U.S. EPA is not requiring Enbridge to use the agitation toolbox.

IV. Consistency with National Contingency Plan

U.S. EPA is issuing the Order pursuant to Section 311(c) of the CWA, 33 U.S.C. § 1321(c), as amended. Section 311(c) removal authority must be exercised "in accordance with the National Contingency Plan," 33 U.S.C. § 1321(c)(1), which in turn requires that "the chosen method [for cleanup] shall be the most consistent with protecting public health and welfare and the environment." 40 C.F.R. § 300.310(b).

Enbridge Comment: Enbridge commented that it believes that active recovery is inconsistent with the NCP, because it is not "the most consistent with protect[ion of] public health and welfare and the environment." (AR 1304). Enbridge also noted that "EPA has generally not proffered a sufficient basis to demonstrate a substantial benefit to the environment or public health to warrant agitation/dredging." (AR 1304).

Response: For the reasons outlined in the Federal OSC's cover letter transmitting the Order (AR 1719), U.S. EPA has determined that active recovery and the other actions required by this Order are the most consistent with protecting public health and welfare and the environment and are thus consistent with the NCP.

V. Response to other comments

U.S. EPA received comments from four local citizens in response to the proposed Order (AR 1154, 1155, 1156, 1673, 1715, 1716). Where possible, U.S. EPA personnel responded to their concerns individually. These responses are included in the Administrative Record (AR 1156, 1423, 1673). Two of those citizens later provided additional comments (AR 1155, 1715) and, as the substance of the second comments was not materially different from the first, they were not responded to separately. A group of citizens provided one set of comments the evening before the Order was issued, and U.S. EPA has responded to those concerns below but did not send a separate response (AR 1716). U.S. EPA has responded below in writing to those concerns that may be common to many members of the public, as opposed to individuals.

Comment: The citizens expressed concerns that the additional work required by the proposed Order would do more harm than good (AR 1154, 1155, 1673, 1716).

Response: U.S. EPA has determined, considering all the evidence in the Administrative Record, that the benefits to the environment of dredging these three impoundments outweigh the harmful environmental impacts of dredging. Although a work plan has not yet been developed for the

dredging work, U.S. EPA and Enbridge will make every effort to limit the downstream impact of dredging these impoundments. U.S. EPA does not believe the oil contamination will spread downstream as a result of the dredging; rather U.S. EPA believes dredging is necessary in order to prevent the submerged oil from migrating further downstream.

Comment: The citizens expressed concerns that the Kalamazoo River will be closed again during dredging (AR 1154, 1155, 1423, 1673, 1715, 1716).

Response: U.S. EPA does not anticipate that there will be widespread river closure while Enbridge dredges the impoundments, although portions of the Kalamazoo River may be closed temporarily during dredging.

Comment: One citizen asked whether the amount of oil in the river was "microscopic" (AR 1715).

Response: Using forensic chemistry methods that accurately detect Line 6B oil in river sediments, U.S. EPA has determined that Line 6B oil is present in 75% of the samples taken from sediments in the areas of the Kalamazoo River affected by the Line 6B oil spill and that the concentration of Line 6B oil is higher in samples taken from the impoundments (AR 1717).

Comment: One citizen asked whether dredging would stir up "settled historics" that would then cause further problems (AR 1715).

Response: As noted above, U.S. EPA has determined, considering all the evidence in the Administrative Record, that the benefits to the environment of dredging these three impoundments outweigh the harmful environmental impacts of dredging.

Comment: A group of citizens commented that work boats for the response interfered with recreational use of the river during the 2012 season and may cause more harm by disturbing sediment (AR 1716).

Response: During the 2012 season, work boats were used to conduct repeated sheen collection in response to ongoing sheening of Line 6B oil on the surface of the Kalamazoo River. U.S. EPA believes that the dredging required by this Order will result in reduced need for sheen collection on the river and, thus, reduced interference with recreational users of the river and sediment disturbance from the work boats.

Comment: Two citizens noted that wildlife and fish were returning to the river and seemed healthy (AR 1154, 1155, 1716).

Response: U.S. EPA is also glad to note that wildlife is returning to the area. The U.S. Fish & Wildlife Service has been involved in the NEBA process, discussed in Section III above, and will continue to be involved in the response efforts.