Enclosure to June 27, 2014 Letter
To Hon. Schuette & Hon. Wyant

Responses to Questions and Requests for Information
Regarding the Straits Pipelines

A. Pipeline Construction, Modification, Useful Life, and Replacement

1. *Please provide copies of the following:*

    a. *All design specifications and as-built drawings of the pipelines*

Response: Please see the documents provided in the folder on the data portal titled "A1a".

    b. *All documents that Enbridge or its predecessor, Lakehead Pipeline Company ("Lakehead"), relied upon from their contractors, inspectors, or any other source to conclude that the pipelines were constructed according to design specifications and the "minimum specifications, conditions and requirements" contained in paragraph A of the Straits of Mackinac Pipe Line Easement granted by the Michigan Conservation Commission on April 23, 1953 ("Easement").*

Response: Enbridge has provided responsive documents for Items 1 through 14 on the data portal in the folder titled "A1b". In addition, Enbridge provides responses to some of Items 1 through 14:

Item 1: Original construction confirmed via drawing 5.92-12369. Drawing indicates adherence to 15 ft. minimum cover up to 50 ft. water depth and taper to zero ft. of cover at 65 ft water depth.

Item 2: Confirmed the following minimum testing specifications: (1) Shop Test 1700 PSI – per Engineering Construction Consideration Paragraph 2; (2) Assembly Test 1500 PSI – per Engineering Construction Consideration Paragraph 3; (3) Installation Test 1200 PSI – per Bechtel Corporation's Final Report dated February 1, 1954, Pages 66, 67 and 73 (this testing occurred on the shoreline. An additional in place test to 790 psi was also completed as confirmed via the same final report); (4) Operating Pressure 600 PSI – Enbridge has set the MOP for the pipeline at 600 PSI.

Item 3: X-ray numbers and inspection company, Pittsburgh Testing Laboratory were recorded in the Bechtel Progress report from May, June, July 1953.

Item 5: As a result of modernizing the pipeline system and establishing remote control room operations, the valves' actuation was upgraded from gas to electric operation.

    c. *All documents evidencing Lakehead's and Enbridge's "compliance with any and all requirements of the United States Coast Guard for marking the location of said pipelines" as stated in the Easement, paragraph B(2).*

Response: Enbridge has placed pipeline markers and Carsonite orange road crossing markers on both pipelines at the shoreline on either side of the Straits. Additionally, the pipelines are depicted on current U.S. Coast Guard nautical maps of the Straits, evidence of which is included on

the data portal in the folder titled "A1c" (note the caution statement in red on p. 11). A full-size version of the nautical map can be obtained from NOAA.

d. All available photographs, films, drawings, or other visual representations of the pipelines during and upon completion of construction.

Response: Please see all photographs, films, drawings, or other visual representations on the external data drive provided by Enbridge.

2. *Please explain and document which specific portions of the pipelines were, upon completion of construction (a) located beneath the surface of the lake bottomlands and (b) located on or above the surface of the lake bottomlands. As to the latter, please explain and document how and to what extent those portions of the pipelines were initially and are today secured to the lake bottomlands over the length of the pipeline and the varying elevations of the bottomlands surface.*

Response: Please see the as-built drawing provided on the data portal in the folder titled "A2".

The Straits of Mackinac Spans 2014 document shows how the portions of the pipelines are secured to the lake bottomlands. The two tabs in the attachment, "East" and "West", list all of the free spans on each leg of the pipeline in column B. Every span is secured to the lake bed at each end by touchdown points (sand/clay cover, grout bags, or anchors), as listed in columns H & I. The spans are ordered geographically from South to North on each tab.

The length of each span, as reported in different survey years, is listed in columns C-G. In cases where at least one end of the span is secured by sand/clay, the length of the span is likely to change over time, as water currents either grow or erode that support. In addition, two spans that are separated by sand/gravel, have the potential to combine into one larger span, due to erosion, or a span may become silted in entirely, as is noted in different locations over the years. Anchor locations are chosen in order to ensure that no two spans can merge and create a span that is longer than the safe limit of 140 ft. New span names are created when anchors are installed and subsequently divide one span into two. That explains why some spans do not have lengths reported in previous years, as they did not exist until an anchor was installed. For example, on the East leg, span E-42 was surveyed to be 91' long in 2010, and an anchor was installed in 2012 that divided this span into two spans, E-42 South (45' long) and E-42-North (52' long). The approximate water depth at each span is listed in column J. This will also change each year depending on water levels. Column A identifies the anchors that we installed in 2012 (in red) and those Enbridge Energy Limited Partnership is targeting to install as part of the 2014 repair program (in yellow). The 2014 repair program will be finalized after Enbridge Energy Limited Partnership receives the 2014 survey data with updated span lengths.

Please refer to East Span Logs; West Span Logs; and Span Repair Logs for the 2012 Survey Logs for GPS coordinates of each of the span locations and the repairs that were made in 2012. Attachments 2 and 3 are the hand-written logs of the 2012 ROV survey that was completed before the 2012 anchor installations. Each page documents information for each span, including among other things, the location and type of the south and north supports of each span, the water depth, the height of the span, and the length of the span in the previous 2010 survey. The survey was completed when the pipeline was locked in with Natural Gas Liquids (NGL), which is the most buoyant fluid that is transported on the line, in order to ensure that the highest span height and

longest possible lengths are measured. After that survey was completed, 17 anchors were installed. The new anchor locations are identified in Span Repair Logs. There is one page per span that was "repaired" by the installation of an anchor. The location of the South and North ends of the span are documented, as well as the location of the "repair", or anchor installation.

3. *Please identify, explain in detail, and document any and all structural changes, that Lakehead, Enbridge, or any intervening owner or operator has to date made to the pipelines and related infrastructure since construction of the pipelines was completed. Please include all available photographs, films, video recordings, or other visual representations of those structural changes.*

Response: As discussed in the cover letter accompanying these responses, Enbridge changed the method of support for the pipelines to a screw anchor system. Documents relating to the anchor system are included on the data portal in the folder titled "A3".

4. *Please identify and provide copies of all documents prepared by Lakehead, Enbridge or any intervening owner or operator of the pipelines relating to the estimated or assumed useful life of the pipelines, including, but not limited to, any depreciation schedules or accounting documents.*

Response: Enbridge Energy, Limited Partnership is performing numerous pipeline inspection and integrity activities at regular intervals to ensure the safety and operational reliability of the Straits pipelines of Line 5. Enbridge manages its assets throughout their life-cycles following its integrated management system. Accordingly, an integrity assessment of the pipelines based on the intelligence gathered through the inspection activities noted above is done on an annual basis to consider integrity management options such as partial, segmental or full pipeline replacement. The pipeline replacement assessments are achieved in conformity with Enbridge's procedure PI-69 which looks at feature density as it relates to impacts on risk and reliability, Procedure for Pipeline Replacement Assessments, provided in Attachment 1. In summary, this procedure outlines three levels of assessment to consider in the evaluation of a pipeline replacement project; Level I, II and III. Enbridge has applied this procedure to all of Line 5 including the Straits. There are currently no plans for pipeline replacement at the Straits of Line 5 as such plans are not needed to maintain the pipeline safety, integrity and overall reliability. Examples of Enbridge's lines where this procedure has been applied and full pipe replacement has resulted include Line 6B and Line 3.

