

DECISION

**NSUARB-LNG-MAP-PC-01
2008 NSUARB 64**

NOVA SCOTIA UTILITY AND REVIEW BOARD

IN THE MATTER OF THE PIPELINE ACT AND THE GAS PLANT FACILITY REGULATIONS

- and -

IN THE MATTER OF AN APPLICATION by MapleLNG LTD. ("MapleLNG") for a PERMIT TO CONSTRUCT a LIQUEFIED NATURAL GAS ("LNG") PLANT at Goldboro, Guysborough County, Nova Scotia

BEFORE: Peter W. Gurnham, Q.C., Chair
Margaret A. M. Shears, Q.C., Vice-chair
Kulvinder S. Dhillon, P. Eng., Member

APPLICANT: MapleLNG LTD.

APPLICATION DATE: March 11, 2008

SCHEDULE "A" Individual Submissions and MapleLNG Responses

SCHEDULE "B" Permit to Construct

DECISION DATE: June 11, 2008

DECISION: Pursuant to Section 14 of the Gas Plant Facility Regulations, the Board hereby issues to MapleLNG Ltd. a Permit to Construct a Liquefied Natural Gas Plant at Goldboro, Guysborough County, Nova Scotia subject to conditions.

I THE PROJECT

[1] This decision is in respect of an application filed with the Board by MapleLNG LTD. ("MapleLNG") for a Permit to Construct ("PTC") a liquefied natural gas ("LNG") plant at Goldboro, Nova Scotia. The application, dated March 11, 2008, included this project description:

MapleLNG is developing a terminal for the import and storage of Liquefied Natural Gas (LNG) at a site in Goldboro, Nova Scotia, Canada. The project is named MapleLNG.

The location is adjacent to the existing ExxonMobil Sable gas plant (SOEI plant) and the Maritimes and Northeast Pipeline (M&NP).

The LNG import terminal will consist of a jetty, LNG storage, an LNG regasification section, nitrogen production and injection and distribution of the product natural gas to the customers, and a co-generation units.

LNG will be supplied by LNG carriers (LNGC), which will berth at a new jetty to be constructed in Betty's Cove adjacent to the MapleLNG site and pump the LNG cargo into storage tanks located on the site's shoreline.

The liquefied gas will be pumped from the storage tanks to the LNG regasification system. In the regasification section the LNG is regasified to the pipeline conditions of the M&NP. Subsequently, the natural gas product is sent through a metering system and is distributed to the M&NP pipeline and the co-generation unit.

If required, the LNG composition will be adjusted to meet the M&NP natural gas specifications by nitrogen injection.

The total nominal send-out capacity of the import terminal in the initial phase is up to 9 BCM/a maximum with possible extension to 18 BCM/a (second phase).

The terminal will operate continuously on a 24 hours per day, 365 days per year basis. Three full containment storage tanks each of 162,500 m³ gross capacity will be constructed, providing the terminal with a total of 487,500 m³ gross capacity of LNG storage.

The MapleLNG site development includes marine docking and unloading facilities with two berths at a single jetty. In the first phase one of these berths will be equipped with unloading facilities. In the second phase (extension of storage capacity and send-out rate) the second berth will be equipped with unloading facilities. The development includes the construction of these facilities for use as a LNG carrier berth with pipelines and other facilities as necessary for unloading LNG and transporting it to storage.

(MapleLNG Application, March 11, 2008, Vol. 1, p. 1)

II THE BOARD'S ROLE

[2] The Board's role under the *Pipeline Act*, R.S.N.S. 1989, c. 345 (the "*Act*") in connection with this application is to ensure that, from a public safety perspective, the LNG plant is designed, constructed, operated and ultimately abandoned in accordance with the *Gas Plant Facility Regulations (Nova Scotia)* ("*Regulations*") and *Nova Scotia Code of Practice for LNG Plants*. The Board's role does not include consideration of environmental or occupational health and safety matters, except to the extent they are addressed in the *Regulations*, nor does the Board's role include any form of commercial regulation of the LNG plant.

[3] Under the *Regulations*, the Board can engage a certifying authority ("CA"), an independent person or a group with expertise in LNG plants, to state whether in its opinion the *Regulations* and associated standards will be met during all phases of the LNG project. The Board engaged the services of Lloyd's Register North America Inc. ("Lloyd's Register") to act as its CA and provide recommendations to the Board with respect to the MapleLNG application.

[4] To date, the Board has carried out the following activities with respect to the project:

- engaged the CA;
- issued Directions on Procedure setting out the Permit to Construct application process;
- held a public information session in Goldboro;
- invited, received and reviewed public submissions on the application; and

- received and reviewed the CA's recommendations with respect to the application.

Public Information Session

[6] In its Directions on Procedure, the Board determined that a public information session would be held to provide an opportunity for interested parties to receive information about the LNG project and to make comments on same. The information session was held on April 7, 2008 at the Goldboro Interpretive Centre, Guysborough County after due public notice. Approximately 30 people, Board staff and a representative of the CA attended the session.

[7] Board staff gave an overview of the Board's role in connection with the MapleLNG application. Lloyd's Register's representative provided background information on the company and the services it would provide as CA to the Board.

[8] Questions from the audience were encouraged at the end of the presentations. The comments and questions were generally supportive of the application. Some questions related to specifics of the MapleLNG application regarding security and environmental matters, and those were referred to the representatives of MapleLNG who were present in the audience. There were no questions regarding the Board's role in connection with the application and no opposition to the project was indicated during the course of the session.

The Board's Continuing Role

[9] It is important to note that the Board's responsibility to oversee the project does not end with the issuance of a PTC. Rather, the Board, with the ongoing assistance of the CA, will continue to monitor the design and construction phases of the project to ensure conformance with the *Regulations*. Upon construction completion, but prior to start up, MapleLNG will be required to file a Licence to Operate ("Licence") application. That Licence will only be issued once the CA has satisfied itself and the Board that the plant has been designed, constructed and tested in accordance with the *Regulations*, and that MapleLNG has in place appropriate quality control, quality assurance and process safety management programs such that the plant may be safely put in to service. The Licence will include conditions to ensure ongoing compliance with the *Regulations*.

[10] Once the LNG plant is operating, the Board's supervision will continue to ensure that MapleLNG complies with the *Regulations* and the conditions in its Licence. In that regard, the CA will conduct regular inspections and audits, reporting their findings to the Board. Should the plant be found to be operating in a manner which is not in compliance, the Board will take such actions as are necessary up to, and including, suspension or revocation of the Licence.

III THE CERTIFYING AUTHORITY'S ROLE

[11] Under the *Regulations*, the CA's role is primarily to determine whether the LNG plant is being constructed, operated or abandoned in accordance with the

Regulations, and to make recommendations to the Board regarding any terms and conditions which should accompany a PTC or Licence issued by the Board.

[12] To date the CA's activities have included:

- reviewing the application for completeness and conformance to the *Regulations*;
- reviewing additional information and clarification provided by MapleLNG;
- reviewing public comments, and MapleLNG's responses to those comments; and
- preparing a recommendation that a Permit to Construct be issued, subject to certain terms and conditions.

[13] The CA's recommendation was:

Lloyd's Register North America Inc (LRNA) as Certifying Authority recommends that a *Permit to Construct* the Maple LNG Terminal can be issued, subject to the proposed conditions listed in the aforementioned letter, together with such others that may be imposed by the Board.

Based on the submitted application, with noted exceptions, the plant will be designed, constructed and ultimately operated in accordance with the regulations and the "Nova Scotia Code of Practice for Liquefied Natural Gas Facilities" dated July 13th 2005.

[14] The CA made the following recommendations for PTC conditions:

- Maple LNG to ensure that the proposed works are carried out and completed in accordance with all federal, provincial and municipal laws, and in particular the Pipeline Act, the Gas Plant Facility Regulations, CSA Z726-07 and the Code of Practice, as amended from time to time; all other applicable codes and standards, as amended from time to time; the Permit, as may be amended; and the application.
- Maple LNG to submit to Certifying Authority, on a timely basis and in complete system packages, all design and materials information relating to components and systems required by the Gas Plant Facility Regulations, the Code of Practice and applicable codes and standards referenced therein.
- Components or systems of the Proposed Works requiring design appraisal to be identified by Maple LNG or its Independent Contractor and agreed to by the

Certifying Authority prior to commencement of construction (the "Identified Components").

- Maple LNG to deliver to the Certifying Authority all design and materials information pertaining to the Identified Components as soon as possible and, in any event, before commencing field installation of each such Identified Component. If after review of such information, the Certifying Authority determines that an Identified Component does not or will not comply with the Gas Plant Facility Regulations, the Code of Practice or the applicable codes and standards referenced therein, the Certifying Authority shall notify Maple LNG and upon receipt of such notice Maple LNG shall, promptly (and in any event prior to the submission of an application for a License to Operate) remedy any such non-compliance.
- Maple LNG to provide reasonable notice to the Certifying Authority of its intended schedule of activities for the proposed works and shall permit a representative from the Certifying Authority to be on site to observe the construction.

[15] The Board has accepted the CA's recommendations. The proposed conditions are incorporated in the PTC.

[16] As noted above, the CA will continue to assist the Board in its supervision of the plant through all phases of design, construction, operation and ultimately, shut down and abandonment.

