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July 4, 2006

Mr. Jean Trudelle
Director, Permits and Regulatory Affairs
Rabaska
999 De Maisonneuve West, Suite 1600
Montreal, QC H3A 3L4

Subject: Additional Questions and Comments on the Conformity of the Environmental Impact Statement with the Federal Guidelines

Rabaska Project – Construction of a Liquefied Natural Gas Terminal in Lévis

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Dear Sir,

Last March, as part of the environmental assessment process, we sent you questions and comments on the conformity of the impact statement with the federal guidelines established for the above-mentioned project.

In May, you submitted to us additional information related to the impact statement. The federal departments involved in the environmental assessment of this project have reviewed the information. Please find enclosed a document with their questions and comments. Please note that this list is neither exhaustive nor final, and it is possible that additional information may eventually be requested.

Should you need additional information, do not hesitate to contact me at (613) 948-1787.

Yours truly,

Original signed by

Dominic Cliche
Panel Manager
Canadian Environmental Assessment Agency

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Canada

Encl. (1)
- Additional Questions and Comments on the Environmental Impact Statement Submitted by Rabaska

c.c.
Elizabeth Boivin, Health Canada
Louis Breton, Environment Canada
Annie Déziel, Canadian Environmental Assessment Agency
Steve Lévesque, Fisheries and Oceans Canada
Jasmine Matin, Canadian Transportation Agency
Livain Michaud, Natural Resources Canada
Pierre Michon, *Ministère du Développement durable, de l'Environnement et des Parcs du Québec*
Lucie Pagé, Transport Canada
Marc Pauzé, National Energy Board

Canada

RABASKA PROJECT

ADDITIONAL QUESTIONS AND COMMENTS REGARDING THE ENVIRONMENTAL IMPACT STATEMENT SUBMITTED BY RABASKA

CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY

JULY 4, 2006

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CA-005

Health Canada appreciates the answers of the proponent with respect to noise impact modelling, specifically the additional information given on activities related to drilling and pile driving, as well as Appendix J detailing new noise modelling to be constructed for the years 1 and 2. However, a concern remains with respect to impulse noise related to construction pile driving. The proponent has specified in answer CA-005 that an adjustment for impulse noise was made according to the MDDEP, without specifying the value of this correcting factor.

The tables 3 and 4 of Appendix J showcase the new noise modelling values for the construction work. Let us specify that pile driving is one of the most disturbing activities for the local population, and the schedule in Figure A-7 indicates that this activity will take place over a three-year period, except during the winter months.

Question/Comment:
Health Canada would like to know, with respect to the receptor points 8, 9, 10 and 11, in year 2 of the construction phase (points that absorb medium to strong impacts), the part of the Ldn specified in Column 4 which corresponds to the noise generated by the pile driving and equipment engines (ref. Table 4 of Appendix J, Additional Information to the impact statement, May 2006).

CA-014 to CA-024

General:
Though we are waiting for the site specific seismic hazard report, most of the items have been handled satisfactorily.

Specific Comments:
The consequences of the future changes in EN1473 with respect to the return period of the Safe Shutdown Earthquake (SSE) could be addressed in the site-specific seismic hazard report. Natural Resources Canada would consider carefully any suggestion that the SSE be taken as the 1 in 5000 year ground motions (as suggested for the circa 2007 version of EN1473) instead of the current EN1473 SSE as the 1 in 10 000 year ground motions, provided safety is not compromised. Other Canadian LNG plants in the planning process have proposed to use standards such as CSA Z276 and NFPA 59A but with 1 in 5000 year ground motions for the SSE design. If the level of performance from EN1473 using the 1 in 5000 year ground motions is comparable to those designs, it could be considered acceptable.

CA-015

Acceptable response but waiting for the seismic hazard study.

CA-018

Acceptable response will be further addressed by the seismic hazard study.

CA-018

Waiting for the seismic hazard study.

CA-021

Accepted, but see comment above on standards.