In addition, please see the documents provided on the data portal in the folder titled, "A4". Please note that one of the responsive documents contains depreciation information for all of the Lakehead system, as when depreciation studies are done, they are done as a whole, and depreciation information specific to Line 5 is not possible.

5. *How long does Enbridge currently estimate the existing pipelines can safely be used before they are replaced? Please explain and document that estimate in detail, and specifically identify any independent scientific and engineering data upon which Enbridge relies.*

Response: Please see the response to Question A4.

6. *Please identify and provide copies of any documents prepared by or for Enbridge relating to the possible replacement of the existing Straits pipelines, including, without limitation, designs, costs, contingency plans, and schedules.*

Response: Please see the document provided on the data portal in the folder titled "A6 – A7". The unclassified estimate prepared by Enbridge was completed with the intent to provide a very high level comparison of options to replace the Straits of Mackinac crossing and assess technical feasibility of construction methodologies. The estimate was not prepared in contemplation of any plan to replace the Straits of Mackinac pipelines, but was prepared for comparison and screening purposes only. Costs and schedules were developed for each option as part of the screening exercise in order to understand a relative comparison of each. In considering the provided estimate, it is extremely important to consider that the proposal was prepared on an unclassified basis, and as such includes significant assumptions and unknowns. Enbridge will not proceed with a project until a Classified (as per American Association of Cost Engineers best practice) estimate is prepared involving a significant amount of engineering, scope definition, schedule development, and construction planning. There were numerous assumptions that were not assessed due to the unclassified nature of the estimate. Since Enbridge has not recently constructed a project that entails similar construction methods to what would be required, Enbridge lacks the historical project cost data to properly evaluate the estimates produced to know if they are outside of our expected accuracy range. The estimate also was prepared based on information from early 2012, and would need to be updated to reflect current market conditions and the regulatory, environmental, safety, operational, and design standards at the time of the estimate's preparation.

7. *What would be the estimated cost of replacing the existing Straits pipelines with new, state-of-the-art pipelines of the same capacity, designed with secondary containment such as double-walled pipelines? Please provide detailed explanation and documentation of that estimate.*

Response: Please see the response to the previous information request.

B. Existing and Potential Future Uses of the Pipelines

1. *Please identify each type of product or substance that has been transported through the pipelines since they were constructed. For each of the last five years, please identify the quantity of each type of product or substance transported through the pipelines.*

Response: From January 1, 2009 until December 31, 2013, the following were the product types and quantities transported.

Average (bpd)	2009	2010	2011	2012	2013
Natural Gas Liquids	76,269	73,924	71,532	74,373	67,871
Condensates	520	0	0	0	0
Light	351,453	388,755	389,277	383,208	397,010
Medium	0	575	0	0	0

2. *Is Enbridge considering the possibility of changing the types or quantities of products or substances transported through the pipelines? If so, in what respects?*

Response: There are no plans to change the product types transported on Line 5.

3. *What, if any, notice does Enbridge give to any government agency or the public about changes in the types or quantities of products or substances transported through the pipelines? Has Enbridge requested or obtained approval from any government agency for such changes? Please identify and document any such notices and approvals.*

Response: Although no notification is required to be presented formally to PHMSA for modifications to commodity types or quantities, those changes are incorporated into Enbridge's integrity management program, which is provided to regulators upon request. The integrity management regulations specify how pipeline operators must identify, prioritize, assess, evaluate, repair and validate the integrity of hazardous liquid pipelines that could, in the event of a leak or failure, affect High Consequence Areas (HCAs) within the United States. The program changes as appropriate to reflect operating experience, the conclusions drawn from integrity assessments made under the program, other maintenance and surveillance information, and evaluations of the consequences of a failure on HCAs. Such changes result from modifications to calculated pipeline volume out and variations in commodities transported sufficient to alter the potential transport mechanisms.

Enbridge has extensive public consultation and public awareness programs. Prior to a project, our right-of-way, community relations and government affairs teams provide information on changes to the pipeline system, such as an increase in the barrels per day transported and product type. That information is also provided through the public disclosure process for new projects, which will typically include a news release and website content.

Through our U.S. Public Awareness Program we provide information on an annual basis to emergency and public officials, affected public, excavators, farmers, and schools near our areas of operation in accordance with federal regulations. In most cases Enbridge goes above and beyond regulatory requirements. State level health and safety officials such as the Michigan State Police and the Michigan Department of Natural Resources are also included in this mailing. Enbridge plans to enhance its public awareness program to include affected public who could potentially be impacted by a spill on water and entities such as the Department of Environmental Quality. Enbridge currently provides information to marine companies and plans to enhance our messaging to include the risk of pipeline damage caused by anchor drops.

Enbridge provides additional area specific information through in-person meetings with emergency and public officials. We have been meeting annually with emergency management, fire departments and law enforcement officials in Cheboygan, Mackinaw, and Emmet Counties for approximately 20 years.

In the upper Michigan area in 2014 alone, we have presented training presentations to all identified priority fire departments in Cheboygan County and plan to offer trainings for all Emmet and Mackinaw County Fire Departments prior to the end of the year. Enbridge is planning a full scale exercise in Cheboygan County for September 2014. That exercise will educate entities that

could potentially be involved in a response on the products transported and the particular course of action if a leak were to occur.

Our online Emergency Responder Education Program provides emergency responders with training on how to safely and effectively respond to an incident on the Enbridge or Vector Pipeline systems. The program, developed by Enbridge in conjunction with the National Association of Fire Chiefs, is provided online and free of charge to emergency responders and was rolled out via mail and email to emergency responders within our counties of operation throughout the U.S. In Michigan, 270 emergency responders, employees and others have registered for the program; 148 have completed it.

We participate annually in pipeline awareness group meetings in the area, including meetings in Gaylord, Petoskey, Ironwood, Iron Mountain, Iron River, St. Ignace, Manistique, Escanaba and Antoine. Additionally, through our Safe Community grant program and other community giving programs we continue to provide funding for training and equipment needed in a pipeline response. In 2013, we provided more than $70,000 to emergency response departments throughout upper Michigan.