IV PUBLIC COMMENT

[17] Written submissions were received from seven parties:

- Kevin McAllister
- Gordon MacDonald - Guysborough County Regional Development Authority
- Gary Cleary - Municipality of the District of Guysborough
- EnCana Corporation
- Bethany Keddy
- Arthur McLaughlin, P.Eng.
- Trudi Rhynd

[18] Issues raised in the public submissions included:

- possible locations of faults and other geological structures (natural and man-made) in the vicinity of the project;
- use of groundwater and the impact on nearby residential water supply;
- jetty size compared to regasification vessel size;
- adequacy of meteorological data used for risk calculations;
- need for containment along the jetty structure;
- risk associated with containment calculations;
- risk associated with routing of highways 344 and 316;
- need for additional assessment for the early regasification option;
- road traffic management and safety, including school bus safety;
- impact of climate change, particularly with respect to sea level rise;
- consideration in the risk assessment of Encana's Deep Panuke onshore pipeline, which will be adjacent to the LNG plant;
- safety considerations for the Meadow Lake dam;
- gold mine tailings management;
- air emissions impacts;
- risk associated with LNG tanker navigation;
- safety issues with respect to the marine unloading terminal;
- fire fighting preparedness;
- impacts of future design changes;
- storage tank dimensions and over-pressure considerations; and
- risk associated with sabotage, terrorism or accidents.

[19] Individual submissions, and MapleLNG's responses, are included in Schedule "A" to this Decision. The CA and the Board have carefully reviewed MapleLNG's responses to these submissions.

[20] The Board understands the concerns expressed by the public and appreciates the time and effort taken to make the Board aware of them. However, the Board's supervision responsibilities under the *Act* and *Regulations* do not include a number of these matters. The Board is satisfied with MapleLNG's responses to the issues which have been raised by the public and notes that those concerns which do fall under the Board's mandate will be fully addressed and considered as the project progresses through

the preliminary and detailed design stages. MapleLNG, in its responses, has indicated its intent to do so.

[21] The Board is satisfied that the ongoing monitoring and reporting by the CA will ensure that compliance with the safety and operational requirements under the Board's jurisdiction will be maintained.

V PIPELINE PERMIT APPLICATION

[22] In addition to the application which is the subject of this Decision, MapleLNG also applied for a PTC for a send-out pipeline. The 1.67 km long, 762 mm outside diameter pipeline would receive the gas from the MapleLNG plant and transport it to a point of connection on the Maritimes and Northeast Pipeline.

[23] Subsequent to filing the pipeline permit application, MapleLNG advised the Board that the pipeline route would require significant alteration from the route originally proposed. At the time of this Decision, MapleLNG has yet to revise its pipeline permit application to incorporate details of the new routing. Thus, the Board is not yet in a position to complete its review of the pipeline permit application.

[24] While the Board does not see this as a reason to delay the issuance of the PTC for the LNG plant, it reminds MapleLNG that no inferences should be drawn with respect to the issuance of a PTC for the pipeline as that application will be judged on its own merits.

VI PERMIT TO CONSTRUCT

[25] The Board has carefully considered the application, the CA recommendations, public submissions and MapleLNG responses. The Board believes that it is in the public interest to issue a PTC to MapleLNG. A copy of the PTC, including the conditions to be met by MapleLNG, is attached as Schedule "B" to this Decision.

DATED at Halifax, Nova Scotia, this 11th day of June, 2008.

Peter W. Gurnham

Margaret A. M. Shears

Kulvinder S. Dhillon

Schedule "A"



May 22, 2008

Nova Scotia Utility and Review Board
1601 Lower Water Street
P.O. Box 1692, Unit "M"
Halifax, Nova Scotia

Attention: Ms. Nancy McNeil
Regulatory Affairs Officer/Clerk

Subject: Application for Permit to Construct – Response to Public Comments

Dear Ms. McNeil:


Please find enclosed our responses to the public comments received from the NSUARB during the public review period that ended May 7, 2008.

If you have any questions or require clarification, please do not hesitate to call the undersigned.

Yours truly,

A handwritten signature in black ink that reads 'R. D. Owen'. The signature is written in a cursive style with a large initial 'R'.

R. Derek Owen
General Manager

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Kevin McAllister	IR Date: May 7, 2008

Information Request:


The area of the proposed LNG has been extensively used for Gold mining since 1868 and has very detailed maps and research of the Geological Faults that are known to exist and can be found by accessing the Natural Resources website or library. What I find very disturbing is that after comparing Maples site plan with the geology of the area it appears that they intend to construct their Pipeline and one of their storage tanks directly on top of these Geological Faults. After reviewing all of the submissions and evidence supplied by Maple I can not find any mention of these Faults in there geological exploration section in Volume 2 and none of their maps show any of the faults in the area.

Under the Pipeline Act- Pipeline Regulations (Nova Scotia) section 16 (a) states [A Bulk plant or storage facility shall (b) be located in an area that is known to be free from flooding, landslides, rock falls, and geological faults.] Given that the Act clearly prohibits their project from being built in this area the board must clearly reject Maples application for its Permit To Construct their LNG at Goldboro.

I will be sending some of the evidence with this letter to verify my research along with a section of a map from the Geological Survey of Canada (G S C Map 832) showing the location of the Geological Faults in relation of Maples infrastructure. Also included are 2 pages from the Geological Survey of Canada (MEMOIR 385) (GOLD FIELDS OF NOVA SCOTIA) that provide details of the known geology in the Issac Harbour gold district, that area of the proposed project. The Department of Natural Resources has compiled a great deal of information dealing with this area due to it being one of the largest gold producers in Nova Scotia and have stated in their report (EASTERN SHORE COMPILATION PROJECT) that (LOCAL FAULTS ARE FOUND IN ALL GOLD DISTRICTS) and specifically refer to Isaacs Harbour, (sheets included with submissions).

MapleLNG Response:

Location of faults and other geological structures are an important part of design considerations for the MapleLNG facility. Currently, MapleLNG will be proceeding with a seismic hazard assessment for the next phase of project development. This assessment will be consistent with seismic hazard assessments completed for other Canadian LNG facilities and will include the following: A desktop study of seismological, tectonic, geological, geophysical, geotechnical, photometric data of the study region; a field reconnaissance to map and quantify the movement (present activity) of nearby geologic faults; and probabilistic analyses carried out to derive site-specific OBE and SSE seismic

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parameters for structural tank design, including peak ground acceleration (PGA) and spectral acceleration (Sa) values, for the appropriate ground conditions and design return periods.


In the seismic hazard assessment completed for the Bear Head LNG site, Jacques Whitford summarized the regional seismic setting as follows:

Other than the west coast of British Columbia, the vast majority of Canada (including Nova Scotia) lies within a mid-plate tectonic regime. In eastern Canada, the nearest plate boundary is the mid-Atlantic ridge located more than 1,000 km beyond Canada's east coast. At this distance, the mid-Atlantic ridge is too far away to cause direct seismicity in eastern Canada, but it is believed that ongoing widening of the ridge results in continual high horizontal compressive stress throughout the eastern North America. Seismic activity has been observed to be concentrated along a series of deep-seated rift faults along the St. Lawrence, Saguenay and Ottawa valleys that were formed several hundred millions years ago during early attempts to open the Atlantic Ocean. It is believed that seismic activity in these areas is caused by fault movement induced by high compressive stresses from the mid-Atlantic ridge. Seismic activity along the St. Lawrence (as shown on Drawing 1) is too distant to cause any significant seismic hazard contribution to the Port Hawkesbury LNG site. Therefore, the seismic hazard at Port Hawkesbury will be dominated by contributions from local seismicity.


Jacques Whitford reviewed the available seismological, tectonic, geological data of the study region. Based on this review, Jacques Whitford confirmed the absence of any information pertaining to the existence of earthquake-induced surface rupture or active faulting in Nova Scotia. (Jacques Whitford and Associates Limited, Seismic Hazard Assessment, Bear Head LNG Terminal Site, May 14, 2004).

The MapleLNG provincial EA described the available seismic information and mapping of fault locations (See attached EA Figure 8.13-3 and text from EA Sections 8 and 9). This information was summarized in the permit to construct submission Volume 3, Section 3b (Design Seismic Data – 2.3 page 8). MapleLNG recognizes further seismic work is required and will be proceeding with a seismic hazard risk assessment as indicated in the above paragraph. Based on the provincial EA, earthquakes are considered to have little if any effect on the proposed plant site.

For clarification of a statement made in this submission, it is assumed that the reference to 'pipeline' in the submitted comments is actually the cryogenic lines supported by the trestle and not the send-out gas pipelines exiting the facility. Based on the Geological Survey Mapping for the area, the trestle runs perpendicular to the Harbour fault crossing it in the vicinity of Dung Cove.

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Also, regarding the reported fault located beneath one of the LNG storage tanks as depicted and circled on the geological mapping figure on page 3 of the public submission, Maple has reviewed an original copy of the same mapping as well as mapping prepared by professional geologists for the provincial EA and conclude that the LNG tanks do not overlie geological faults (See attached Figure 8.13-3 from the Provincial EA and an original copy of the Geological Survey Map of Canada (Map 832)).