CA-025 to CA-028

The proponent's answers on hydrogeology issues are satisfactory. However, we have the following additional comments on the report entitled *Hydrogeological Characterisation at two Proposed Excavation Sites – Rabaska Project*, done by SNC Lavalin – Environnement (May 2006):

The proponent presents a hydrogeological study for two selected sites: Access road (A) and LNG Storage tanks (B). The objectives of the study are not clearly stated. The applied comprehensive methodology consists of field work (drilling of test and observation wells, groundwater sampling, pumping tests), laboratory analyses, interpretation of pumping tests, and groundwater flow modelling. The linkage between the pumping tests and the numerical simulations is not well explained. Several maps that are important for the comprehension of the study are not presented. The effects of the planned pumping on the domestic wells along the 132 Rd. are poorly discussed.

Specific comments:

A. Chapter 1, page 1: The objectives of the study are not clearly stated. It seems that the objectives are: to estimate the effects of the water withdrawal at sites A and B on the water table and neighbouring domestic wells; and to estimate the infiltration rates.
B. Chapter 3.2, page 16: Surficial sediments play a major role in the recharge of the regional aquifer units (bedrock). Depending on the nature of the surficial sediments, they may constitute an aquifer unit or confine the groundwater flow. The proponent should present a map of the surficial sediments in both study areas.
C. Chapter 3.3, page 17: The drillers' logs database indeed consists mainly of rock wells. The proponent should give a map with the spatial distribution of domestic wells in study areas (160 wells in a radius of 5 km). The reported yields and drawdowns (dynamic water level) in this database could be used as a first estimate of the aquifer transmissivity.
D. Chapter 3.3, page 18, 19, and 20: The proponent should give a map of the actual potentiometric surface based on the conducted groundwater measurements and static water levels (depth to water) reported in the drillers' logs database.
E. Chapter 3.3, page 18: A bedrock surface model has been built by Teratech. The proponent should present this model in the report. Was this surface used to define the top surface of the rock layer?
F. Chapter 3.3, page 20: The surface waters (streams) influence largely the direction of the groundwater flow. Is this a possible reason for the observed southward flow of the groundwater at site B?
G. Chapter 4, page 31: The transmissivity is log-normally distributed and the geometric mean is the best estimate of the average transmissivity. Storage coefficient, however, tends to be normally distributed and because of this, the arithmetic mean should be reported. This parameter has a major role in the transient flow simulations.
H. Chapter 4: Was there any influence of the water withdrawal during the pumping tests on the neighbouring domestic wells? What was the reason for the duration of the pumping tests of 72 hours?
I. Chapter 5, page 36: The proponent states that the interference between the pumping and anticipated drawdowns at sites A and B are very low. However, along the 132 Rd. (Boulevard de la Rive Sud), where most of the domestic wells are located, the simulated drawdowns are approximately 3.5 m (pumping at site A, Figure 5.3) and 1.5 m (pumping at site B, Figure 5.4). The joint effect will thus result in a drawdown of approximately 5 m. The proponent should state the groundwater levels along this portion of the 132 Rd. What are the average depths of the pumps in the domestic wells?
J. Chapter 5: For both sites, the boundary conditions were defined as imposed head at the northern and southern boundaries, and as no flow zone along lateral, east and west boundaries. In addition, a recharge flux was imposed on top of the model. In this way the southern boundary has a major impact on the simulated drawdowns. Imposed head

boundary is generally used to simulate hydraulic contact with surface water body which can provide 'indefinite' water quantities to the model. It would be more appropriate to simulate the southern limit : a) as an imposed flux boundary (the flux can be estimated with a simple flow net analysis or used from the initial simulation – natural flow conditions without any additional pumping), in this way the modeller has the control over the water quantity entering the system from the south; or simply as a no flow boundary posed along existing natural surface water divides assumed to superimpose the limits of the shallow (~40 m) groundwater flow which was actually simulated by the numerical model.