4. *Is it possible that Enbridge will transport diluted bitumen through the pipelines? Please identify and provide copies of any documents created by or for Enbridge discussing that possibility.*

Response: Diluted bitumen is not a permissible commodity identified for transportation on Line 5 as per the Enbridge Service Levels, Table 2: Commodity Routing Summary.

5. *What, in Enbridge's view, is the economic value of the pipelines? Please explain and document Enbridge's estimate of that value.*

Response: Please see the document provided on the data portal in the folder titled "B5" for supporting information. There are many ways to arrive at an economic value of the pipelines. Due to the nature of pipelines systems, it is impossible to separate the twin pipelines crossing the Straits from the larger valuation of Line 5, so what is presented is the value of Line 5 as a whole. This valuation was accomplished using the discounted free cash flow method. The assumptions underlying the valuation model are:

- Throughputs: The valuation assumes Line 5 is fully utilized over 10 years
- Tolls: Line 5 tolls include Enbridge Energy, Limited Partnership index toll and Facility Surcharge Mechanism associated with Line 5 expansion. The index toll attributed to Line 5 is calculated as the difference between Border to International Border (Marysville) and Border to Superior. The tolls are escalated at 3.89% for the next 10 years (2014 Oil Pricing Index Factor). The surcharge on the expansion capital assumes nominal 11.5% return on equity and 6.15% cost of debt and a capital structure of 55% equity and 45% debt
- Operating Cost that can be specifically identified for Line 5 such as power, property tax and integrity cost are shown separately
- Other Operating Cost: the remaining operating costs for the Lakehead System are allocated to Line 5 based on three factors: Gross Property, Plant & Equipment, barrel miles, and revenue.
- All Operating costs are escalated at 10-year historical average inflation rate of 2.36%.

- Power: Power curve for Line 5 is used to determine power costs
- Maintenance Capital: 2013 actual maintenance expense was inflated at the same rate as Operating Cost above
- Integrity capital is based on Enbridge 10-year plan.
- Discount Rate is based on the pre-tax weighted average cost of capital (WACC), assuming 11.5% return on equity, 6.15% of cost of debt, and 55% equity and 45% debt capital structure
- Terminal Value: Dividend Growth model is used to determine the terminal value. Expected Dividend (D) is the last 3-year average free cash flow, required rate of return (K) is pre-tax WACC above; growth rate (G) assumes 3%.

Using a discount rate of 9.1%, the economic value of Line 5 using this model is $610.7MM.

6. *How much revenue has Enbridge obtained from operating the pipelines since it began that operation? Please identify and document the amount of revenue Enbridge has obtained from operation of the pipelines in each of the past 5 years.*

Response: Please see the revenues obtained during the operation of Line 5 since 2002, on the data portal in the folder titled "B6". Compilation of revenues prior to 2002 is not possible since the accounting was not done using an automated system, and would require significant time and resources to review off-site records and compile and assess the data.

C. Pipeline Inspections

1. *Since the pipelines were constructed, when and by what means has Enbridge or any prior operator of the pipelines inspected or arranged for the inspection of the physical integrity of (a) the portions of the pipelines and related structures that are located below the surface of the water and (b) any portions of the pipelines and related structures that are not located below the surface of the water? Please provide copies of the documents relating to those inspections, the findings obtained, and any actions taken by Enbridge or the prior operator as a result of the inspections.*

Response: Since the pipelines were constructed, Enbridge Energy, Limited Partnership has performed a series of in-line inspections (ILI) using ILI tools, underwater inspections using remotely operated vehicle (ROV) as well as aerial inspection on both pipeline crossing at the Straits (on shore and below the water surface).

- ILI

Enbridge has been conducting ILI using ILI tools at regular intervals at Straits crossings. There are a launch trap and a receiving trap at north shore and south shore of the Straits, respectively, for the ILI, i.e., the ILI will cover the pipelines located both on shore and below the surface of the water. Table 1 below shows the ILI history performed by Enbridge Energy, Limited Partnership at the Straits of Mackinac over the years with the most recent geometry and metal loss inspections at both crossings being performed in 2013.

All the documents relating to the ILI and findings obtained are available, either in electronic format or in hardcopies. Considering that the volume of the documents/reports accumulated from

the ILI runs over the years is quite large, only the reports from the two latest inspections are provided as they describe the most current condition of the asset. If it is felt that additional reports are needed, the rest of reports from other historical inspections may be provided.

Table 1 ILI History on Line 5 Straits of Mackinac

Inspection Segment	**ILI Tool Type**	
	Geometry	**Metal Loss**
Straits of Mackinac - East	1987 TDW Caliper Survey 1998 Enduro-Caliper 2003 Ctool 2003 BJ Inertial Geometry (Geopig) 2005 BJ Inertial Geometry (Geopig) 2008 GE CaliPPer™ 2013 BH Geopig	1991 Linalog LR MFL 1998 PII - MFL HR 2003 GE-PII MFL 2008 GE-PII MFL 2013 GE MFL3
Straits of Mackinac - West	1987 TDW Caliper Survey 1998 Enduro-Caliper 2003 Ctool 2003 BJ Inertial Geometry (Geopig) 2005 BJ Inertial Geometry (Geopig) 2008 GE CaliPPer™ 2012 Rosen Caliper 2013 BH Geopig	1991 Linalog LR MFL 1998 PII - MFL HR 2003 GE-PII MFL 2008 GE-PII MFL 2013 GE MFL3

The two crossings have been regularly inspected using ILI tools over the years. There are no features that meet excavation criteria reported to date. Note that two corrosion validation digs were executed in 2009 following the 2008 ILI run on the West crossing. Shallow corrosion features were found at ILI tool called area. The field non-destructive examination (NDE) reports of these two digs are provided in the folder titled "C1".

- ROV Inspections

In addition to the ILI at the Straits, Enbridge also employs ROV for underwater inspections to examine the span conditions and the anchor support conditions etc. at the below water surface segments of the two crossings at regular intervals. Table 2 below shows the underwater ROV inspection history performed by Enbridge Energy, Limited Partnership at the Straits of Mackinac over the years with the most recent ROV inspections at both crossings being performed in 2012. Also shown in Table 2 are the follow-up actions after the ROV inspections.

All the documents relating to the ROV inspections and findings obtained are available. Considering the large volume of the documents accumulated from the ROV inspections and the huge sizes of the videos taken during the inspections over the years, only the reports and videos from the most recent inspections (2012) are provided as the sample documents/videos. If it is felt

that additional documents/videos are needed, they may be provided but please note that they represent hundreds of gigabytes of information.