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**ATTACHMENTS FOR KEVIN MCALLISTER
RESPONSE
(EXCERPTS FROM PROVINCIAL EA)**

Attachments

8.13.2.5 Proposed Keltic Site

The remainder of this discussion will focus on the proposed Keltic Site and its immediate environs, since this part of the Keltic Study Area is slated to become industrial and subject to greater potential environmental risks overall. Thus, a greater knowledge of its geology is needed to better understand existing groundwater conditions, possible groundwater flow control characteristics, and mitigation needs. The major F2 fold axis at the proposed Keltic Site and environs strike east-west and plunge east, with 3.5 km generally between anticlinal axis. Locally from south to north, the major anticlines and synclines shown by Fletcher and Faribault (1981, 1893a, 1893b, 1893c, 1893d), Schiller (1961) and Hill (1991) east of the Country Harbour and Isaac's Harbour Faults include: the Isaac's Harbour Anticline at Dung Cove; the Long Lake Syncline at roughly the south boundary of the proposed Keltic Site; the Upper Seal Harbour Anticline at the south end of Gold Brook Lake; the Little Lake Syncline at the south end of Ocean Lake and Meadow Lake; an unnamed anticline at the north end of Ocean Lake; and the Loon Lake Synclinorium at Big Stillwater within the Isaac's Harbour River watershed. In larger scale (smaller area) mapping south of the Seal Harbour Lake area, Faribault (1904) shows the South, Middle and North Anticlines, and their associated synclines. These are smaller folds superimposed onto the Isaac's Harbour Anticline, where the distance between secondary anticlinal axis averages about 0.5 km. The nearby Country Harbour Fault is the most prominent strike-slip fault on Nova Scotia's eastern shore. Roland (1982) suggests that there has been upwards of 8 km of sinistral displacement along it, although drag folding and shearing in strata of the Loon Lake Synclinorium (Hill, 1991) suggests that there has been more than 10 km, and perhaps as much as 18 km, of sinistral displacement along this fault. It extends up into Horton Group deposits to the north. The Isaac's Harbour Fault, which is another major regional fault, defines the east shore of Isaac's Harbour and may extend up to 4 km northwest of Stewart Lake. Sinistral displacement along the Isaac's Harbour Fault at Dung Cove was in the order of 600 m to 800 m (Faribault, 1904). There is an apparent displacement of about 1 km along the New Harbour Fault located about 10 km east. Due to the large displacements that have occurred along the nearby regional faults, the structural geology within the proposed boundaries of the Keltic Site is expected to be complex. Faribault (1904) shows a fault along Dung Cove Brook, which is likely to be a synthetic fault to the Isaac's Harbour Fault and along which there has been 75 m to 125 m of sinistral displacement. Other faults parallel the Isaac's Harbour and Dung Cove Brook Faults to the south and north of the proposed Keltic Site (Faribault, 1899 and 1904), and there is severe faulting in underground workings at Gold Brook Lake (P. Smith, pers. comm., 2001). Field mapping by a geoscientist along the gas plant access road has revealed yet another, north-south trending fault along which there may have been up to 50 m of strike slip displacement and also perhaps some normal displacement. The many lineaments identified by Tilsley (1996b) and which parallel the Isaac's Harbour and Dung Cove Brook Faults, such as those along parts of Betty's Cove Brook and Gold Brook, suggest a broad shear zone and/or other faults that are likely to be related to the Isaac's Harbour Fault. These cannot be directly mapped due to the thick till present.

