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October 20, 2023

Joe McGaver
Enbridge Energy
11 East Superior Street, Suite 125
Duluth, MN 55802

Docket # IP-NO-2020-2-N00471

Dear Mr. McGaver,

As you know, the Wisconsin Department of Natural Resources (DNR) is in the process of preparing an Environmental Impact Statement (EIS) for the proposed Line 5 Wisconsin Segment Relocation Project. The DNR is requesting supporting data and clarifications from Enbridge to be used in the completion of the EIS. Listed below is the information we are requesting at this time. This information is primarily related to sediment and oil-spill modeling conducted by the firms RPS and DNV under contract with Enbridge. Additional questions related to pipeline construction are also included.

Sediment modeling questions:

1) Explain whether and how the sediment dispersion models for small and medium-sized streams, described in the *Construction Assessment: Sediment Discharge Modeling Report* (RPS 2023; hereafter, the "RPS Sediment Report"), accounted for inputs from the following sediment sources:
   a) Sediment suspended in water pumped from the trench line in the stream, and trench water from contributing upland drainage areas (i.e., sediment associated with trench dewatering),
   b) Sediment inputs from the disturbed stream banks,
   c) Erosion from the in-stream trench line and associated disturbed sediment,
   d) Erosion from the surrounding workspace/area of disturbance,
   e) Erosion and sediment associated with nearby steep slopes,
   f) Pre-construction sediment, between the time of clearing and initiation of the crossing,
   g) Sediment inputs during the entire time of construction, assumed to be 20 hours in the case of small streams (RPS sediment report, section 3.6.1, pg. 33) and 32 hours in the case of a medium-sized stream per RPS's model assumptions (section 3.6.2, pg. 35),
   h) Sediment inputs during the time-period between the completion of trenching activities and permanent seeding and/or the removal of clear span bridges. According to Enbridge's Environmental Protection Plan, seeding may take up to 20 days (sec. 15, pg. 11). Bridge removal would occur "after final cleanup and permanent seeding" (sec. 23.2.3, pg. 18).
   i) Sediment inputs during bank stabilization after seeding, which would take at least 2 months.

2) The RPS Sediment Report (pg. 32) claims that the sediment inputs for the sediment dispersion model are conservative, based on "[p]rior projects." What prior projects is the report referring to? Explain how these projects are relevant to the circumstances of the proposed project? How do the observed sediment loads from these projects compare to the assumed sediment inputs for the sediment dispersion models.

3) Enbridge's October 17, 2023 response to comments from the U.S. Environmental Protection Agency on the RPS Sediment Report includes the following statement (pg. 1):

   > "RPS used multiple sets of conservative assumptions to maximize potential sediment disturbance values from operations and to minimize background concentrations, which would in turn maximize the difference between the two."

   Please list all conservative assumptions used to maximize potential operational sediment disturbance values, the source or basis of the assumption, and the reason for the assumption's inclusion.

4) As described in the RPS Sediment Report (pg. 15), the sediment transport model assumes that small and medium watercourses are rectangular and smooth-bottomed. How are geomorphology and flow dynamics accounted for? Explain how model estimates would change were geomorphology (e.g., regionally characteristic riffle-pool-run spacing and representative sinuosity) incorporated. Explain how resuspension in riffle areas is accounted for, including potential stream features where sediment may accumulate disproportionately, potentially altering habitat for macroinvertebrates and fish.

5) The RPS Sediment Report states that the model results for small and medium streams are a "first order approximation" (pg. 15). First order approximations are inherently uncertain, making it useful to characterize the magnitude and bounds of that uncertainty on estimated values. What is the level of uncertainty for each model's estimations of total suspended sediment (TSS)? Is it possible to characterize the envelope of probable values for provided point and extent estimates? Why/why not?

6) Please conduct a series of model runs that characterize the sensitivity of the model to variable sediment input amounts. The DNR specifically requests that models be performed for the following:

   a) A scenario with 0.5x the originally assumed sediment input.
   b) A scenario with 0.75x the originally assumed sediment input.
   c) A Scenario with 1.25x the originally assumed sediment input.
   d) A scenario with 1.5x the originally assumed sediment input.