K. Chapter 5: Figure 1.2 indicates that there are surface water bodies in the proximity of both sites. How were they taken into account by the numerical model?
L. Chapter 5.2: The proponent should present a map with the used finite elements grid, the imposed boundary conditions, and at least the topographic information as background.
M. Chapter 5: The recharge rate was assumed in reasonable ranges (0, 50 and 100 mm/y/m^2). What was the reason to assume uniform recharge rates over large portions of the model? Was it possible to correlate the recharge rate with the nature of the surficial sediments?
N. Chapter 5: What is the model sensitivity to the variation of recharge rates? What will the variation of the drawdowns along the 132 Rd be if the recharge rates were lower or higher, or spatially distributed? In addition, the simulations were conducted under transient conditions. The recharge is also transient process. What will be the impact of transient recharge on the simulated drawdowns? As most of the inflow was computed for the beginning of the dewatering period, what will be the optimal time to start with the excavation work?
O. Chapter 5: The numerical model was calibrated against the 'actual static water level conditions in the study area'. The proponent should give the calibration results in a chart with axes representing the measured and calibrated groundwater levels. It is not clear why the pumping tests were conducted. Since pumping rates and drawdown-time relationships are available, the proponent should also calibrate the model against the observed drawdowns in the tested and observation wells. This should be done particularly because the model predictions for the infiltration rates in the excavations are simulated under transient conditions.
P. Chapter 5: The proponent should also present a map of the simulated groundwater levels (depth to water) under natural conditions.
Q. Chapter 5: The infiltration rates in the excavations were estimated with average measured hydraulic conductivities. Two extreme cases were also considered: 0.1K and 10K. What is the impact of these scenarios on the domestic wells?
R. Chapter 5: The storage coefficient was assumed constant. The storage coefficient has important influence on the simulated drawdowns. If the pumping well is installed in an aquifer with higher S, the well shows lesser drawdown. What will be the variation of the drawdowns along the 132 Rd. if the storage coefficients were lower or higher?

CA-029

We had requested the specifications of the nature of ground failure consequences which may occur in the project's sectors. Every time there are mass movements, they must be clearly specified (i.e. rock falls, rotational landslides affecting shale deposits, rotational landslides affecting weathered bedrock, quick clay flow slides or perhaps lateral spreads.

CA-030

Please refer to the comments at question CA-032.

CA-031

The answer is confusing. The question did not deal with factors which could result in a mass movement, but rather with the inconsistencies between the map in Figure 4 (Appendix A, Part 4, Volume 2) and the mention concerning rock falls in Section 5.1.3 of Part 3, Volume 2, Appendix F1. If rock falls can occur on the pressurization pump building, then they must be indicated on the map. Moreover, what does the last sentence of the answer mean? "Mass movement has not been identified as the most probable cause.'' The cause of what phenomenon?

CA-032

The proponent must specify the dynamic loading conditions defined during the analysis which resulted in the conclusion that the sector cannot be affected by mass movements.

CA-033

The question dealt with the impact of rotational landslides that can affect the river-crossing areas of the Etchemin, Chaudière and Beaurivage rivers. The proponent has provided an appropriate answer. However, the quick clay flow slide that occurred in mid-April along the des Couture river in St-Romuald reminds us that we must also view this type of highly retrogressive mass movement, and not only for relatively weak impact rotational landslides. This quick clay flow slide had a width of some 100 meters and was characterized by a retrogressive distance of approximately 60 meters, with the retrogressive impact being probably limited by the upward displacement of the bedrock.

Consequently, the proponent will have to assess if local conditions (topography, geology, mechanical property of soils, presence of sensitive clay, etc.) around the river-crossing areas are conducive to quick clay flow slides. If this is the case, the possible impact (their widths and especially their retrogressive distances) will have to be specified on the maps in Figures A2 to A4. If the opposite holds true, it will then be important to explain, with supporting arguments, that this type of mass movement cannot occur or that its possibility is so low that it needs not be considered.