9.22.7 Faults/Shear Zones, Seismic Events and Tsunamis

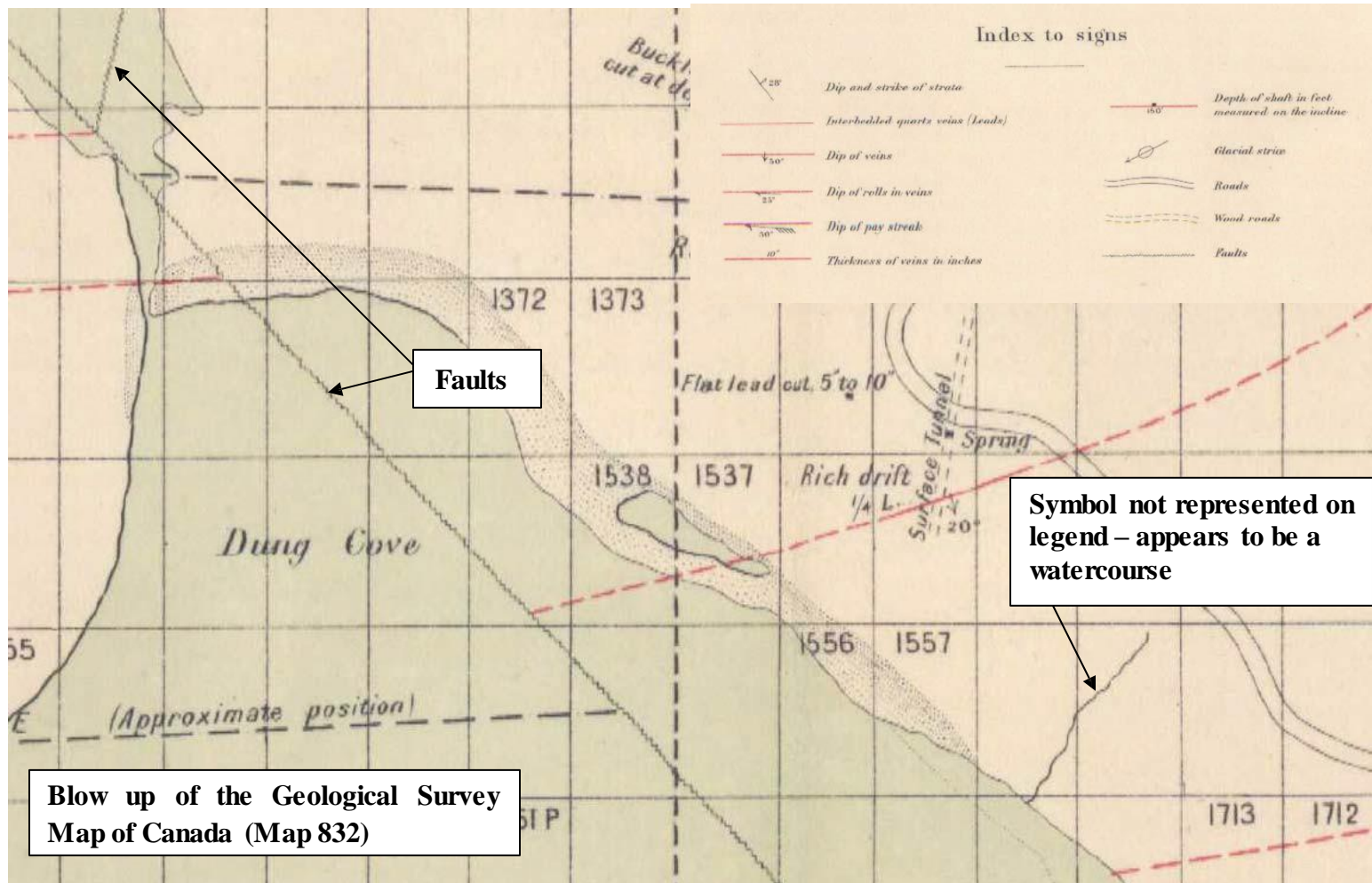
9.22.7.2 Seismic Considerations

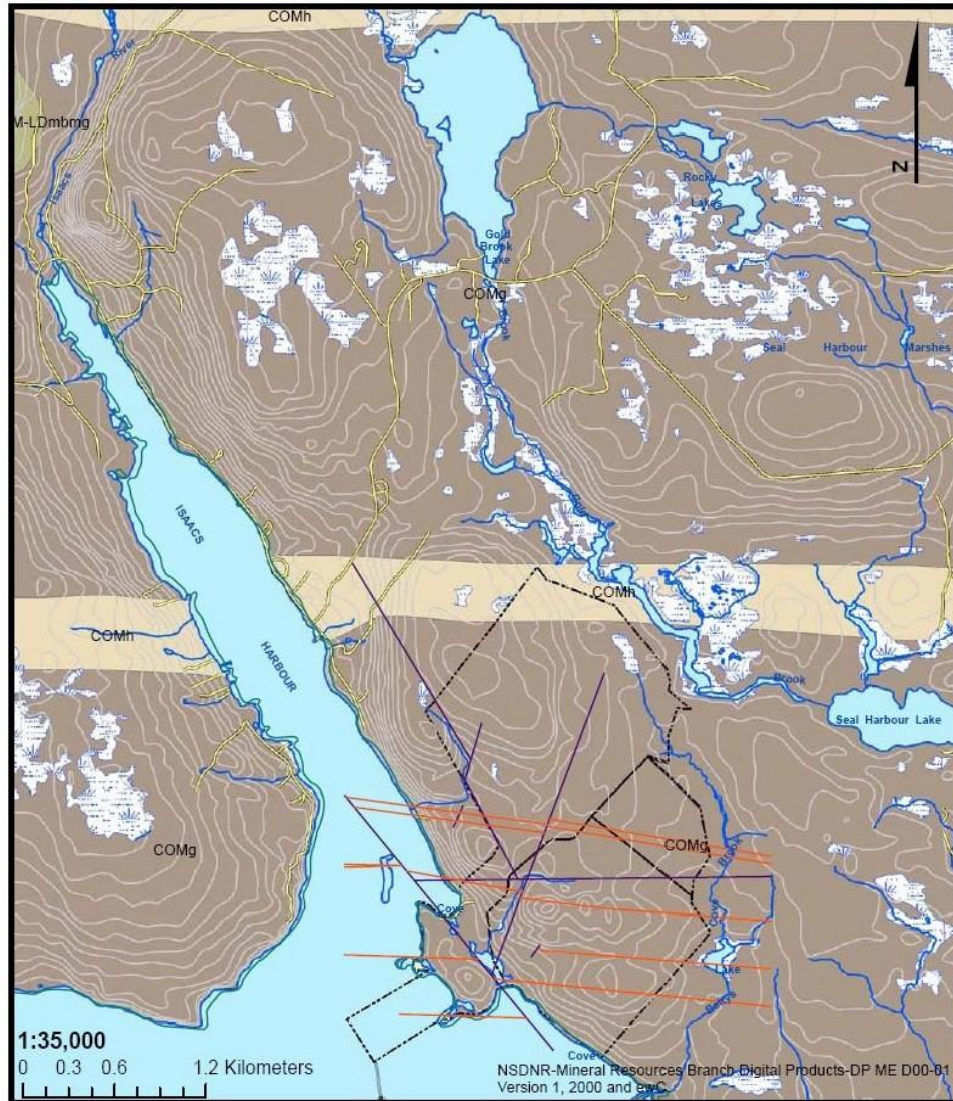
Notwithstanding Nova Scotia's location within the stable continental part of the North American tectonic Plate, within Canada's eastern seismic region, large earthquakes have occurred in the past and will inevitably occur in the future. These are likely to have little effect, if any, on the proposed plant site only and may (or may not) occur at any time during its construction and/or operation. Tanks and other structures on site will be designed for the seismic rating in the region, as required under CSA Z276-01. In addition, all structures at the site will be built to meet or exceed the new design criteria as set out in the 2005 edition of the NBCC. Appropriate contingency planning will also address the possibility of structural failure which may result from such an event. With proper mitigation measures in place, the residual effects, although improbable are expected to be of major significance (see Table 11.0-1 in Section 11.0). Considerations for mitigation are presented in Section 10.

Seismic Hazard

Figures 9.22-1 to 9.22-5 contain the new seismic hazard maps that will be used in the 2005 edition of the NBCC to replace the 1985 maps presently in use in the 1995 NBCC (Adams and Atkinson, 2003). The 2005 edition of the NBCC was adopted by Nova Scotia on May 1, 2006 (T. Ross, pers. comm., 2006). The 2005 edition of the NBCC contains significant changes in the provisions for seismic loading and design (Heidebrecht, 2003). The 1995 NBCC employed seven "zones" (0 to 6) to describe peak ground velocity and acceleration, determined at a probability of 10% in 50 years. In the 2005 edition of the NBCC, the Geological Survey of Canada is now using a probability of exceedance of 2% in 50 years, and calculating hazard in the form of uniform hazard spectra, which provides a much better period-dependent representation of earthquake effects on structures. The implication is that the design forces in short-period structures relative to those in long-period structures would be much larger than is the case for structures designed in accordance with the 1995 NBCC provisions.

Table 9.22-1 presents the seismic hazard for various spectral acceleration time periods as given by Adams and Halchuk (2003) for site category C (very dense soil and soft rock, $360 < V_{30} \leq 760$ m per second (m/s)), and seismic hazard with appropriate ground motion amplification factors as defined by Liam Finn and Wightman (2003) applied for site categories B (rock, $760 < V_{30} \leq 1,500$ m/s) and A (hard rock, $V_{30} > 1,500$ m/s) for three localities along Nova Scotia's Eastern Shore, compared to three urban areas with low to high levels of seismic hazard, i.e. Toronto, Montreal, and Vancouver (Heidebrecht, 2003). The seismic hazard at the proposed Keltic plant site would fall somewhere between that for Halifax and Canso, and since all important structures will have foundations built directly onto bedrock, it could be defined as a class A to B site. Even when taking into account the nearby magnitude 7.2 Grand Banks event of 1929, Figure 8.13-7 shows the seismic hazard for the Keltic plant site to be generally low; similar to or less than site class A to B criteria for Toronto for time periods of 0.2 and 0.5 seconds, and only slightly above that for Toronto and significantly less than for Montreal for 1.0 second period events.






Legend

- Fau t (asmapped byewC)
- Anticline axis (as mapped by ewC)
- FORMATION
- Devonian Granite
- Halifax Formation
- Goldenville Formation

FIGURE No 8 13 3

KELTIC PETROCHEMICALS IN .

BEDROCK GEOLOGY
JULY 2006

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	Information Requested By: Gordon MacDonald – Guysborough County Regional Development Authority	IR Date: May 2, 2008

Information Request:

Safety of Nearby Residential Groundwater

Figure 2.1 Battery Limit scheme of the Utilities of the LNG Import Terminal, Page 3 BOD Utility Systems

Figure 2.1 indicates groundwater as a source of water. Surface water was identified as the potential source of water for industrial requirements in the environmental assessment review process. Although there is a condition of environmental approval that groundwater be monitored during construction and operation of the projects, groundwater was not seriously considered as a potential source of industrial or potable water. Had the proponents identified this there would have been a request from the Municipality that the volumes of water required be identified and a groundwater compensation plan be put in place to cover nearby residences should a safety/health issue arise as a result of groundwater withdrawal and impending hydrological changes in the groundwater flow.

MapleLNG Response:

A well water mitigation plan has been developed in accordance with Condition 3.3 of the Nova Scotia Environmental Assessment Approval and accepted by Nova Scotia Environment. Attached is the NSE approved Standard Operating Procedure for dealing with Water Well Complaints.

Information Request:


Regasification Vessel Specifications

5.2 Vessel sizes

Table 4.1: Selection of LNG carrier fleet used for the design of marine facilities does not have dimensions for potential vessel that regasifies on board and docks to send regasified vessel to an onshore pipeline.

MapleLNG Response:

The jetty will be designed for the handling of vessels with dimensions outlined in Table 4.1 (i.e. capacities of 75,000 m³ up to 250,000 m³ and vessel lengths ranging from 260m to 345m). Current regasification vessels fall within the dimensions outlined in Table 4.1, capacities ranging from 138,000 m³ up to 150,900 m³ (Reference: http://exceleerateenergy.com/downloads/Exceleerate_vessels.pdf).

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Information Request:

QRA

QRA MapleLNG Draft Report, Table 5.3, page 63

The individual risk has been calculated based on meteorological data from Halifax for a single year. This does not accurately reflect the conditions at the site, nor does a 2-year period come close to capturing the average wind speeds and directions. 100 yr averages and site specific data should be used to recalculate the risk in all cases once the final design and site layout has been completed.

MapleLNG Response:

For a QRA, not only is wind direction and wind speed needed but also Pasquill stability class. The nearest geographical location having all these required data was Halifax, Nova Scotia. Shorter time periods are commonly used in individual risk calculations and there is a preference for the use of recent and complete data sets.

Information Request:

MapleLNG Impounding, page 12

“For determining the evaporation rate the TNO Effects model shows difficulties to calculate a pool evaporation from water. Therefore the evaporation has been determined by assuming an average subsoil on land with a maximum pool height of 0.1 m”


How applicable then is this model for accurate representation of the risk? As proposed in this application, there will be no containment for spills at the terminal or along the pipeline trestle which travels over water.

MapleLNG Response:

The TNO Effects model is considered applicable to accurately represent risk and has been used to calculate effects from unlikely LNG releases at other LNG facilities in the world. This model is based on assumptions (like all models) and in general is believed to generate conservative results.

Furthermore, of primary importance are the following assumptions:

1. The maximum effect distances for natural gas dispersions have been calculated up to ½ LFL (Lower Flammability Limit). Vapour clouds can only be ignited when

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between LFL and UFL (Upper Flammability Limit) (i.e. ½ LFL can not be ignited), thus ½ LFL contours must be considered to be conservative.

2. In addition the natural gas dispersions have been based on neutral gas dispersion models. As described in the studies, the actual dispersion of natural gas from a pool of LNG will be a combination of initially dense gas dispersion (cold natural gas), followed by neutral gas dispersion (partly warmed up natural gas) and finally light gas dispersion (normal temperature natural gas). Thus, using neutral gas dispersion models, the effect distances must be considered to be conservative.

Containment of spills at the facility was considered based on the requirements of the NS Department of Energy Code of Practice (CoP) for LNG facilities and the CSA Z276-07. In summary, there will be containment for spills at the terminal, specifically in the vicinity of LNG Booster pumps, submerged combustion vaporizers and the boil off gas (recondensor) area. Containment is not considered on the jetty as the unloading arms in the transfer area over the waters edge will be made of solid metal piping. Containment on the trestle is also not considered as the trestle simply supports the solid metal cryogenic lines transporting the LNG to the tanks. Furthermore, impoundment on the jetty/trestle is considered not feasible and technically difficult to collect about 150 - 200 m³ (or even more) of LNG at a relatively small area (jetty head) and at such a distance to shore. If the LNG collected at the jetty would be routed to shore, the majority of LNG will likely vaporize before reaching shore.


NB: Please note that a conservative calculation of the ½ LFL effect distance in case of a 2 minute outflow from one LNG unloading arm (full bore rupture) was completed.