Table 2 ROV Inspection and Span Support Installation History of Line 5 Straits of Mackinac

Year of ROV Inspection	**Follow up Actions (Anchor Support Installation)**	**Type of Support Installed**
1963	None	
1972	None	
1975	3	Grout Bags
1979	None	
1982	None	
1987	7	Grout Bags
1989	None	
1990	None	
1992	6	Grout Bags
1997	None	
2001	8	Grout Bags and mechanical support
2003	16	Mechanical Screw Anchors
2004	16	Mechanical Screw Anchors
2005	14	Mechanical Screw Anchors
2006	12	Mechanical Screw Anchors
2007	None	
2010	7	Mechanical Screw Anchors
2012	17	Mechanical Screw Anchors

- Aerial Line Patrols

Moreover, in compliance with the requirement by PHMSA and by following Enbridge operations and maintenance manual, Enbridge personnel perform aerial line patrols along the pipeline route at regular intervals at the Straits. The interval for aerial line patrol at Straits is bi-weekly, and not to exceed 3 weeks. The air patrols are another means to confirm the physical integrity of the pipelines of the Straits of Mackinac.

All of the documents to which this response refers are located on the data portal in the folder titled "C1".

2. *When was the last inspection of the physical integrity of the entire length of the pipelines completed? To the extent not already addressed in response to the preceding question, please document the timing, methods, results of the inspection and any actions taken by Enbridge as a result of the inspection.*

Response: Please see the response to the previous request.

3. *Please provide copies of any photographs, films, video recordings and in-line inspection data of the pipelines obtained by or for Enbridge.*

Response: Please see the response to information request A1d.

4. *Does Enbridge currently have an established plan, procedure, or schedule for inspection of the physical integrity of the pipelines at regular intervals? If so, please explain and document it, including the methods, timing and supporting rationale.*

Response: Enbridge Energy, Limited Partnership currently has comprehensive plan and procedures established by way of a Pipeline Integrity Management System for the inspection of the physical integrity of the pipelines at regular intervals, which meet and exceed regulatory requirements such as Code of Federal Regulations (CFR) 49 Part 195, Transportation of Hazardous Liquid by Pipeline. As shown below, Enbridge employs three methods for the inspection of the physical integrity at the Straits.

- In-Line Inspections (ILI):

  The ILI re-inspection intervals at the Straits are every 5 years, which is in line with the requirements of the re-inspection interval in CFR 49 for the liquid pipeline in high consequence areas. Re-inspection intervals are evaluated following each ILI to ensure adequate inspection frequencies are applied to manage identified threats. The most recent ILI runs at Straits were conducted in 2013 and the next ILI runs will be performed in 2018.

- Remotely Operated Vehicle (ROV):

  The re-inspection interval using ROV at the Straits is every two years, which was determined based on the span growth study performed by Enbridge in 2004 and also is included in the annual long range budgeting and inspection planning activities. The most recent ROV inspections at Straits were performed in 2012 and the next ROV inspections will be conducted in 2014.

- Aerial Line Patrols:

  In compliance with the requirement by PHMSA and by following Enbridge operations and maintenance manual, Enbridge personnel perform aerial line patrols along the pipeline route at regular intervals. The interval for aerial line patrol at Straits is bi-weekly, and not to exceed 3 weeks.

5. *When Enbridge learns of a potential problem with a segment of the pipelines (an anomaly or some other concern), how does Enbridge calculate the risk of a spill or leak? Please explain and document the method(s) used by Enbridge to assess such risks. At what point is that risk judge high enough by Enbridge to warrant some sort of follow-up? At what point is that risk judge high enough to warrant shutting down operation of the pipeline until the problem can be resolved?*

Response: The Straits crossing is regularly inspected by Enbridge Energy, Limited Partnership, using both remote operated vehicles (ROVs) and state-of-the-art in-line inspection (ILI) tools. The ROV inspections are extraordinary, both in their frequency and thorough look at the exterior of the pipe and its immediate environment. In-line tool runs are also looking for any risk factors. In addition to the inspections, Enbridge is continually implementing initiatives and activities in integrity, safety and operations.

Enbridge also routinely collects data on current, flows and temperature conditions in the Straits. In recent years, valves and other facilities on each side of the Straits have been upgraded.

ROV external inspections are conducted every 2 years. The most recent took place on in 2012 and are scheduled to take place again during the summer of 2014. Internal inspections take place at least every five years.

When Enbridge learns of a potential problem, such as an ILI-reported feature, Enbridge will calculate the potential of risk of a spill or leak using fitness for purpose (FFP) methods such as AGA Pipeline Research Committee, Project PR-3-805, "A Modified Criterion for Evaluating the Remaining Strength of Corroded Pipe", as listed in the references of Code of Federal Regulations (CFR) 49 Part 195, Transportation of Hazardous Liquid by Pipeline.

After an ILI, for example a corrosion ILI, the failure pressures of the reported features are calculated. The safety factor of each feature is also calculated by comparing the calculated failure pressure with the pipeline maximum operating pressure (MOP). If the calculated safety factor for a feature is below the industry commonly established safety level, the safety factor is maintained through operating pressure reduction at the feature location. Features, which meet excavation criteria, will be excavated and assessed through non-destructive examination (NDE) in a timeline according to the feature safety factor level and feature severity. The field NDE is used in validation of the ILI measurement. This validation provides the basis for any further actions related to pipeline operation, pipeline repair and any other program learnings. These learnings would be applied to the entire current data set or any other applicable data sets that have been completed on the Enbridge system.

Based on historic and recent ILI, there have not been any leak or rupture threats identified on the two segments of pipeline crossing the Straits. As described in the response to Question 1 in this subsection, Enbridge has conducted field assessment to validate ILI results and assess reported shallow corrosion features.

In high risk areas, focus projects are executed to evaluate the risks of a spill or leak. The Straits has been identified by Enbridge as a Top Risk area and as a part of this analysis secondary reviews of the ILI information and all possible mitigations to manage the risk have been reviewed.

To date, as confirmed by multiple ILI's, no pipeline repairs have been required within the Straits, demonstrating that the pipeline designs have been performing exceptionally well. There is a low susceptibility to internal corrosion due to clean commodities and a "self-cleaning" flow rate. There is a very low likelihood of corrosion on the external surface of the pipe due to the combination of the enamel coating applied during original construction and the application of cathodic protection which has been in place since the line was first in operation. Back to back ILI's have confirmed that there was no damage from installation or any type of physical impact damage while in operation that are in any way a threat to the integrity of the pipeline or which require repair. The ILI's conducted across the Straits of Mackinac are sensitive enough to identify minor variations in pipe surface contour which are a typical, and acceptable, aspect of seamless pipe construction and are benign to the integrity of the pipe. Long-seam cracking is not an issue in the pipes through the Straits as this portion was constructed with seamless pipe. Further, the two parallel 20-inch lines allow Enbridge to have operated the lines over the years at approximately 25% of their Maximum Operating Pressure. This is a very low pressure compared to the capability of the pipelines or, in other words, it results in a large safety factor well over and above the design capability of the pipelines. In summary, as confirmed through the regular and ongoing integrity inspections through the Straits of Mackinac, there have been no integrity threats affecting the pipe over the more than 60 years of operation.