7) Conduct an additional series of model runs for small and medium streams with sandy clay substrate, under both the original sediment-input scenario and the additional scenarios listed in question 6 a-d above. Sandy clay substrate exists in the project domain (e.g., Silver Creek and Brunsweiler Creek) and is considered important due to its propensity to erode. Model runs for this type of sediment would improve our understanding of the sensitivity of the model to variable substrate compositions, since sediment type interactions are modeled in SSFATE (Swanson 2007, pg. 1231).

8) Please explain how sediment composition of model inputs was formulated. Describe how the coarse and fine sediment composition categories are representative of the sediment composition found in and around waterways in the proposed project area. Is it common for streams in this area to have 50/50 mixes of silt and clay, or 50/50 mixes of silt and sand? Provide examples from the project area of small and medium

water courses that have these substrate mixes. How sensitive is the SSFATE model to changing sediment compositions (e.g., 70% silt, 30% sand)?

9) In some places along the proposed route, multiple streams are crossed close to a common confluence point (within 1km of each sediment source). How do TSS impacts change when considering the combined impact of multiple crossings on downstream receiving waters? What factors could affect the answer and how?

   a) Is the sediment load additive for a given sediment class?
   b) How would the spatial extent, deposition depth, and time in exceedance be affected/ changed by the confluence of two streams? Why/why not?
   c) How would deposition be affected by the confluence of two streams?
   d) Would associated increases in flow from stream confluences have the potential to carry sediment further than otherwise expected by the original SSFATE specification? Why/why not?

10) How do multiple stream crossings in close proximity change the behavior of the sediment transport model? Several streams along the proposed route are crossed multiple times in short succession. For example, one unnamed tributary of the Marengo River is crossed four times by the pipeline within roughly 800 meters (proposed crossings WDH-102_x1 t, WDH-102_x2 t, 102_x3 t, sase1001e). How do sediment loading/pulse dynamics change if multiple crossings are considered in series?

    a) Are sediment loads additive under a multiple crossing scenario? If not, what behavior do they exhibit under the assumptions of the model?

    b) Are cumulative areas over a certain sediment concentration threshold additive under a multiple loading scenario? If not, what behavior do they exhibit?

    c) Are cumulative times over a certain sediment concentration threshold additive under a multiple loading scenario? If not, what behavior do they exhibit?

11) According to the RPS Sediment Report, many intermittent and ephemeral streams were excluded from the sediment transport modeling exercise due to insufficient monthly flow data (pg. 19).

    a) How do ephemeral streams differ in sediment transport dynamics from the more regularly flowing streams and rivers in the model?

    b) Why was an alternative approximation of ephemeral stream impacts not considered despite these streams being the majority flow regime category for project crossings?

    c) Erosion control measures are not 100% effective; there is a lag time between permanent restoration initiation and establishment/completion, and disturbed streambed sediments will be eroded to some degree during flow events. What potential for sediment erosion exists in intermittent and ephemeral streams? For example, how much erosion could be expected during the first storm event after construction is completed?

    d) What is the potential for combined sediment releases from ephemeral streams (for example due to a regional rainstorm of sufficient severity/series of smaller events) to contribute sediment to downstream waterways and supply additional sediment loads?

12) In Fig. 5-1 (pg. 45) and Fig. 5-3 (pg. 51) of the RPS Sediment Report, re-label the X axis to appropriately indicate the described variable (assumed to be hours). Provide new versions of figures 5-1 through 5-4 in a high-resolution format.

13) Tables 5-1 (pg. 46), 5-3 (pg. 47), 5-6 (pg. 52), and 5-8 (pg. 53) summarize maximum TSS concentrations and hours TSS is above the 19 mg/L threshold, for small and medium streams, at non-uniform distances. Provide tables summarizing the same data at regular intervals (e.g., every 10 meters) for all existing and requested modeling runs. Provide these tables in .csv or MS Excel format. Each column should represent a variable, each row a data point. Refer to the table below as an example.