Information Request:

QRA MapleLNG Draft Report Figure 6.2, page 84

It appears from this figure that the rerouting of highway 316 falls within the Individual risk LNG Import Terminal of 10-3 and 10-4. "From the risk source to the 1 in 10, 000 (10-4) annual chance of fatality risk contour the risk to the public is deemed unacceptable and no other land uses except the sources facility, page 82 QRA Maple LNG, section 6.1"

It is not acceptable to reroute highway 344 at this location. There is no warning system proposed or system to shut off this portion of the highway at this location should an accident occur however unlikely the model suggests.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Gordon MacDonald – Guysborough County Regional Development Authority	IR Date: May 2, 2008

MapleLNG Response:

The individual risk as defined in the QRA is the likelihood or probability per year that a person who is continuously present and unprotected at a particular location will die as a consequence of an accident at the site. Therefore, on roadways where individuals are only occasionally present, the fatality risk is considered to be significantly less because it is not continuously occupied.

A road is thus not normally considered land use in relation to a QRA and as such it is not unacceptable to run the road through areas with risk contours above 10^{-4} .

Information Request:

Conceptual Design: Process Systems

Early regasification and LNG transshipment


2.8.1 Early Regasification

The environmental assessment for this concept has not been reviewed by the regulator or the public; it constitutes a material change in project development and direction. It is the first time that the concept has been introduced to the public and municipality. The QRA has not assessed regasification at the terminal.

MapleLNG Response:

The on-board regasification of LNG is being investigated to provide further opportunities for the operation of the LNG facility such as the ability to provide natural gas to the market before the terminal has completed commissioning and the ability to provide additional send-out capacity for the terminal if future spot cargoes are available.

MapleLNG does not consider the inclusion of the early regasification option as a formal request in the Permit to Construct to move forward with the execution of this work. Early regasification was included in the submitted Permit to Construct application to inform the UARB that this alternative could be studied in further detail. Should MapleLNG decide to pursue this option, an evaluation of the impact on current permits, QRA and regulatory approvals would be completed from a project development and timing perspective.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Gordon MacDonald – Guysborough County Regional Development Authority	IR Date: May 2, 2008

Information Request:

Traffic Safety

Scope of Work, page 18

6.0 Installation and Construction

6.1 Construction Execution Plan

The construction execution plan should cover Management of Traffic and safety to surrounding communities. This should link to the Traffic study conducted as part of the conditions for EA approval. Traffic safety was an issue during the SOEP construction phase particularly children and school buses.

MapleLNG Response:

A Transportation Management Plan has been prepared in accordance with Condition 1.9 of the Environmental Assessment Approval and has been approved by Nova Scotia Transportation and Infrastructure Renewal. This plan is linked to the traffic impact study completed under Condition 1.3 of the EA approval. The plan covers the following items: identification of primary and secondary transportation routes; details of all required road realignments and upgrades; transportation schedules; dust management measures; safety management measures; methods to ensure contractor compliance; monitoring measures; and communication policies.

Information Request:


Sea Level Rise and Climate Change

Conceptual Design Marine Facilities, page 10

The design has not taken into consideration potential sea level rise as predicted by the International Panel on Climate Change (IPCC) a figure of 60 cm. The application is void on any discussion of the safety aspect of sea level rise and the impact on the jetty and pipeline trestle.

MapleLNG Response:

As per the attached figure, the minimum elevation of the structure is CD+8.62 m. For the trestle, the lowest level of the superstructure is chosen at CD +9.00 m and for the loading platform, the lowest level is CD +10.35 m. Considering a sea level rise of 0.60 m, the elevation of the loading platform is still sufficient; see attached Drawing 0381-004: Typical Cross Sections and Side Views.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Gordon MacDonald – Guysborough County Regional Development Authority	IR Date: May 2, 2008

The trestle cross beams slope up at the underside (see attached Drawing 0381-004) leaving a small area of exposed concrete. The additional load due to wave crests contacting the concrete cross beam support is small compared to the total wave load. As the ice load is significant higher than the wave load on a pile, there is ample safety left for wave conditions (overall safety factor of approximately 5.0) and therefore some additional load on the underside of the concrete cross beam will have no effect.

**ATTACHMENTS FOR GORDON MACDONALD
RESPONSE**

Attachment 1
Standard Operating Procedures
Domestic Water Well Complaints

Standard Operating Procedure Domestic Water Well Complaints

Maple LNG will establish a filing system and designate an individual responsible for receiving domestic water well complaints.

Designate will document the following information during initial conversation with complainant:

- f* Homeowner name, address (civic and mailing) and contact information.
- f* Type of water supply (i.e., drilled well, dug well or spring).
- f* Nature of the problem (i.e., quantity and/or quality issues).

If the complaint is managed at this time, Designate will simply file the information and provide notification to Nova Scotia Environment and Labour (NSEL).

If the complaint warrants investigation, Designate will initiate action immediately. This will involve:

- f* Contact to NSEL who will choose whether or not to get involved.
- f* Determination of the need to contact an independent “qualified person (QP)” to handle the investigation. The QP will be asked to respond in a timely manner satisfactory to the homeowner.

Depending on the nature of the complaint, an investigation may include one or more of the following activities:

- f* Physical assessment:
 - Measurement of water level in the well
 - Removal and assessment of the pump and; noting that only persons licensed to do so under the NSEL Well Construction Regulations will remove or alter the position of a pump located in a well.
 - Video log of the well
 - Flow test
- f* Chemical assessment:
 - Collection/submission of a water sample to a Canadian Association of Analytical Environmental Laboratory (CAAEL) certified facility
- f* Comparison of physical and/or chemical results with baseline survey information.
- f* Preparation and submission of a report to the homeowner and NSEL.

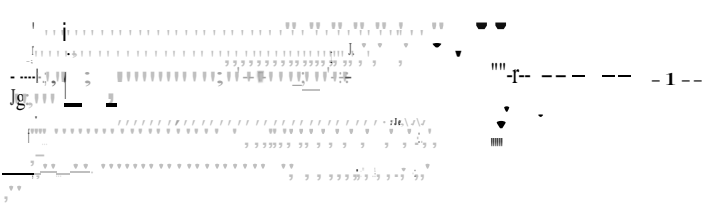
Depending on the results of the investigation, mitigation may include:

- f* Provision of a temporary water supply.
- f* Well replacement.
- f* Follow-up testing.

f Preparation and submission of a final report to the homeowner and NSEL.

Designate will file all relevant information pertaining to the complaint.

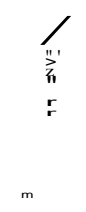
SECTION A-A



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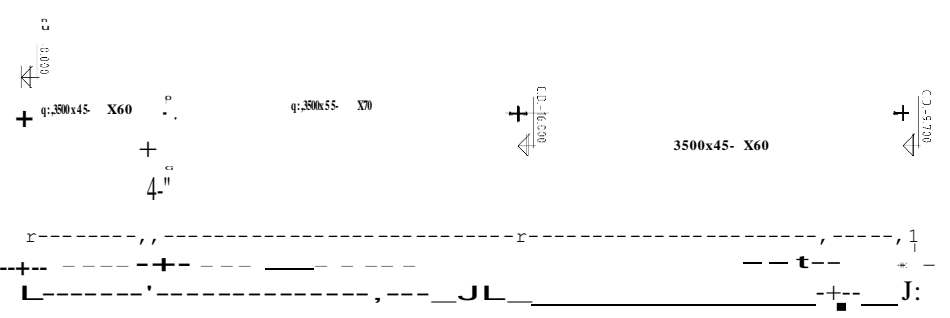
SECTION A-A



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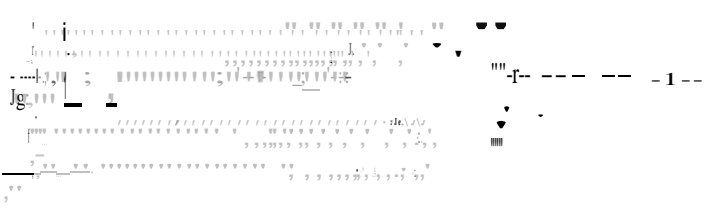
SECTION A-A



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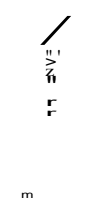
SECTION B-B



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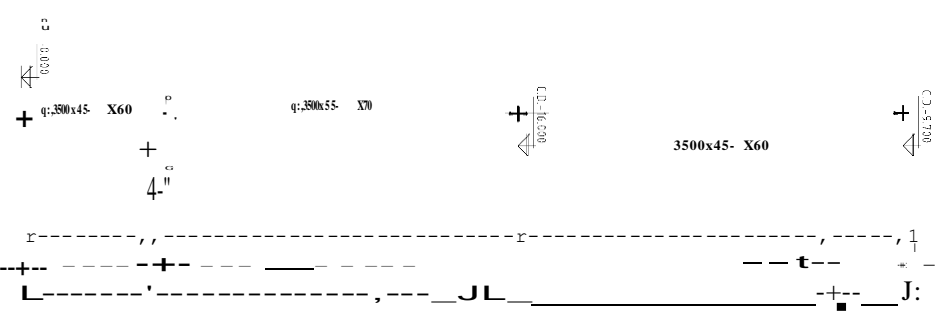
SECTION B-B