The east and west legs are also regularly inspected by divers and/or remote operated vehicles to identify and measure unsupported spans, damage to the external coating and support systems, etc. Since construction Enbridge has employed a span management program, monitoring the length of unsupported spans and repairing as necessary.

6. *Does Enbridge notify any government agency of its inspections and report the results of the inspections to the agency? If so, please explain and document such notifications and reports.*

Response: There is no requirement to do so, so Enbridge does not notify any regulatory agency of its inspections nor the results of those inspections. PHMSA requires that Enbridge (and all other liquids pipeline operators) have an Integrity Management Plan that complies with 49 CFR Part 195, and PHMSA conducts regular audits of that Plan to ensure it complies with regulation. The only possible notifications related to pipeline inspections that might be required: (1) if an inspection discovers a condition that is otherwise reportable under 49 CFR Part 195, then Enbridge would comply with that regulatory requirement and handle the condition as required; (2) if a technology other than in-line inspection, pressure testing, or external corrosion direct assessment is used to evaluate the pipe's integrity; or (3) relates to variances from the five-year inspection frequency regulation (49 CFR §195.452) for high consequence areas, but Enbridge has not had to request such a variance for the Straits, as its inspection interval is far more rigorous than required by regulation. However, Enbridge does engage in a comprehensive public outreach program that keeps local and state governmental officials and other affected stakeholders informed as to Enbridge's activities, especially if Enbridge conducts any work in a particular jurisdiction as a result of the inspections.

D. Pipeline Leak Prevention, Detection and Control

1. *Since the pipelines were constructed, has any oil or other substance ever leaked out of them or been released into the environment? If so, please identify and document, for each such leak or release, if any, (a) when and where it occurred, (b) how it was detected, (c) the type and quantity of the substance(s) involved, (d) whether and to whom it was reported, and 9e) what if any actions were taken in response to the leak or release.*

Response: No. The pipelines crossing the Straits have not experienced any releases.

2. *Please identify, describe in detail and document all methods, procedures and devices currently used by Enbridge to prevent, detect and control potential leaks or releases from the pipelines. Please explain and document the supporting rationale for them and why Enbridge believes they are sufficient given the unique risks presented by the location of the pipelines.*

Response: The Straits of Mackinac have been specifically identified by Enbridge as a high consequence area (HCA) that poses special risks and concerns for pipeline operations. The section of Line 5 that runs under the Straits of Mackinac is correspondingly protected by multiple redundant methods, procedures and devices, which are designed and optimized to prevent the release of hydrocarbons into the environment and mitigate the magnitude of a release in the unlikely event of a pipeline failure, and the pipeline would not be restarted until field verification has confirmed there is no release.

Pipeline Design

The design of the section of Line 5 that runs through the Mackinac Straits is the primary method used to address the enhanced consequences of pipeline failure in this environmentally sensitive area. Line 5 splits into two heavy walled parallel pipes before entering the Straits and recombines within Mackinaw pump station located on the downstream bank.

Both lines running under the Mackinac Straits are also protected by local low pressure shutdown logic that will initiate a cascade shutdown of Line 5 and isolate the lines under the Straits in the event that a leak in either line creates a low pressure condition. This system, combined with the strategic placement of downstream backflow check valves, will reduce the maximum volume of oil lost after the system is isolated to the volume contained within one of the two pipes.

Computational Pipeline Monitoring (CPM)

Line 5 is protected by a computer-based pipeline monitoring system that utilizes measurements and pipeline data to detect operational anomalies that indicate possible leaks. This system employs a sophisticated computer model of Line 5 to compare the expected pressures and liquid flow rate in each section of the line to the actual measured pressures and flow rate. Discrepancies between the expected and actual values result in a leak alarm that precipitates the shutdown of the line.

Flow and pressure measurement exists upstream and downstream of the Straits to ensure the CPM system is equipped with appropriate pipeline operational data that may indicate a leak.

Supervisory Control and Data Acquisition (SCADA)

Line 5 is remotely controlled and monitored using a Supervisory Control and Data Acquisition (SCADA) system. The system is designed to remotely control the line, detect anomalies, issue controller alarms, and initiate a station shutdown or line stop when allowable operating limits are exceeded or logical arguments fail.

Examples of SCADA controller alarms include:

- Explosive vapor alarms;
- Pump seal failure alarms;
- Equipment vibration alarms;
- Station fire alarms.

Examples of SCADA initiated station shutdown or stop line commands include:

- High pressure limits;
- Low pressure limits;
- Unintentional valve closures.

Line Balance Calculations

Line balance calculations compare the volume of oil injected into Line 5 with the volume of oil delivered from line 5 to identify unexpected losses of oil that would indicate a leak. Line balance calculations are performed every 2 hours using both 2 hour and 24 hour balance intervals. The 2 hour balance interval will be considered a leak trigger when the injected volume over the 2 hour period exceeds the delivered volume by 400 m3. The 24 hour balance interval will be considered a leak trigger when the injected volume over the 24 hour period exceeds the delivered volume by 400m3.

Line balance leak triggers will result in an additional line balance calculation that is performed over a 10 minute interval. If the volume of oil injected during this interval exceeds the amount of oil delivered by a 10 percent margin, the line will be shut down, sectionalized and isolated.

Controller monitoring

Line 5 is monitored 24/7 by highly trained and qualified Enbridge employees located in the Edmonton Control Center. Controllers are trained to monitor the operating parameters of the line and react to: operational anomalies; CPM alarms; discrepancies in line balance calculations; SCADA alarms; SCADA station shutdown commands; and SCADA stop line commands.
Controllers continuously monitor SCADA data to identify the pipeline leak triggers itemized in the lists below.

Pipeline leak triggers from the upstream side of a suspected leak site include:

- Sudden drop in upstream discharge pressure;
- Sudden change in upstream control valve throttling or pump speed;

- Upstream unit(s) shut down (or lock out) in combination with a sudden drop in upstream discharge pressure and/or a sudden change in upstream control valve throttling (or a sudden change in percentage VFD control);
- Sudden increase in upstream flow rate.

Pipeline leak triggers from the downstream side of a suspected leak site include:

- Sudden drop in downstream suction pressure;
- Sudden change in downstream control valve throttling or pump speed;
- Downstream unit(s) shut down (or lock out) in combination with a sudden drop in downstream suction pressure and/or a sudden change in downstream control valve throttling (or a sudden change in percentage VFD control);
- Sudden drop in holding pressure at a delivery location;
- Sudden decrease in downstream flow rate.

