



ONTARIO ENERGY BOARD

IN THE MATTER OF the Ontario Energy Board Act, 1998, S.O.1998, c.15, Schedule B;

AND IN THE MATTER OF an Application by Pembina Infrastructure and Logistics LP for a permit to drill hydrocarbon injection and withdrawal wells within the vicinity of the Moore 3-21-XII Designated Storage Area and to expand the storage capacity at the Corunna Storage Terminal (the "Application");

AND IN THE MATTER OF Ontario Energy Board File Number EB-2015-0032

**Responses of Pembina Infrastructure and Logistics LP ("Pembina")
to the Ontario Ministry of Natural Resources and Forestry's ("MNR") Request for
Additional Information**

Interrogatory #2 – Additional Information

Question/ Request:	a) Will you confirm that s. 12.0: Risk Assessment in the Application does not address the requirements of s. 7.1 <i>Risk Assessment</i> and the related requirements of s. 7.2 <i>Assessment of Neighboring Activities</i> of CSA Z341? b) What aspects of sections 7.1 and 7.2 of CSA Z341 cannot be conducted at this time in light of the Applicant's stated reason for non-completion of a risk assessment, being: "As business demands will determine the product and flow rate required in each cavern, a risk assessment cannot be performed until this information is confirmed."
Response:	a) Section 12.0 Risk Assessment in Pembina's Application does not at this time fully address all of the components s. 7.1 and s. 7.2 of CSA Z341. Pembina's response was originally written to show the process that Pembina undergoes for each individual cavern in relation to specific Hazard and Operability Study ("HAZOP") analyses as part of the design process. The HAZOP method provides a means of systematically reviewing the design and operation of a system to identify potential hazards and/or operability problems. It focuses on how a process may deviate from the design intent, and draws on the expertise of the team members and their past experience with the design and/or operations of similar facilities. Additionally to the HAZOP, Pembina has begun to undertake development of a Hazard Risk Matrix ("Risk Matrix") to determine the potential risks associated with the conversions of the brine caverns to hydrocarbon storage as detailed in the Application. Pembina has requested that Stantec Consulting Ltd. ("Stantec") conduct modeling to assess the consequences and incremental risk associated with proposed additional hydrocarbon storage at the facility. The Risk Matrix will look at hazards associated with the storage caverns, such as the accidental release of flammable liquids, which could potentially result in flash fires, jet fires or vapour cloud explosions. It will document the assumptions, results and conclusions and contains the following major sections: • System Description; • Hazard Identification;



- Source Characterization;
- Consequence Modeling;
- Risk Modeling; and
- Results and Conclusions.

Once complete, the content of this Risk Matrix will address the requirements of s. 7.1 and s. 7.2 in CSA Z341, to the extent these sections can be assessed without specific design criteria for each well. This is again addressed in the HAZOP process, as detailed above.

Additionally and as stated in the Application, Pembina will also do a cavern installation review, which will be designed to meet the requirements of s. 7.1 and s. 7.2 in CSA Z341, for each Proposed Cavern¹. The cavern installation review will include the following:

- Piping has been designed to B31.3 American Society of Mechanical Engineers Code ("ASME Code") and registered with the Technical Standards and Safety Authority;
- ESVs installed on the product and brine lines are designed to American National Standards Institute, and each ESV is stroked quarterly as a minimum to ensure the operation of this safety system;
- The pressure envelope is protected by a redundant pressure sensor system incorporated into Pembina's distributed control system and monitored 24 hours per day (365 days per year) with automatic closure;
- Wellheads are designed to the American Petroleum Institute's Specification for Wellhead and Christmas Tree Equipment (API 6A);
- Brine cavern conversions will follow the CSA Z341 *Storage of Hydrocarbons in Underground Formations* series of standards; and
- Monitoring of the fluid flow into and out of the cavern is recorded.

- b) The statement "As business demands will determine the product and flow rate required in each cavern, a risk assessment cannot be performed until this information is confirmed" from Pembina's Interrogatories response dated May 21, 2015 was intended to point towards the HAZOP in which the specific parameters required to complete the HAZOP are detailed. These parameters include flow, temperature, pressure, product composition and phase.

The HAZOP for each Proposed Cavern will be conducted prior to any introduction of hydrocarbons into the Caverns. Once completed for each Proposed Cavern, Pembina will forward the HAZOP to the Ontario Energy Board and MNR.

¹ After performing an assessment of all 14 Suspended Caverns at the Corunna facility, Pembina identified 11 Suspended Caverns (the "Proposed Caverns") as having good potential for conversion to storage (as further defined on p. 3 of Pembina's Application).



Interrogatory #3 – Additional Information

**Question/
Request:** In light of the fact that there has been no update to the previous geomechanical assessments completed in 1987, 1992 and 1995.

- a) Does the Applicant have a qualified opinion as to the current adequacy of these dated assessments, and if so, can we be provided with that opinion along with the geomechanical assessments?
- b) The Applicant indicates in its interrogatory response that it is “currently exploring options to update the geomechanical assessment.” What are the “options” being explored and when does the Applicant expect a selected option to be completed and implemented?

Response: a) Pembina has engaged the original authors of the geomechanical assessments (the "Assessments") with a view to obtaining a qualified opinion as to the current adequacy of the assessments. As of the date of these responses, we have yet to receive confirmation that such an opinion can be provided. Although we are unable to provide the requested qualified opinion at this time, we will continue to engage qualified consultants with a view to obtaining such an opinion and will provide updates to the Ministry in this regard as it becomes available.

With respect to providing copies of the Assessments, it was brought to our attention by a third party following filing of the Application that the Assessments were obtained by Pembina's predecessor in interest, Dow Chemical Canada Inc. ("DOW"), pursuant to an agreement between Dow and such third party which has operations in the areas surrounding the facility. The agreement provides that Pembina cannot provide the Assessments to a third party without the prior written permission of the third party, among other conditions.

Following the Ministry's request to disclose the Assessments, Pembina promptly engaged in discussions with the third party to obtain the required consent to disclose; however, discussions regarding the disclosure of the Assessments are ongoing. Although we are unable to provide a copy of the Assessments at this time, Pembina continues to make every effort to obtain the required consent with the intention to providing the Ministry with a copy of the Assessments as soon as we are able.

- b) At this time, Pembina's "options" consist of:
 - Engaging the original authors of the Assessments with a view to obtaining a qualified opinion as to the current adequacy of the Assessments; and
 - Pembina contacting Respec Consulting & PB Energy to supply an outline and a quote for an operational and high-level geomechanical assessment of Pembina's Corunna cavern storage facility.

Once Pembina has received and reviewed the qualified opinion and the outline and quote, Pembina will provide an update to the MNR and OEB with respect to the timing of completion and implementation of the selected option.