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SECTION B-B



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SECTION C-C



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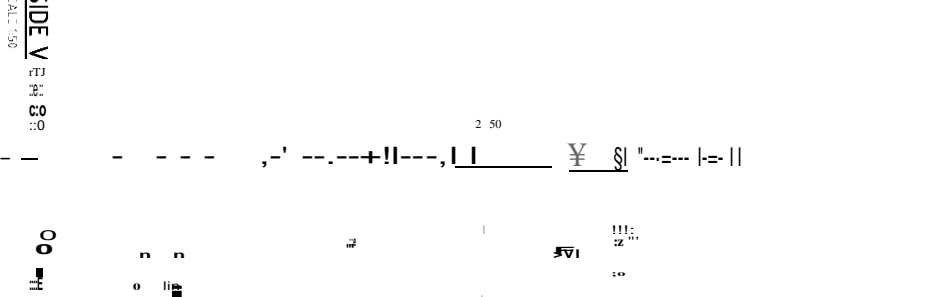
SECTION C-C



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SECTION C-C



3500x45- X60

1/4" V. r

SECTION D-D



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SECTION D-D



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SECTION D-D

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1/4" V. r

Maple LNG Nova Scotia

TRIPPOSE ON SIDE VIEW

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	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Gary Cleary – Municipality of the District of Guysborough	IR Date: May 2, 2008

Information Request:

1. *The safety of nearby residential groundwater does not appear to be adequately addressed. In the documentation with the application for permit, it indicates that groundwater could potentially be used for both industrial process and potable water supply where as the Environmental Assessment indicated that process water would be from surface water (lakes). Impact on the hydrology of groundwater in that area must be addressed.*

MapleLNG Response:

A well water mitigation plan has been put in place in accordance with Condition 3.3 of the Nova Scotia Environmental Assessment Approval and accepted by Nova Scotia Environment. Attached is the NSE approved Standard Operating Procedure for dealing with Water Well Complaints.

Information Request:

2. *The information used for design of marine facilities is based on meteorological data from Halifax and should be based on long-term site specific data that will consider all risks for final design.*


MapleLNG Response:

For a QRA not only wind direction and wind speed are needed, but also Pasquill stability class in combination with wind speed and wind direction. The nearest geographical location having all these required data was Halifax, Nova Scotia. Shorter time periods are commonly used in individual risk calculations and there is a preference for the use of recent and complete data sets.

Information Request:

3. *The model used to determine the amount of containment required to address potential spills does not appear to accurately address the risk.*

The TNO Effects model is applicable to accurately represent risk and has been used to calculate effects from unlikely LNG releases at other LNG facilities in the world. This model is based on assumptions (like all models) and in general is believed to generate conservative results.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Gary Cleary – Municipality of the District of Guysborough	IR Date: May 2, 2008

Furthermore of primary importance are the following assumptions:

1. The maximum effect distances for natural gas dispersions have been calculated up to ½ LFL (Lower Flammability Limit). Vapour clouds can only be ignited when between LFL and UFL (Upper Flammability Limit) (i.e. ½ LFL can not be ignited), thus ½ LFL contours must be considered to be conservative.
2. In addition the natural gas dispersions have been based on neutral gas dispersion models. As described in the studies, the actual dispersion of natural gas from a pool of LNG will be a combination of initially dense gas dispersion (cold natural gas), followed by neutral gas dispersion (partly warmed up natural gas) and finally light gas dispersion (normal temperature natural gas). Thus, using neutral gas dispersion models, the effect distances must be considered to be conservative.

Containment of spills at the facility was considered based on the requirements of the NS Department of Energy Code of Practice (CoP) for LNG facilities and the CSA Z276-07. In summary, there will be containment for spills at the terminal, specifically in the vicinity of LNG Booster pumps, submerged combustion vaporizers and the boil off gas (recondensor) area. Containment is not considered on the jetty as the unloading arms in the transfer area over the waters edge will be made of solid metal piping. Containment on the trestle is also not considered as the trestle simply supports the solid metal cryogenic lines transporting the LNG to the tanks. Furthermore, impoundment on the jetty/trestle is considered not feasible and technically difficult to collect about 150 - 200 m³ (or even more) of LNG at a relatively small area (jetty head) and at such a distance to shore. If the LNG collected at the jetty would be routed to shore, the majority of LNG will likely vaporize before reaching shore.


NB: Please note that a conservative calculation of the ½ LFL effect distance in case of a 2 minute outflow from one LNG unloading arm (full bore rupture) was completed.

Information Request:

4. *The rerouting of Route 316 as shown in the documents appears to place the new road within a risk area passing between the storage tanks and regasification plant.*

MapleLNG Response:

The individual risk as defined in the QRA is the likelihood or probability per year that a person who is continuously present and unprotected at a particular location will die as a consequence of an accident at the site. Therefore, on roadways where individuals are only

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Gary Cleary – Municipality of the District of Guysborough	IR Date: May 2, 2008

occasionally present, the fatality risk is considered to be significantly less because it is not continuously occupied.

A road is thus not normally considered land use in relation to a QRA and as such it is not unacceptable to run the road through areas with risk contours above 10^{-4} .

Information Request:

7. *The Environmental Assessment for the project reviewed by the public and the Regulator did not consider the issue of early regasification, which would be a material change in the project development. The references in the permit documents are the first time this concept was introduced to the public or the Municipality.*

MapleLNG Response:

The on-board regasification of LNG is being investigated to provide further opportunities for the operation of the LNG facility such as the ability to provide natural gas to the market before the terminal has completed commissioning and the ability to provide additional send-out capacity for the terminal if future spot cargoes are available.


MapleLNG does not consider the inclusion of the early regasification option as a formal request in the Permit to Construct to move forward with the execution of this work. Early regasification was included in the submitted Permit to Construct application to inform the UARB that this alternative could be studied in further detail. Should MapleLNG decide to pursue this option, an evaluation of the impact on current permits, QRA and regulatory approvals would be completed from a project development and timing perspective.

Information Request:

5. *The construction execution plan does not appear to adequately address safety of surrounding communities and in particular school bus traffic.*

MapleLNG Response:

A Transportation Management Plan has been prepared in accordance with Condition 1.9 of the Environmental Assessment Approval and has been approved by Nova Scotia Transportation and Infrastructure Renewal. This plan is linked to the traffic impact study completed under Condition 1.3. The plan covers the following items: identification of

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Gary Cleary – Municipality of the District of Guysborough	IR Date: May 2, 2008

primary and secondary transportation routes; details of all required road realignments and upgrades; transportation schedules; dust management measures; safety management measures; methods to ensure contractor compliance; monitoring measures; and communication policies.

Information Request:

- 6. *The conceptual design does not appear to address concerns related to potential significant rise of sea level on marine facilities.*

MapleLNG Response:

As per the attached figure, the minimum elevation of the structure is CD+8.62 m. For the trestle, the lowest level of the superstructure is chosen at CD +9.00 m and for the loading platform, the lowest level is CD +10.35 m. Considering a sea level rise of 0.60 m, the elevation of the loading platform is still sufficient; see attached Drawing 0381-004: Typical Cross Sections and Side Views.

The trestle cross beams slope up at the underside (see attached Drawing 0381-004) leaving a small area of exposed concrete. The additional load due to wave crests contacting the concrete cross beam support is small compared to the total wave load. As the ice load is significant higher than the wave load on a pile, there is ample safety left for wave conditions (overall safety factor of approximately 5.0) and therefore some additional load on the underside of the concrete cross beam will have no effect.

ATTACHMENTS FOR GARY CLEARLY RESPONSE

Attachment 1
Standard Operating Procedures
Domestic Water Well Complaints

Standard Operating Procedure Domestic Water Well Complaints

Maple LNG will establish a filing system and designate an individual responsible for receiving domestic water well complaints.

Designate will document the following information during initial conversation with complainant:

- f* Homeowner name, address (civic and mailing) and contact information.
- f* Type of water supply (i.e., drilled well, dug well or spring).
- f* Nature of the problem (i.e., quantity and/or quality issues).

If the complaint is managed at this time, Designate will simply file the information and provide notification to Nova Scotia Environment and Labour (NSEL).

If the complaint warrants investigation, Designate will initiate action immediately. This will involve:

- f* Contact to NSEL who will choose whether or not to get involved.
- f* Determination of the need to contact an independent “qualified person (QP)” to handle the investigation. The QP will be asked to respond in a timely manner satisfactory to the homeowner.

Depending on the nature of the complaint, an investigation may include one or more of the following activities:

- f* Physical assessment:
 - Measurement of water level in the well
 - Removal and assessment of the pump and; noting that only persons licensed to do so under the NSEL Well Construction Regulations will remove or alter the position of a pump located in a well.
 - Video log of the well
 - Flow test
- f* Chemical assessment:
 - Collection/submission of a water sample to a Canadian Association of Analytical Environmental Laboratory (CAAEL) certified facility
- f* Comparison of physical and/or chemical results with baseline survey information.
- f* Preparation and submission of a report to the homeowner and NSEL.