Watercourse Size	Flow Level	Sediment Mixture	Distance from the Upstream dam (m)	Max. Concentration of TSS (mg/L)
Small	Low	Fine	10	46
Small	Low	Fine	20	…
…	…	…	…	…
Small	Low	Fine	1000	MDL
Small	Average	Fine	5	…
…	…	…	…	…

14) What are the periods of record for the TSS data acquired from each USGS gaging station? For example, the USGS provides a time series of Suspended Sediment Concentration (SSC) for the White River near Ashland, WI (USGS gage 04027500) spanning from May to December of 1976, with 226 samples. Were samples associated with this gaging station used to estimate the range of modern TSS variability, as is implied in the RPS sediment report, section 3.4.1 (pg. 25)? If so:

a) Were these samples integrated with others from a different time period?

b) Explain why (and if) samples from 1976 accurately reflect the hydrology and patterns of TSS loading occurring in the Bad and White rivers today. Are land uses in these watersheds and local climate factors comparable between 1976 and the present?

c) Do data from the Bad River at Odanah (USGS 04027000) overestimate background TSS levels relative those that occur upstream closer to where the proposed pipeline crosses the river? Why/why not?

Other construction-related questions:

15) Explain the process by which soil probes were used to identify areas of shallow bedrock. If available, provide the location (mile markers) of all soil probes taken. For those locations where the probe encountered bedrock, note the approximate depth to bedrock.

16) Describe or cite specific best management practices that would be employed at each blasting location to prevent irreversible damage to stream ecology and prevent the downstream migration of contaminants that may result from the blasting.

17) Explain whether and how Enbridge has changed its engineering and construction plans and best practices for the proposed Line 5 relocation based on its experiences with aquifer breaches that were caused by the construction of the recent Line 3 relocation project in Minnesota.

18) Describe when, how, and where pipeline coating will be applied; for example, whether it will be applied in advance of pipeline being transported to installation sites? What are the coating materials?

<u>Spill probability questions</u>:

19) The following statement is made on page 2 of the report titled *Line 5 Wisconsin Segment Relocation Project: Probability of Failure Analysis* (DNV, Feb. 2023; hereafter, "DNV Probability Report"):

> "For time-based threats such as external corrosion, internal corrosion, and [stress corrosion cracking], a remaining life is calculated. A Weibull function is then performed to convert expected remaining life to annual probabilities."

What was the calculated remaining life used to model the annual probability of failure (POF) for the relocation of Line 5?

20) What is the approximate remaining life of the original Line 5 pipeline (i.e., those spans laid in 1953)? Which segments have already been replaced, and in what years? Apart from the Bad River Reservation and the Straights of Mackinaw, what other spans are planned to be replaced in the future, and approximately when?

21) The likelihood of a pipeline failure varies depending on the time interval being considered. What time intervals were modeled for the POF analyses?

22) The following statement is made on page 5 (section 3.5) of the DNV Probability Report with respect to threats associated with Natural Gas Liquid (NGL) service and the effects of changes in operating conditions:

> "a review of PHMSA accident data for pipelines that transport multiple batched products including NGLs and refined products was inconclusive."

What was the nature of this review? Please describe the type of analysis that was completed and why the findings were characterized as inconclusive.

23) Are the threats listed on page 2 (section 3.1) the only threats that were factored into the POF estimates? Do the models treat all threats in the same manner in all places? How are interactions between multiple threats incorporated into the POF models?

24) Page 3 of the DNV Probability Report states that:

> "The results from both DNV's proprietary model [of probabilistic risk] and those calculated using PHMSA data were then aggregated to determine a [probability of failure] per mile per year."

Explain how the component estimates (i.e., the outputs of DNV's probabilistic risk model and the calculations using PHMSA data) were aggregated. Provide an example calculation.

