**Comments on Human Factors Factual Report**

1. Cover page: Is the Office of Marine Safety the office that drafted this report? If not, revise title page to include correct office and address.
2. Page 8 (2nd paragraph): Identify who gives the pipeline controllers assignments and when assignments occur.
3. Page 8 (3rd Paragraph): Does NTSB support the idea that column separation may occur anywhere, including on relatively flat terrain? If not, this paragraph needs to be revised to reflect this is Enbridge's perspective. Identify what are the "other forces" that cause column separation. Identify whether a column separation can be caused by something other than leaks or changes in elevation in hilly terrain.
4. Page 9 (1st Paragraph): This paragraph requires more information. Who has made the "request" to minimize the amount of information coming from the MBS analyst? Is it only a "request"? What is the information that the MBS analyst now provides? How does the information differ from what the analyst provided in the past?
5. Page 9 (2nd Paragraph): When did Enbridge begin the practice of promoting terminal operators to "shift leads"?
6. Page 9 (2nd Paragraph): According to the report, the "night shift" pod-mate stated that (1) she conducted the calculation to estimate the time needed to "pack the line" and (2) she conveyed this information to the shift lead "about 0600 before the second attempt to restart operations on the line." This account appears to be inconsistent with findings in the "control room and SCADA" fact report. There, it states that the draft procedure was used "during the shift B start up of Line 6B at 4 am." *See* page 11 of "control room" report.
7. Page 17: Since simulators did not have MBS alarms, was there any separate training on the use and actions to be taken based on the MBS System?
8. Page 20: Second line from bottom, change "made" to "mate".
9. Page 24 (Line 2): Change "made" to "mate".
10. Page 26 & 27: Do these tables indicate all alarms of this type received in the Control Room for all the lines controlled therein?
11. Page 27 (1st Paragraph): Shows line had been SD at 14:49 (specify that this is Mountain Time).
12. Page 28 (First Paragraph under Enbridge Health & Safety): Why is this new stated position tied to the accidental deaths that happened more than 2 years prior?

**Comments on Emergency and Environmental Response Group Factual Report**

1. Cover Page: Correct Jon Gulch's contact information. The zip code is 48138.
2. Page 10: EPA has more recent numbers for oil collected (1,147,933 gallons) and soil and debris collected (186,108 cubic yards).
3. Page 10: "In addition, about 155,000 cubic yards of hazardous and non-hazardous soil and debris disposed, including river dredge spoils" is a sentence fragment. Insert "In addition, Enbridge has collected and disposed of about 186,108 cubic yards of hazardous and non-hazardous soil and debris, including river dredge spoils."
4. Page 10: Revise the following phrase "[t]he Enbridge approved Oil Recovery and Containment Plan" to state instead "[t]*he EPA approved* Oil Recovery and Containment Plan that Enbridge developed . . ."

5. Page 15 (under "Oversight of Spill Response Efforts"): It states "Accordingly, in subsequent briefings with Enbridge officials, the on-scene coordinators stressed that Enbridge should make all efforts necessary to protect the Superfund site and directed that oil boom should be installed 30 miles downstream at Morrow Lake as a collection point." Please delete "in subsequent briefings," since EPA does not recall this issue being discussed more than once or twice. During the initial phases of response, the boom installed at Morrow Lake was primarily for protective measures to stop the potential flow of oil to Lake Michigan.
6. Remove Attachment 15 (interview of the USCG DRAT supervisor (TJ Mangoni)): Since the report does not reference any portion of that Attachment, please remove.