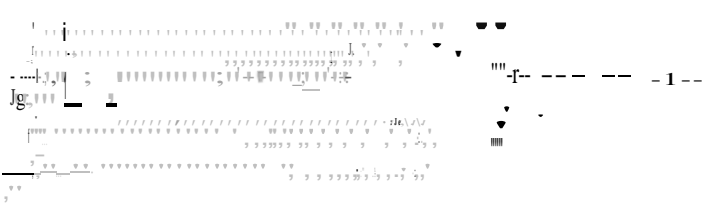
Depending on the results of the investigation, mitigation may include:

- f* Provision of a temporary water supply.
- f* Well replacement.
- f* Follow-up testing.

f Preparation and submission of a final report to the homeowner and NSEL.

Designate will file all relevant information pertaining to the complaint.

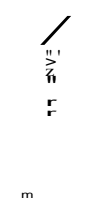
SECTION A-A



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SECTION A-A



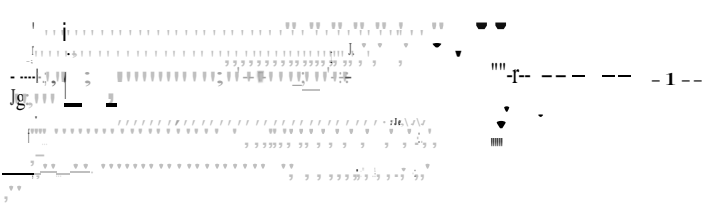
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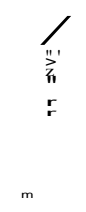
SECTION B-B



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SECTION B-B



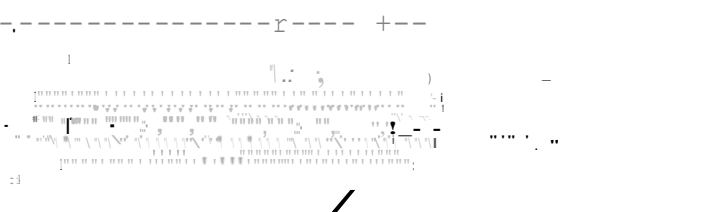
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SECTION C-C



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SECTION C-C



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SECTION D-D



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SECTION D-D



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GENERAL INFORMATION: REVISIONS AND NOTES

BERT INGLINE

SIDE VIEW 30

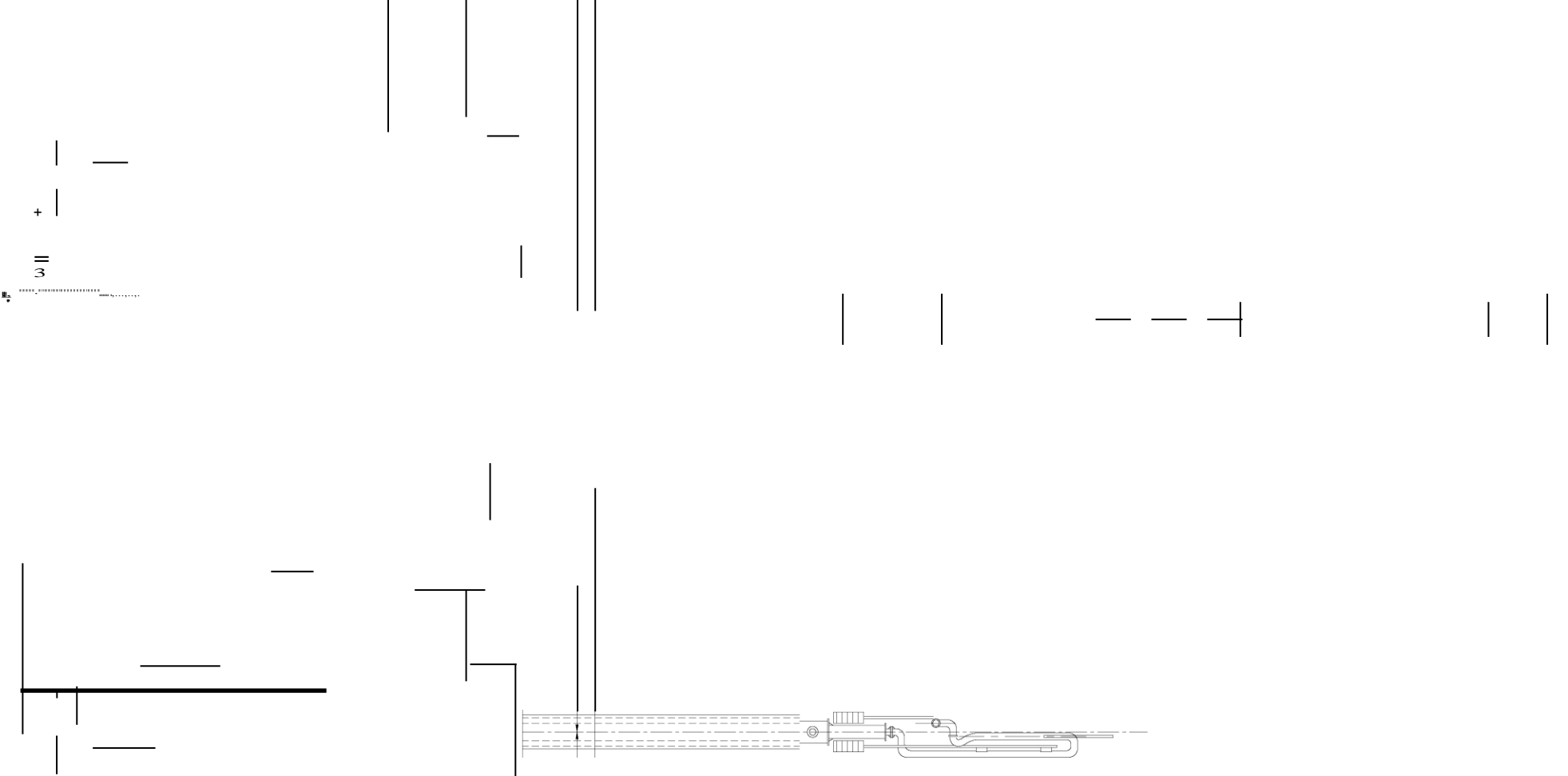
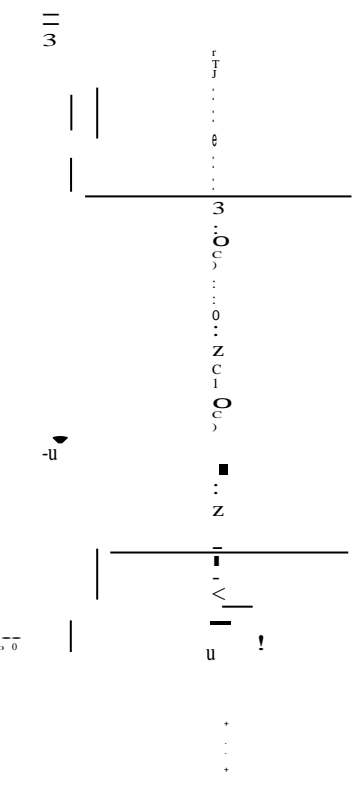
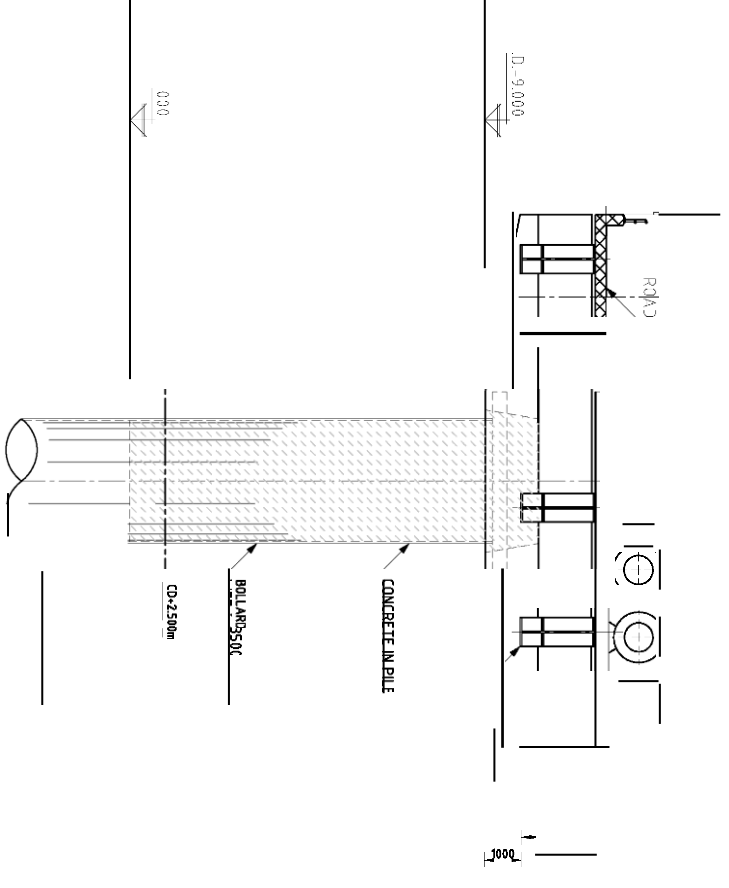
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Maple LNG Nova Scotia