Controllers also consider alarms from the CPM system and line imbalances that exceed the line balance thresholds from the line balance calculations as independent leak triggers.

When three or more active leak triggers occur, the line is immediately shutdown, sectionalized and isolated.

When one or two leak triggers are identified, the controller has 10 minutes to analyze the information and conclusively rule out the possibility of a leak. If the possibility of a leak cannot be irrefutably ruled out within 10 minutes of the first leak trigger being identified, then the line is shutdown, sectionalized and isolated

Facility Inspections and Aerial Patrols

The Line 5 right of way, including the Mackinac Straits, and the North and South banks of the Straits where Line 5 enters and exits the water, are patrolled by air once every two weeks. The facilities, most notably the North Straits Valve Site and Mackinaw Station, are frequented by Enbridge Field Staff and formally inspected at least twice a year (more often 4 times a year).

Acoustic Inline Inspection (Smart PIGS)

Enbridge also periodically makes use of Acoustic Inline Inspection tools (Smart PIGS). In addition to a comprehensive Integrity Management plan, the application of acoustic inline inspection tool technology helps detect anomalous acoustic activity associated with pipeline leaks. In essence, the smart PIGS are tuned to 'listen' for leaks. This method has detection thresholds well below that of real-time software based methods, and as such can be used to augment visual and other inspection methods to periodically confirm the integrity of the pipeline.

For additional information about Enbridge's pipeline control and leak detection systems, please see the information on the data portal in the folder titled "D2 – D6".

3. *For each method, procedure or device used by Enbridge to detect a potential leak, please explain and document how a leak would be distinguished from a column separation.*

Response: All alarms and leak triggers (including column separation) generated by Enbridge leak detection systems and all leak triggers identified by Enbridge controllers are assumed to be leaks until they are conclusively proven otherwise.

If column separation is suspected, Enbridge has comprehensive controls, tools and procedures in place to validate the existence of the column separation and calculate the volume of oil required to fill the column before a restart is attempted. The column separation tool utilizes the elevation profile of the line, line geometry, line pressures, product density, and projected flow rate to validate the presence of the column separation and calculate the amount of time required to fill the column separation. Fill times in excess of 10 minutes require the approval of a senior Control Center administrator before column fill can begin. Fill times in excess of 30 minutes are rare, and require the approval of the vice president of Pipeline Control before column fill can begin.

The controls described in the previous paragraph are designed to predict the volume of the column separation before any attempt to restore the column is made to reduce the risks associated with a column separation and a leak existing in the same vicinity in a pipeline.

It is important to note that column separations form around the highest elevation points on a pipeline. In contrast, the line that runs under the Mackinac Straits is the lowest elevation point on Line 5. The section that flows under the Mackinac Straits is **not prone** to material column separation due to the elevation profile of the line. In rare cases, very minor column separation may occur across the Straits when the line is isolated using the upstream and downstream valves and the product in the line cools and reduces in volume. When this occurs, the column closes immediately after the upstream valves are opened and the pipelines under the Straits are pressurized by the upstream product in high elevation sections of the line.

For additional information about Enbridge's pipeline control and leak detection systems, please see the information on the data portal in the folder titled "D2 – D6".

4. *For each method, procedure or device used by Enbridge to detect potential leaks or releases, please identify and document its sensitivity or limits, i.e., the smallest quantity or rate of loss that it can detect. Given the limits of Enbridge's leak detection methods, what quantity of oil or other substances could be released from the pipelines without detection each day if the pipelines were operating at (a) full capacity, and (b) the average rate of operation over the last year?*

Response: Enbridge employs overlapping leak detection methods to identify leaks and alert the controller. Our CPM system and our line balance calculations are the two methods with defined sensitivity limits. Leaks that fall below the thresholds for these two systems will rely on other methods of detection, including: surveillance, inline and facility inspections, aerial patrols, and third party/employee reports.

The quantity of oil that could be released without being detected by the CPM system or line balance calculations is approximately 400m^3/day (~3350 bbls/day.) This unlikely scenario assumes that the other overlapping leak detection do not alert the operator of the release.
The following leak detection methods have defined sensitivity limits, and are used as part of Enbridge's overlapping leak detection strategy on line 5.

Computational Pipeline Monitoring (CPM)

The Enbridge CPM system monitors for leaks over multiple time windows, and is compliant with the industry standard API 1130, *Computational Pipeline Monitoring for Liquids*. Volume balance calculations are based on pipeline sections bounded by flow meters. The CPM continuously calculates imbalances between the expected product amount in a pipeline section and the CPM measured amount. Imbalance thresholds are assigned that address measurement and modeling uncertainty. A CPM imbalance alarm is activated when the imbalance threshold is exceeded. There are three volume balancing windows that are used on Enbridge's pipelines to monitor for different sizes of leaks: 5-minute, 20-minute and 2-hour windows. By evaluating material balances for three different time periods, the CPM is capable of detecting leaks of different sizes in an effective manner.

Enbridge uses techniques described in the industry standard, API 1130, to evaluate CPM performance in the three windows. The flow rate provided, 3,782 m3 (~24,000 bbls) per hour is approximately the operating capacity of the line. The average annual flow rate, 3,580 m3 per hour is lower, as the average accounts for periods of pipeline shutdown. The volume out at the reduced flow rate would not be materially different. The Enbridge leak detection system consists of multiple and sometimes overlapping volume balance segments bounded by flow meters. In particular, the volume balance segment that protects the Straits is captured in the table below.

		Average performance m^3 (% of nominal flow rate)		
Summary of Line 5 Leak Sensitivity	*Nominal Flow Rate (m3/hr)*	*5 min alarm window threshold*	*20 min alarm window threshold*	*2 hr alarm window threshold*
North Straits to Indian River segment	3,782	88 (28%)	164 (13%)	378 (5%)

Line Balance Calculations

The leak detection sensitivities for the line balance calculations based on the nominal flow rate of 3,782m^3/hr are listed in the table below.

Interval	Nominal Interval Flow (m^3)	Detection Threshold (m^3)	Sensitivity
2 Hour	7,564	400	5.3%
24 Hour	90,768	400	0.4%

For additional information about Enbridge's pipeline control and leak detection systems, please see the information in the folder titled "D2 – D6".

5. *Please describe in detail and document (a) the number, location and training of Enbridge or contract personnel responsible for continuously monitoring the operation of the Straits pipelines and leak detection methods or devices, and (b) the procedures followed in the event a potential leak or release is detected.*

Response: Line 5 is controlled and monitored 24/7 by one of ten fully qualified Enbridge Controllers specifically trained to operate Line 5 – including the portion of the line that runs

through the Mackinac Straits HCA. The Line 5 controller is continuously supported 24/7 by a Leak Detection Analyst, Senior Technical Advisor, Shift Supervisor, as well as on-call support provided by a senior administrator and a support engineer.