CA-034

The liquefaction of sand beds during seisms can result in displacements along slightly inclined surfaces over distances that can total several hundreds of meters (as in the case of the Bartlett and Youd example, 1995[1]). We are not only dealing with rotational landslides that can directly affect the banks of watercourses around river-crossing areas. We must also consider the possibility that the sectors behind these areas can be rendered fluid through lateral spreads.
Potential impact areas must be specified on the maps in Figures A2 to A4 where relevant (please refer to the comments of question CA-033).

[1] Bartlett, S.F. and Youd, T.L., 1995, Empirical prediction of liquefaction-induced lateral spread: Journal of Geotechnical Engineering, ASCE, v. 121, No. 4, p. 316-329.

CA-035

Please refer to the comments of question CA-034. Maps available in the development plan of the MRC (regional county municipality) can only be considered, at the most, as guides within the scope of this project.

CA-036

Please refer to the comments of question CA-034. Lateral spreads induced by liquefied sand levels can have a shearing effect on piles.

CA-037

The proponent's answer is satisfactory to the extent that the tabling of Terratech's reports answers previously specified concerns.

CA-039

Reference: Part 3, Volume 1, Section 2.3.2.5

In his answer to question CA-039, the proponent mentions that a complementary inventory of the avifauna will be completed in 2006. We will need the results of all complementary inventories before pursuing our analysis of the environmental effects on the avifauna.

Questions/Comments:

Please provide us with the results of complementary avifauna inventories to be completed in 2006.

CA-040

Reference: Part 3, Volume 1, Section 6.2.2.5

In our opinion, the proponent will have to review the first part of his answer to question CA-040. If he plans to clear during the month of June, i.e. during the peak of the bird nesting season, he will have to implement measures to ensure compliance with the *Migratory Birds Convention Act*, 1994, and its rules and regulations.

Questions/Comments:

A. How will the proponent ensure compliance with the rules and regulations of the Migratory Birds Convention Act, 1994 during clearing?
B. What will be the effects of this clearing on breeding species if the work is done during the months of June and July?
C. Has the proponent planned to implement measures to mitigate the effects of clearing during the bird nesting season? If so, what are they?

CA-052

Reference: Part 3, Volume 1, Section 2.4.11

The proponent has mentioned that a number of inventories detailing underwater noise levels around the jetty will be done in the spring of 2006.

Questions/Comments:

A. At the very least, a point of measurement will have to be placed (1) at the location of the terminal, (2) in close proximity to the south shore of the Île d'Orléans in front of the infrastructures and (3) at the mouth of de l'Église Creek.

B. During this fieldwork, the proponent will also have to measure the loss of the audible signal through propagation in order to model expected underwater noise levels according to the limits established in the study area, both during construction work and normal operations of the maritime infrastructures.

CA-058

Reference: Part 3, Volume 1, Section 4.9.1

In answer to the question CA-058, Figure A-7 presents a more detailed work schedule and Figure A-23 presents a life cycle schedule of vulnerable species in the study area.

Questions/Comments:

A. In Figure A-7, specify when the 1.25 ha right-of-way for the riverside will be completed.

B. Figure A-23 should not only limit itself to vulnerable species, but should also include the life cycle of the main species in the study area, as requested in question CA-058.

CA-064

Reference: Part 3, Volume 1, Section 6.2.2.2

According to the answer given for question CA-064, the proponent did not find in the literature information on underwater noise levels caused by work similar to the work to be done for the Rabaska project. We are aware that there may not be data in the literature on driving the same type of piles, using the same method and in the same implementation environment as that of the Rabaska project. However, it is important that the proponent provides, before the work begins, the most realistic estimate possible of noise levels expected when building the maritime infrastructures. To this effect, we hereby enclose a non-exhaustive bibliography on the impacts of noise in aquatic environments in the Appendix for information purposes. With the help of this type of information, the proponent should be able to:

Questions/Comments:

A. Indicate the underwater noise level for every construction activity of the maritime infrastructures (drilling, pile driving, use of barges, etc.). Differentiate between standard pile driving and sonic pile driving.

B. Using modelling, indicate the expected underwater noise levels within the boundaries of the study area for every activity taking place during the construction of the maritime infrastructures.