25) For each reported POF/mile/year, provide component estimates for:

    a) POF per mile per year based solely on DNV's probabilistic risk model.
    b) POF per mile per year based solely on calculations using PHMSA data related to manufacturing defects and welding/fabrication defects plus a "mitigation reduction factor of 10" (as referred to on pg. 3 of the DNV Probability Report).
    c) POF per mile per year based solely on calculations using PHMSA data related to manufacturing defects and welding/fabrication defects with a mitigation factor of zero.

26) Explain the basis for selecting a "mitigation reduction factor of 10 (i.e., a reduction of one order of magnitude)" as described on page 3 of the DNV Probability Report. What exactly is being reduced by an order of magnitude? How are "the preventative measures that Enbridge may implement during the design, construction, and operation of the Line 5 Segment Relocation" accounted for?

27) Calculate and provide estimates of POF/year for each one-mile span of the proposed relocation route, starting at MP 0.0 and ending at MP 42.0. Provide the aggregated estimate of POF/year, as well as the component estimates listed in question 25 a-c above.

28) Calculate and provide estimates of POF/mile/year for each span of the proposed relocation route delimited by the boundaries of the sub-watersheds (12-digit HUCs) listed below. Provide aggregate POF/mile/year, as well as the component estimates listed in question 25a-c above:

a)	040103011105	Fish Creek-Frontal Chequamegon Bay
b)	040103011101	Beartrap Creek-Frontal Chequamegon Bay
c)	040103020611	Deer Creek-White River
d)	040103020404	Troutmere Creek-Marengo River
e)	040103020403	Lower Brunsweiler River
f)	040103020405	Marengo River
g)	040103020305	Hardscrable Creek-Bad River
h)	040103020304	Devils Creeks-Bad River
i)	040103020203	Lower Tyler Forks
j)	040103020506	Potato River
k)	040103020505	Vaughn Creek
l)	040103020703	Graveyard Creek-Frontal Lake Superior

29) Were the 40 geohazards identified by Enbridge (Draft EIS, table 6-7-1, pg. 152-155) included as inputs in DNV's probabilistic risk model? If not, explain how the following geohazards are otherwise reflected in model assumptions and input variables:

a)	G0A	MP 0.63	Bay City Creek
b)	G2B	MP 2.92	Beartrap Creek
c)	G15A	MP 15.87	Unnamed Tributary of Trout Brook
d)	G23D	MP 23.88	West of Highway 13 – Far slope
e)	G25A	MP 25.22	East of E. Butler Road
f)	G29A	MP29.80	Camp Four Creek

30) How would an unanticipated pipeline exposure (i.e., loss of soil cover) of average size and duration affect POF? Provide a site-specific description for each geohazard listed in question 29 a-f above. Assume average exposure size and time-to-mitigation based on historical data from PHMSA for oil and gas pipelines in Wisconsin, Minnesota and Michigan. Provide a quantitative estimate of the change in POF per year for the corresponding one-mile segment (e.g., MP 0.0 to MP 1.0 for G0A at Bay City Creek).

31) How were differences in pipe wall thickness, as proposed by Enbridge (Draft EIS, pg. 28), incorporated into DNV's probabilistic risk model? All else being equal, how much does an increase in wall thickness from 0.5 inches to 0.625 inches reduce POF/year/mile as estimated using DNV's probabilistic model? Would an additional increase of the same increment, from 0.625 inches to 0.75 inches, result in the same reduction? If what would the model-predicted reduction be for this additional increment?

32) Provide a table listing all datasets used as inputs to POF models and calculations included in DNV Probability Report, plus any additional data used to respond to the questions above. For each dataset, note the following:

a) Data source
b) For non-proprietary/non-confidential data, provide URL(s) for the webpage(s) from which the dataset in question can be downloaded or requested.
c) Whether the dataset was used in DNV's probabilistic risk model.
d) Whether the dataset was used to calculate POF by another method. If so, specify the method and provide a brief description and/or citation(s) as footnotes.