**Comments on the Integrity Management Group Factual Report**

1. General Comments: There is no reference to Enbridge's internal report. As a factual matter, NTSB should note that Enbridge conducted its own investigation and reached certain conclusions with respect to integrity management. These include:
   - Enbridge has found little value in the practice of measure the pH of any moisture found between the pipe and disbanded coating or the practice of conducting soil sampling if SCC colonies are found during an excavation. (Enbridge Internal Report, p. 22)
   - Enbridge concluded that "consideration should be given to conducting a laboratory and site test program to confirm the appropriate crack growth test for the range of soil types." *(id.)*
   - Enbridge concluded that it did not accurately predict the growth rate for the ruptured crack because the Paris Erdogan model does not take into account the "stress amplitude ratio." (id.)
2. Page 2 (1st Paragraph): The report states that line 6B is owned and operated by Enbridge Energy, Inc. According to Enbridge, Enbridge Energy, Limited Partnership is the owner/operator of line 6B. (*See* Enbridge Accident Report – Hazardous Liquid Pipeline Systems (revised Dec. 20, 2010)).
3. Page 2 (2nd Paragraph): The report says that there were "no injuries or fatalities." However, several people did seek medical attention (can be confirmed with the Calhoun County Health Department). Enbridge must have received several claims for bodily injuries. Perhaps the finding should be that "no person was injured or killed when the line ruptured at 5:58 p.m. on July 25, 2010."
4. Page 2 (3rd Paragraph): The report says that the maximum allowable discharge pressure at Marshall was 523 psig due to a voluntary restriction between Stockbridge and Sarnia. However, Enbridge states on page16 of its internal report that the voluntary pressure restriction was 520 psig, not 523. Also, Table 2 of Enbridge's internal report shows a pressure restriction of 520 psig at MP 610 -- only two miles from the rupture. Table 2 shows that immediately upstream of Marshall there was a point pressure restriction of less than 300 psig.
5. Page 7 (Line 269): Replace "contracted" with "contractor."
6. Page 9 (Line 342 to 350): Why is language stricken with respect to pressure restrictions for cracks?
7. Page 9 (Line 361): Report says that Enbridge provided ILI data from 2007 to 2009. However, other sections of the report discuss ILI data pre-dating 2007.

8. Page 10 (Crack management Discussion): The shortness of this discussion is a problem. Enbridge knew about the cracks in the rupture pipe for at least five years. Further, Enbridge has conceded that it underestimated the growth of the ruptured crack. Therefore, there should be a substantial statement of the practices used by Enbridge to manage stress corrosion cracking crack growth.
9. Page 10 (Lines 385-398): This discussion is relevant and should not be deleted. Is BMT "industry standard"?
10. Page 11 (Line 428): It is not clear whether NTSB has received the entire report relating to the 2005 ILI. In that report, one of the cracks in the ruptured pipeline (feature 0154-05538) was identified by the vender (GE pipeline solutions) as being among the among the fifteen features representing "some of the significant features detected by the USCD inspection process using the following criteria – amplitude of the signal (associated with the depth of the feature), the length of the feature, and representation of various defect categories."
11. Page 16 (Lines 673 to 679): Same comment -- NTSB should note that the vender, GE Pipeline Solutions, identified one feature in the rupture pipe to be significant.
12. Pages 30, 30 & 32: Figures suggest adding year dates to color key at bottom and figures 31 & 32 suggest label Girth weld at right of figures.

**Comments on the Control Room and Supervisory Control and Data Acquisition (SCADA) Group Factual Report**

1. General Comments:
   - The report covers the same topics twice. Section D (incident overview) gives a detailed chronology of the events in the control room on the 25th and 26th. However, Section F (operations) goes over this same material. Consider consolidating Sections D and F. The findings on pages 7-46 appear to be central to the report, but they are difficult to understand. Please revise for clarity.
   - The report contains numerous figures, showing screen shots of the SCADA system. These figures are apparently screen shot from a simulator and not from the actual terminals used by Enbridge. Please explain why. It is difficult to understand the significance of these figures, provide additional explanation for these figures.
2. Page 4: The report states that "there were a total of 25 personnel in the control room" and directs the reader to the control room layout at Figure 1. That layout, however, shows that there were 27 positions in the room. Who was missing?
3. Page 5 (2nd Paragraph): There is a finding that Line 6B was one of the more difficult consoles to operate, according to statements during interviews. Explain why. Is there any factual basis for this collective opinion?
4. Page 5 (Last Paragraph): This paragraph is a run-on sentence.
5. Page 7 (2nd Paragraph): Define a "scheduled conflict shutdown." (Paragraph also contains grammatical mistakes.)
6. Page 7 (4th Paragraph): This paragraph is not clear. Was the pig held in position at the Niles? If so, explain how this done.
7. Page 7: Second paragraph says original schedule was to SD Line 6B @ 7:30 PM (7/25/10) and to US @ 4:00 AM (7/26/10). In the last sentence of this paragraph, it says that the SD was moved 1 hour ahead to 6:30 PM (7/25/10) with the same 4:00 AM SU.