C. Reassess the potential impacts of increasing underwater noise levels for every construction activity on fish, by using modelling results and reviewing the enclosed literature.

D. Look at the possibility of using sonic pile drivers to drive piles. Assess the time required for this approach.

E. Reassess the relevance of applying mitigation measures to avoid or reduce these impacts.

CA-066

Reference: Part 3, Volume 1, Section 6.2.2.2

In answer to question CA-066, the proponent mentioned that he did not find in the literature data on underwater LNG tanker noise levels. He specified, however, that underwater noise levels from boats of various sizes will be measured during the ambient noise characterization study.

Questions/Comments:

A. Present an estimate of underwater noise levels for towing vessels, reference LNG tankers (116,000 m^3) and Qflex Class LNG tankers (216,000 m^3), in relation to noise levels measured during the ambient noise characterization study or to data taken from literature on boats of similar size to LNG tankers.

B. The proponent will have to indicate, through modelling, expected underwater noise levels within the boundaries of the study area when mooring or setting sail, as well as present results for reference LNG tankers or Qflex Class LNG tankers and take towing vessels into account in models.

C. Reassess the potential impacts on fish of increasing underwater noise levels in the terminal area during operations, by using modelling results and reviewing the enclosed literature on noise impacts in aquatic environments.

CA-081

Reference: Part 4, Volume 1, Section 5.4

The permanent right-of-way will be built along certain watercourses for a considerate distance (e.g. the Pénin River, the Roy watercourses, etc.). As the access road is located in the permanent right-of-way, sediments will have to be monitored to prevent any impact on riparian habitats (e.g. drainage ditches, sedimentation basins, slope stabilizations, etc.).

Questions/Comments:
The proponent will have to describe which mitigation measures he plans on implementing on the access roads located less than 20 m from the mean high water level (MHWL) to avoid impacting the water quality and the riparian habitat.

CA-082

Reference: Part 4, Volume 1, Section 5.5

The water used during hydrostatic tests will be taken from local rivers or waterworks. The document *Answers to questions and comments of regulatory bodies* of May 2006 specifies that pumping and release flows will be adjusted so as to not affect watercourse use. The following mitigating measure will have to be added to the environmental assessment in order to ensure minimal flow in watercourses:

Questions/Comments:
When pumping water for hydrostatic tests, do not take more than 15% of the watercourse's current flow.

CA-084

Reference: Part 4, Volume 1, Section 7.3.2.5

The proponent was asked to contemplate using the diversion canal method for certain watercourses instead of building dams and using pumps, in order to avoid the risk of dewatering in the event of a pump breakdown. However, the proponent does not intend to use this approach; consequently, in order to ensure rapid intervention in the event of a pump breakdown, the proponent will have to add the following mitigation measure to the environmental assessment:

Question/Comment:
A supervisor will have to be on the worksite at all times when the pump is in operation for all crossings using the damming and pumping approach.

CA-091

Reference: Part 4, Volume 1, Section 7.3.3.2

The open trench method, presented in Appendix G of Volume 3 for the Etchemin, Chaudière and Beaurivage rivers will have to be avoided as an alternative. The risk of impacting riparian habitats by constructing a temporary road spanning the entire width of the river on riverbeds, for periods of one to four months, is considered to be high.

The proponent has contemplated using barges to comply with our request for alternative solutions that did not involve constructing a temporary road made of stone fill. This solution has been discarded for technical reasons. However, many other methods should have been proposed (road-boring technique, temporary bridges, etc.).

Questions/Comments:

A. Present alternatives that do not require building temporary roads made up of stone fill on riverbeds.

B. Specify which proposed method will be preferred.

CA-094

Part 4, Volume 1, Section 9.2.2

The watercourses with the information sheet numbers 3, 23, 24, 31 and 33 have several functions relating to fish (nursery, feeding, etc.).

Question/Comment:
Add watercourses 3, 23, 24, 31 and 33 to the list of watercourses that will require specific monitoring regarding the presence of aquatic and riverside vegetation in and around the work area, as well as substrate quality.