Controllers are trained to operate Line 5 by completing a comprehensive training program that includes instructor led training, web-based training, simulations, and extensive on-the-job experience. Controllers are trained to monitor the operating parameters of the line and react to: operational anomalies; leak triggers, CPM alarms; discrepancies in line balance calculations; SCADA alarms; and SCADA station shutdown commands.

Controller Qualification

Line 5 controllers are qualified to operate the Line 5 console after the following conditions have been met:

1. Completion of all learning objectives/competencies defined in the Line 5 training curriculum;
2. Completion of all Line 5 proficiency checklists;
3. Consistent demonstration of the ability to follow the Line 5 governing procedures and best operating practices;
4. Successful completion of Line 5 emergency response training;
5. Successful completion of the Line 5 console readiness assessment conducted by a qualified Line 5 mentor;
6. Successful Operator Qualification (OQ) assessment conducted by qualified Senior Technical Advisor for OQ-covered tasks.

Controllers must successfully complete annual emergency response training and must also complete an OQ re-assessment every three years to maintain their qualification.

Leak Detection Analyst Training

Enbridge has one leak detection analyst on shift 24/7 within the Enbridge Control Center. This Leak Detection Analyst is responsible for the analysis of CPM based leak detection alarms. Leak Detection Analysts undergo a comprehensive training and certification program before being qualified. Leak Detection Analysts are supported by Leak Detection Engineers who are on call 24/7 to provide additional assistance when required.

Semi-Annual Team Training

Controllers, Senior Technical Advisors, Shift Supervisors, Leak Detection Analysts, and on-call Administrators are required to participate in semi-annual (fall and spring) training sessions that involve topics relating to lessons-learned, team training, human factors, and simulator based emergency response scenarios.

Leak/Release Procedures

The procedure followed when a leak is suspected is described in the response to question 4.

In the event a release is confirmed, Line 5 will be shut down, sectionalized and isolated. Control room staff will notify emergency responders and regional management – who are responsible for reporting the release to the appropriate regulatory bodies and coordinating the containment and clean-up effort.

For additional information about Enbridge's pipeline control and leak detection systems, please see the information on the data portal in the folder titled "D2 – D6".

6. *Please describe in detail and document the automatic shut-off valve system currently used by Enbridge for the Straits pipelines including the location of the valves, the condition(s) that trigger a shut-off, the amount of time that elapses between the triggering condition and the full shut-off of product at the valve locations. Given the time required to activate the shut-off valves and the location of the valves, what quantity of oil or other substances present in the pipelines between the valves could be released from the pipelines in the event of a leak, if the pipelines are operating at (a) full capacity, and (b) the average rate of operation over the last year? Has Enbridge estimated or obtained an estimate of how widely such quantities of oil could spread in the water before spill response personnel could arrive at the scene and actually implement spill containment measures? If so, please provide copies of all documents relating to that subject.*

Response: Line 5 (Straits of Mackinac) employs low pressure logic whereby valves are automatically closed if pressure levels fall below specific limits (65 psi on West Valve NO-2-V-2 (1475.62W) and 45psi on East Valve NO-1-V-2 (1475.62E)) in addition to the leak detection methods deployed (see response to 2). Given that sufficient leak indications are present, the line 5 automatic shut-off valves require approximately 3 minutes to close.

Flow rate	3 min closure time
Average (500,000 bpd)	5,637
Full capacity (574,000 bpd)	5,793

In addition to the Tactical Response Plan provided in response in other information requests, Enbridge has modeled how widely quantities of crude oil could spread before spill containment measures could be implemented; the response plans and the modeling were compared, and the response plan addresses all areas where oil may flow following a release on the Straits so that the response is fully prepared to address all contingencies.

For additional information about Enbridge's pipeline control and leak detection systems, please see the information on the data portal in the folder titled "D2 – D6".

E. Contingency Planning and Spill Response

1. *Please identify and provide a copy of all contingency plans currently in use by Enbridge and applicable to the Straits pipelines that describe how Enbridge would respond to a spill or leak of oil or other substances from those pipelines. Have such plans been approved by the Pipeline and Hazardous Materials Safety Administration, the U.S. Coast Guard, or any other governmental agency?*

Response: Enbridge has included on the data portal in the folder titled "E1 – E3" the 2013 PHMSA-approved Integrated Contingency Plan ("ICP") and supplementary Tactical Response Plan

for the Superior Region and Straits pipelines. The ICP was drafted in 2013 and underwent an extensive, first ever PHMSA coordinated peer review, which incorporated United States Coast Guard, U.S. EPA, independent third party industry expert: Det Norske Veritas, Canadian National Energy Board with PHMSA facilitating the final approval. Comments were collected by PHMSA, changes made, and final approval was issued in June 2013.

Enbridge adopted the best practice of an Emergency Response Action Plan (ERAP) as a way to provide a full, transparent view of our emergency response plan without compromising security of our assets. You will see in the attached documents the ICP for the Region that is responsible for the Straits pipelines along with the "for public use" Emergency Response Action Plan. It should be noted that the ICP is not for public use since it contains Transportation Security Administration (TSA) deemed security items and should not be released.

The plans have been shared with local municipalities, U.S. Coast Guard ("USCG") Sector Sault Ste. Marie, contracted Oil Spill Removal Organizations, and other stakeholders. Mr. Steve Keck, Contingency Preparedness Specialist from Sector Sault Ste. Marie has been engaged with Enbridge for the past several years. He has a physical copy of the tactical response plan and his responsibility includes maintaining the Area Contingency Plan issued by the USCG.

Plans are currently underway to conduct a USCG Area PREP full-scale exercise in September, 2014, that includes the USCG, US EPA, local county emergency managers, MI DEQ and many other stakeholders at Indian River with a focus on containment and common operating picture. Both PHMSA and the National Energy Board will be invited to attend.

Finally, Enbridge has voluntarily accepted the National Preparedness for Response Exercise Program ("PREP") as the guide for emergency response exercises. The PREP guidelines are the minimum and Enbridge strives to exceed the minimum number of exercises each year.

2. *How, if at all, do the contingency plans for the Straits pipelines differ from those applicable to the remainder of Enbridge's Line 5 and specifically address the unique risks presented by the Straits pipelines?*

Response: The supplemental Tactical Response Plan ("TRP") for the Straits pipelines was created as an industry best practice above and beyond what regulations required. This plan is specific to the Straits pipelines and addresses detailed response strategies for emergency responders to use. With the Straits being recognized as a high impact/consequence site, Enbridge has created the plan to mitigate the risks of an incident by pre-planning tactics, equipment requirements, personnel needs, etc.

The TRP augments existing control point mapping that Enbridge has established for decades. Control points are verified after each equipment deployment exercise and at least once every three years outside of exercise conduct. For additional information, please see the Straits response plan on the data portal in the folder titled "E1 – E3".