The third paragraph says the line was to be SD @6:00 AM (7/25/10) and restarted @ 4:00 AM (7/26/10). Please address this discrepancy.

7. Page 15 (4th Paragraph): Appears to be a repeat of information from p. 13 ("Operator B1 told Operator B2 that they were going to give it another try, but he asked him whether he was serious then he responded yes. Operator B1 asked him to open up and have his holding pressure high. Operator B2 said it was already high and he would open up and hold the pressure at 180.")
8. Page 15 (Last Paragraph and Page 45, Last Paragraph): Replace "haven" with "having." (Need to search this term throughout the document and replace.)
9. Page 33, 34, & 35 (Figures 11, 12, & 13): Times are Mountain, should be labeled as such.

**Comments on the Control Internal Management Group Factual Report**

1. General Comments: It appears that Enbridge estimated the growth rate of an unexamined crack (the crack that caused the rupture-later found to be SCC) identified in the ILI using a fatigue crack growth model and the crack grew faster than estimated causing the rupture. The following additional facts should be included in the report:
    - If Enbridge did not excavate the crack, explain how Enbridge knew the crack type.
    - Provide Enbridge's justification for using a fatigue crack growth model to estimate the growth rate for the crack.
    - Did the Enbridge assessment procedure include the reduction in wall thickness due to corrosion and how was this done for a crack that was not field inspected?
2. Page 7: This section of the report includes an Enbridge statement that the pipe-to-soil potentials were adequate in the vicinity of the rupture for corrosion control. The following facts should also be included in this section:
    - Enbridge was aware of the corrosion problem with tape because on Line 6A it analyzed the 2007 and 2009 GE ML ILI tool runs to analyze the corrosion growth rate. Enbridge found that the average corrosion growth rate was 6.8 mils/yr with a maximum rate of 48.2 mils/yr.
    - The industry generally recognizes that single layer tape coatings have a tendency to disbond after about 15 years of service. This allows water underneath the coating and since the tape is an electrical insulator the cathodic current cannot reach under the coating to control the corrosion.
    - The CP measurements on a tape coated pipeline only relate to locations on the pipe where holidays exist in the tape coating exposing the pipe's steel surface. At all other locations, the steel surface is electrically shielded.
3. Page 14: The manufacturers' tolerances of various ILI tools are included. For example, the PII crack detection tool tolerance is stated as +/- 8% of the wall thickness, but in an analysis of the dig data from the 2005 ILI run, the data indicated +100% to -55% of the thickness. Additional facts should be included explaining how the accuracy of the manufacturers tolerances are confirmed, based on actual field depth and length data compared to predicted depths and lengths.
4. Page 25: Includes the statement that "Enbridge considers field and ILI data to be sufficiently accurate if the data falls within an error band of +/- 10%." The report should

also explain what data Enbridge provided to show that this is the typical range for its data.

**Comments on Materials Laboratory Factual Report**

1. Page 1 (2nd Paragraph): The report says that there were "no injuries or fatalities." However, several people did seek medical attention (can be confirmed with the Calhoun County Health Department). Enbridge must have received several claims for bodily injuries. Perhaps the finding should be that "no person was injured or killed when the line ruptured at 5:58 p.m. on July 25, 2010."
2. Page 2: It is stated that an EPA consultant observed the Materials Group. Please provide a name and contact number to EPA.
3. Page 22: The discussion of the 2005 USCD data should mention that one of the features (feature 0154-05538) was listed as "significant" by GE Pipeline solutions.