Spills modeling questions:

33) The *Operations Assessment: Oil Spills Report* (RPS, Feb. 2023; hereafter, the "RPS Spills Report") includes the following references (pg. 61). Provide a copy of each:

a) Enbridge. 2016. Guide: Shoreline Cleanup Assessment Technique (SCAT) Guidance. Version 1.0, 06/30/2016. Effective date 6/30/2016. 99 p.

b) Enbridge. 2018b. Enbridge Inland Spill Response Tactics Guide. Prepared by Enbridge, Elastec, QualiTech, LAMOR, and Riverspill Response Canada, Ltd.

c) Enbridge. 2019. Incident Management Handbook. Process, Organization, and Guidance for Incident Response Management. Planning Cycle Guide including Roles and Responsibilities. Prepared by The Response Group. October.

d) Enbridge. 2022b. Release volume data provided to RPS by Joe McGaver, Enbridge. Received April 28, May 2, May 18, and May 20, 2022.

34) The RPS Spills Report refers to the following information sources used by the modelling team. Provide a copy of each:

a) Enbridge Integrated Contingency Plan (ICP) (sec. 2.1, pg. 12)
b) Enbridge Submerged Oil Management Program (SOMP) (sec. 2.1.2.5, pg. 22)

35) Provide updated information on the daily volume (barrels per day) of light crude and NGLs transported via Line 5 since 2017, averaged by year. Complete the table below. Previously provided information on volume by source (e.g., synthetic light crude versus Bakken) only reported the values of high and low annual averages for the period between 2017 and 2019, as opposed to averages by year.

		2017	2018	2019	2020	2021	2022
Total Light Crude & NGLs				519,000			
Light Crude, by source:	Synthetic Light Crude from Western Canada Oil Sands						
	Light Crude from North Dakota Bakken Shale						
	Total Light Crude			439,000			

(Continued)		2017	2018	2019	2020	2021	2022
NGLs, by source:	From Western Canada						
	From North Dakota						
	Total NGLs			80,000			

36) Please run two additional spill-trajectory and fate models using RPS' Spill Impact Model Application Package (SIMAP): One model each for the White River and Bad River, for unmitigated full-bore release (FBR) spills under flow conditions sufficient to cause the Bad River to breach its banks north of U.S. Route 2 (a gage height of 6 feet or higher at the USGS gage at Odanah (04027595; see https://test.wim.usgs.gov/thresholds for additional information). For each model run, estimate the amount of oil that would enter the estuary, Lake Superior, and Chequamegon Bay, respectively, accounting for estuarine influences, including recurring seiche effects observed at the USGS gage at Odanah.

37) Provide an MS Excel spreadsheet file including tables (tabs) for all SIMAP model runs previously conducted for the Bad River and White River, respectively, plus the additional model runs requested in question 36 above. Each table should summarize the model outputs (columns) shown in the example table below, at 5-mile intervals (rows) downstream of the proposed river crossing. The selected outputs are for a four-day simulation, as described in the RPS Spills Report, Appendix B, sec. 4.1 (pgs. 82-83).

Dist. from Proposed Crossing (miles)	Max. Surface Oil Thickness (µm)	Max. Dissolved Hydrocarbons (µg/L)	Total Oil Thickness on Shoreline & Sediment (µm)
5			
10			
15			
20			
25			
30			
35			
40			

38) Based on previously conducted SIMAP models, estimate how long it would take Enbridge and its subtractors to contain and recover surface oil resulting from an FBR spill in the White River and Bad River, respectively, under average flow conditions. These scenarios are illustrated in the RPS Spills Report in the following figures: Figure 4-34 (pg. 129) and Figure 4-87 (pg.182). Assume the spill would occur in June, that mitigation features are in place within the predicted timeframe, and that adverse weather would not impact the cleanup efforts.

39) Explain why Figure 4-16 of Appendix B to the RPS Report (pg. 111) shows dissolved hydrocarbons in the Bad River at higher concentrations and reaching farther downstream in the mitigated release scenario than the unmitigated scenario (Fig. 4-42, page 137).