3. *How many Enbridge employees or contract personnel are directly responsible for responding at the site of a spill or leak from the Straits pipelines? Where are they located and how long would it take for them to arrive at the scene?*

Response: Enbridge is unique in that we have our own Tier 1 first response equipment for oil releases. Our Spill Management Teams are located throughout the regions that would respond to the Straits pipelines (upwards of 200 responders in Superior region and 150 responders in Chicago region). As you can see in the ICP we have GPS mapped average response times for company and contracted personnel based on speed limits and no inclement weather conditions. In addition, our SMTs have a comprehensive training syllabus that they adhere to. This training includes operations of skimmers, boom deployment, HAZWOPER and a range of other tactical courses for emergency response.

Company field personnel would be immediately dispatched to an incident from the closest positions and then progressively further away depending on the scope of the incident and person-power needed.

Below are the estimated response times for Enbridge responders in Superior and Chicago regions (from Annex 1, Response Time Maps *Enbridge Manned Station Travel Time Coverage Overview and Enbridge Response Trailer and Manned Station Maps)*:

Superior		
STATION	**TYPE**	**RESPONSE TIME TO STRAITS***
Mackinaw	Manned with Trailer	0 – 1 hours
Gould City	Manned with Trailer	0 – 1 hours
St. Ignace	Trailer	0 – 1 hours
Indian River	Manned with Trailer	0 – 1 hours
Manistique	Manned with Trailer	1.5 hours
Rapid River	Manned	3.5 hours
Escanaba	Manned with Trailer	3.5 hours

*One hour is to be added for notification and deployment.

Chicago		
STATION	**TYPE**	**RESPONSE TIME TO STRAITS***
Louiston	Manned	2 – 3 hours
Bay City	Manned	3 – 4 hours
North Branch	Trailer	4 – 5 hours
Marysville	Manned with Trailer	4 – 5 hours
Howell	Trailer	4 – 5 hours
Stockbridge	Manned	4 – 5 hours
Marshall	Manned with Trailer	4 – 5 hours

*One hour is to be added for notification and deployment.

Below are the estimated response times for contractors (from Annex 1, Response Time Maps):

Superior Contractors		
ORG	**TYPE**	**RESPONSE TIME TO STRAITS***
Marine Pollution Control	Response Personnel, Trailer & additional equipment (listed in ICP, Annex 2 Notifications)	4 – 5 hours

Chicago Contractors		
ORG	**TYPE**	**RESPONSE TIME TO STRAITS***
Clean Harbors	Response Personnel, Trailer & additional equipment (contact information listed in ICP, Annex 2 Notifications,)	6-7 hours

Enbridge has implemented a robust incident management system that operates under the Incident Command System (ICS). Our regional Incident Management Teams (IMT) are trained to ICS 100, 200, 300 and 320. They have position specific training to the different roles in ICS. Once field personnel are on scene or information is garnered from public safety personnel, the regional IMTs would be activated accordingly.

In addition to company personnel, Enbridge has a response agreement in place with Marine Pollution Control (MPC) out of Detroit for Oil Spill Removal Organization duties. MPC is the preferred contractor for the USCG for oil spills in the Straits area.

The document titled "*MPC WCD Response Times*" depicts equipment and estimated response times for MPC and their affiliates. Enbridge has also provided a document reflecting the Enbridge manpower in the area of the Straits. Enbridge has a technician living near the Mackinaw station (on the south side of the Straits), another approximately 35 miles south of the Mackinaw station, and two approximately 90 miles west of the Straits. For additional information, please see the Straits response plan on the data portal in the folder titled "E1 – E3".

4. *Under Enbridge's currently applicable contingency plan, please explain and document (a) what is the worst case discharge or spill? (b) how much would it cost to clean up a worse case discharge or spill? And (c) how long would it take to clean up a worst case discharge?*

Response: (a) The estimate for the worst-case discharge at the Straits is 8,583 barrels, which takes into account pipe elevation as opposed to flat ground elevation. The responses to (b) and (c) are contained on the data portal in the folder titled "E4".

F. Compliance with Easement Terms

1. *Please provide written documentation that Enbridge is currently in full compliance with all terms and conditions of the April 23, 1953 "Straits of Mackinac Pipe Line Easement" granted by the State of Michigan to Lakehead Pipe Line, Inc., Enbridge's predecessor in interest.*

Response: The easement contains 13 requirements related to the design, material specifications, construction and operation of the Straits pipelines. Enbridge refers to all of the documentation that is being provided with these responses as well as information in the cover letter to evidence that Enbridge currently meets all of the requirements embodied in the specifications contained in the easement.

The easement also specifies a requirement to maintain minimum unsupported span lengths of 75 feet. The peer-reviewed engineering calculations in 1953, which were reconfirmed by external specialists in 2002-2004 (JP Kenny) and 2003-2005 (Keifner and Associates), indicated the pipelines would be safe with unsupported spans across the bottom of up to 140 feet, It is believed that the State of Michigan set an initial span length in 1953 of 75 feet, as an added safety factor as it was difficult to inspect the line in the 1950s and ensure adequate supports were in place. With the advent of ROV submersibles, Enbridge employed this technology for regular monitoring of the crossings. In 2002, to address currents and potential washouts, Enbridge began installing screw anchor pipe supports. The anchors are ten-foot-long steel screws that are augured into the lake bed on either side of the lines and hold a steel saddle that permanently supports the lines. In the 12 years since installation of the screw anchors, Enbridge has yet to observe any wash out of those very durable supports.

Such an inspection is planned for 2014 using an Autonomous Underwater Vehicle and it will e completed later in the year. The last underwater inspection of the line was completed in 2012. Based on the previous multiple inspections, and a desire to reduce risk even further, Enbridge has stepped up its program for installing screw anchors with an expectation that upon completion of the 2014 program and inspection, it will not only ensure meeting the 75-foot span requirement in the easement, but provide an average unsupported span length of less than 50 feet which represents a "three times" safety margin. Overall, today's supports of the pipeline spans is far superior to those employed during the construction and initial operation of the pipelines.

G. Access to Enbridge Records Under the Easement

1. *To the extent not already provided in response to the questions and requests for information above, the State of Michigan requests, pursuant to Section I. of the Easement, copies of or the opportunity to inspect Enbridge's records of oil or any other substances being transported in the Straits pipelines, as well as inspection reports covering the automatic shut-off and check valves and metering stations used in connection with those pipelines.*

Response: For a list of valve inspections used in connection with the pipelines, please see the spreadsheet provided on the data portal in the folder titled, "G1". There are no metering stations at the Straits of Mackinac. Additionally, records relating to oil type and quantity were provided in response to a previous request.