CA-096

Reference: Part 4, Volume 4, Appendix A

As mentioned in question CA-096, the DFO advocates building clear-span structures to cross watercourses. A closed culvert (according to the specifications given in question CA-096) should only be built if it is technically difficult to install a clear-span structure.

Contrary to what is mentioned in page 2.111 of the document *Answers to questions and comments of regulatory bodies*, a clear-span structure does not generally have side clearances and can be installed quickly with minimal interventions on the watercourse (e.g. arched culverts, temporary bridges).

In the context of this project, DFO considers that using closed culverts to cross watercourses is not warranted, as the proposed structures do not permit the free passage of fish.

Question/Comment:
To guarantee free passage of fish, clear-span structures (e.g. arched culverts, temporary bridges) should be used to cross the watercourses with the following information sheet numbers: 3, 4, 6, 15, 19, 22, 23, 24, 26, 31, 33 and also the Saint-Claude Creek (this list could be reviewed following the characterization study for the nine watercourses having undergone an inventory in the spring of 2006). In the event that the proponent should decide to use any other structure to ensure the free passage of fish, he will have to pledge to the DFO that he will maintain the free passage of fish, and will have to prove it by performing an appropriate monitoring.

CA-098

Reference: Part 4, Volume 4, Appendix A

Stabilizing the vegetation is a measure which considerably mitigates the impacts on the riparian habitat. The proponent mentions that he will favour bank stabilization through seeding if conditions allow. However, he is still considering stone packing as a solution.

Questions/Comments:
All stone packing must be covered by vegetation and this cover must be monitored.

CA-099

Reference: Part 4, Volume 4, Appendix A

Watercourses with the information sheet numbers 3, 23, 24, 31 and 33 have several functions relating to fish (nursery, feeding, etc.). Even though the work planned will occur only over a short period of time, the riparian habitat may still be affected. Consequently, a restriction period will have to be respected for these specific watercourses.

Question/Comment:
For the watercourses 3, 23, 24, 31 and 33, the proponent will have to comply with a restriction period from April 15th to July 15th. This list could be reviewed following the characterization study for the nine watercourses having undergone an inventory in the spring of 2006

CA-300

Reference: Part 3, Volume 2, Appendix F-2, page 107

The dimension of the hole, which resulted from an accident, is between 0.5 m^2 (800mm) and 1.5 m^2 (1,380mm) according to the Sandia Report (2004-6258), and the Det Norske Veritas (DNV) scenario presented for the Cacouna Energy project.

In the studies given for the Rabaska Project, DNV worked with a hole of 0.44 m^2 (750mm).

Questions/Comments:
Can we obtain the positioning of DNV's Joint Sponsor Project (JSP) report with respect to the other reports available (Sandia, ABS, etc.)? In fact, what is the difference between the two scenarios? Why not use the worst case scenario?

CA-301

Reference: Part 3, Volume 2, Appendix F-2, page 127

In the risk studies presented, the heat radiation considered is in relation to a water table in a state of equilibrium. This principle is taken from the study following a JSP from DNV. It explains that the size of the initial water table will decrease and become stable at a size considered to be in a state of equilibrium. In the literature, it appears that the water table considered is the initial one.

Questions/Comments:
Can we obtain the positioning of DNV's JSP Report with respect to the other reports available (Sandia, ABS, etc.)? Why not use the initial water table?

CA-302

Reference: Part 3, Volume 2, Appendix F-2, page 122

The length of exposure to heat radiation levels of 12.5kW/m^2 has important repercussions on individuals. Considering an initial water table for a hole with a 750mm diameter:

Questions/Comments:

A. How much time will it take for the initial water table to decrease in size to the water table in a state of equilibrium?
B. Explain the variation in heat flux contours (5 kW/m^2, 12.5 kW/m^2, 37.5 kW/m^2) during this period of time.
C. Provide references for the radiation thresholds described in page 121. (They differ from the figures given in the ABS Consulting 131-04 GEMS 1288209 Report, for example).