40) The RPS Modeling Report, Appendix B, sec. 4.2.2.3 states the following (pg. 213):

> "As seen by comparison of unmitigated and mitigated HARV and FBR scenarios, the application of mitigation activities did not appreciably reduce in-water effects, unlike the surface and shoreline effects. This is because in-water effects are predominantly driven by dissolved hydrocarbons within the water column. This dissolution occurred quickly and near the release point, prior to oil reaching the first [control point]. Therefore, the DHC moving downstream in the water column were not able to be removed by emergency response equipment that focused on removing surface oil."

How would Enbridge remove dissolved hydrocarbons when dissolution occurs prior to oil reaching a control point? Is this information provided on any of the plans requested in questions 33 and 34?

41) Section 2.1 of the RPS Spills Report (Oil Spill Emergency Response Mitigation, pg. 12) describes how floating and submerged oil would be contained and recovered from rivers, streams, and other open waters. Provide information on how oil containment and recovery would be conducted on land and in wetlands. Under what, if any, conditions would oil skimmers work in wetlands with thick vegetation? Which, if any, of the plans and documents requested in questions 33 and 34 include this information?

42) Use OILMAPLand to model the overland movement of oil released along the proposed route (only) and the potential extent of downstream movement, for a maximum travel time of 4 days, for the following spill scenarios. These scenarios were previously modeled for a 12-hour maximum travel time:

a) Full-Bore Release (FBR) under high flow conditions
b) FBR under 95^{th} percentile stream current velocity conditions
c) Recent Average Release Volume (RARV) under low flow conditions

43) Use OILMAPLand to model the overland movement of oil released along the proposed route (only) and the potential extent of downstream movement for the maximum travel times of 12 hours and 4 days, respective, for the following spill scenarios. These scenarios were not previously modeled for either maximum travel time.

a) FBR under average flow conditions
b) RARV under average flow conditions
c) Historic Average Release Volume (HARV) under average flow conditions

44) Provide a table in MS Excel format showing the time it would take spill plumes modeled with OILMAPLand to reach the Areas of Interest listed in Table 4-1 and Table 4-2 in the RPS Report, Appendix B (pg. 93). Include all scenarios that were previous modeled plus those modeled in response to question 40 above.

45) Provide the following geographic information system (GIS) data layers, either as part of a Geodatabase or as separate Shapefiles:

a) Polygons of the OILMAPLand outputs (i.e., simulated oil spill plumes) of all previous model runs conducted for the existing, proposed and alternative routes, plus the additional model runs requested (for the proposed route only) in questions 42 and 43.

b) All hypothetical release points corresponding to the polygons requested in (a) above. These are described in the RPS Spills Report, Appendix C, section 4.1 (pg. 18).

c) Polygons of the modeled plumes of Natural Gas Liquids (NGL) corresponding to the NGL “Could Affect” (High Consequence Areas) line segments, which Enbridge provided to the DNR for the Draft EIS.

d) All hypothetical release points corresponding to the polygons requested in (c) above.

46) The RPS Modeling Report, Appendix B, Section 4.2, states the following (pg. 203):

> “The assessment estimated the potential short-term (i.e., acute) exposure of biota to floating oil and subsurface oil contamination (in-water and on sediments) and predicted the resulting percent mortality. Values were derived based on the calculated river area affected within each grid cell based upon the concentration and duration of exposure, relative to the sensitivity being assessed.”

a) What was the duration of exposure (time) assumed when determining 100% mortality calculations for acute toxicity exposure in Tables 4-9 through 4-14 (pg. 208-214)?

b) Was the duration of exposure on habitat and species upstream of mitigation control points increased to account for oil being present in that portion of the river until recovery operations finished? If not, provide updated calculations with the duration of exposure increase to the estimated number of days it would take finish oil recovery efforts.

c) Provide the species lists that make up the behavior groups from Tables 4-9, 4-10, 4-13 and 4-14.

d) Why were long-term effects of oil exposure to the defined behavior groups not considered?

If you have any questions regarding these requests, please call me at 608-267-9564, or email me at Gregory.Pils@wisconsin.gov.

Sincerely,

Greg Pils

Greg Pils, Director
Bureau of Environmental Analysis and Sustainability

Cc: Tim Drake Tim.Drake@erm.com
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