TRIPPOSE ON SIDE VIEW

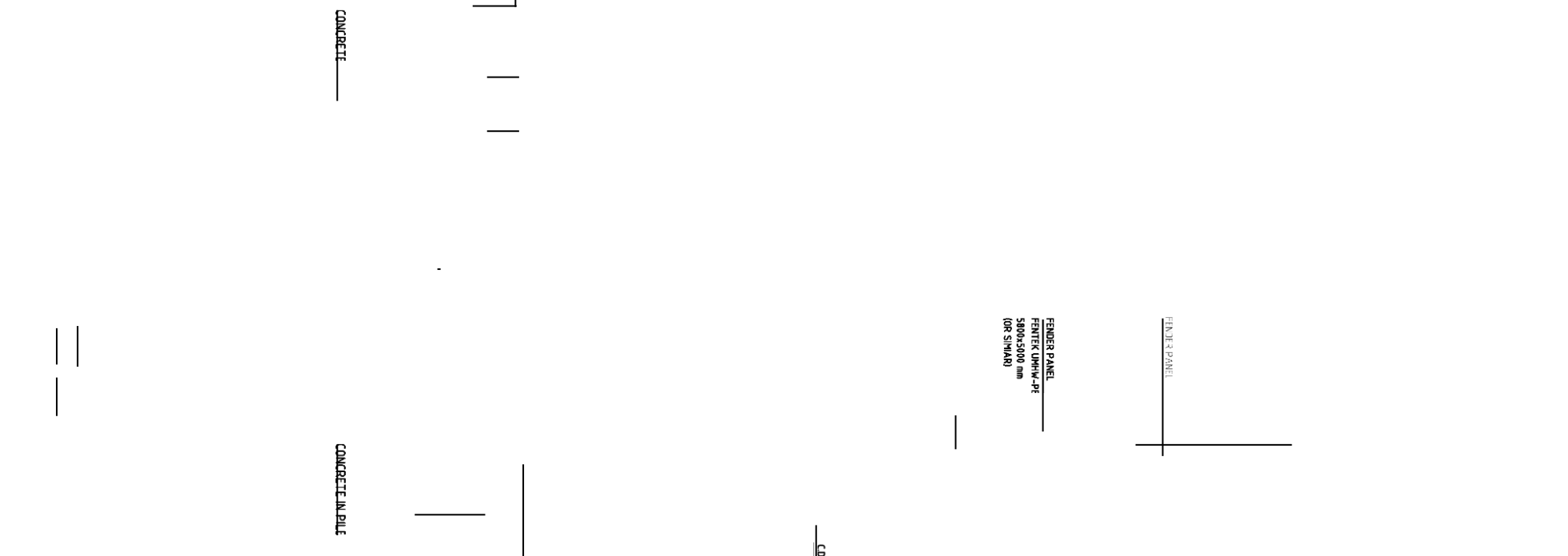
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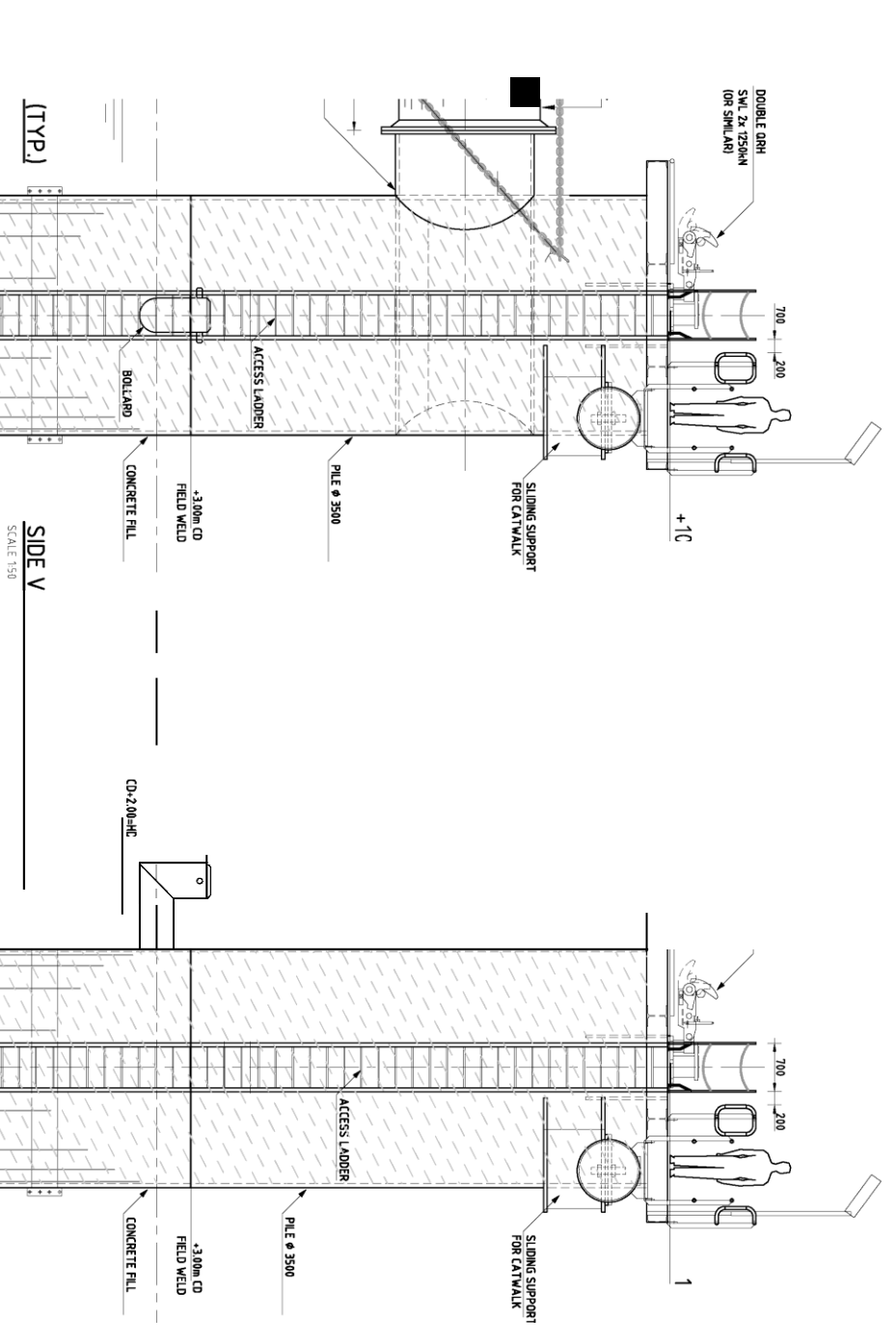


FENDER PANEL
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FENDER PANEL



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(OR SIMILAR)




NO.	DESCRIPTION	DATE	BY	CHKD.
1	CONCEPTUAL DESIGN	02/02/2007
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HASKON
MARITIME

3000 AV. VAN DER BEEK
1105 CA, THE HAGUE
THE NETHERLANDS
TEL: +31 (0)70 426 2200
FAX: +31 (0)70 426 2201
WWW.HASKON.NL

Project Number: 950643.01 / 0381-004
Drawing Number: ...

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct LNG-MAPLE-PC-01	
	Information Requested By: EnCana	IR Date: May 7, 2008

Information Request:

EnCana is confident that properly designed, the Maple LNG project can co-exist with its Deep Panuke pipeline without posing an inappropriate risk to public health and safety. The purpose of EnCana's written comment is to request that the Board ensure that Maple LNG consider in the course of its next stage of design the potential impact of the two projects and design its project appropriately to mitigate any identified risk.

EnCana has reviewed the Maple LNG application for a permit to construct filed on March 11, 2008 with the Nova Scotia Utility and Review Board. EnCana notes that in Volume 3 "Safety, Health & Environment" Maple LNG has filed a FEED Risk Assessment based on its proposed facility layout. EnCana has the following comments regarding the FEED Risk Assessment:

1. *Reference - Volume 3, Section 3.a "Risk Assessment", Section 2.6 "Surrounding land use"*

MapleLNG does not mention the Deep Panuke onshore pipeline which will be located in the 100m pipeline corridor next to their facilities.

2. *Reference – Volume 3, Annex 3.A1 "Quantitative Risk Assessment (QRA) – Section 6.1 "Risk acceptability criteria"*


The risk acceptability criteria of MIACC (Figure 6.1) indicates that no other land use should be permitted within a 10E-4 risk contour. In Figure 6.2 the 10E-04 risk contour appears to overlap with the edge of the designated 100m pipeline corridor.

3. *Reference – Volume 3, Annex 3.A1 "Quantitative Risk Assessment (QRA) – Section 7 "Risk Related to External Influences"*

MapleLNG does not mention the Deep Panuke pipeline located in the 100m pipeline corridor.


MapleLNG Response:

Regarding comments 1 and 3 MapleLNG will revise the quantitative risk assessment (QRA) at least 30 days prior to construction to include EnCana's Deep Panuke project in all applicable sections of the assessment including surrounding land use and risk related to external influences.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct LNG-MAPLE-PC-01	
	Information Requested By: EnCana	IR Date: May 7, 2008

In response to comment 2, the individual risk as defined in the QRA is the likelihood or probability per year that a person who is continuously present and unprotected at a particular location will die as a consequence of an accident at the site. Therefore, on the pipeline where individuals are rarely present, the fatality risk is considered to be significantly less because this area of the pipeline corridor is buried and not continuously occupied.

A pipeline is thus not normally considered land use in relation to a QRA and as such it is not unacceptable to run the pipeline through areas with risk contours above 10^{-4} .

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Bethany Keddy	IR Date: May 2, 2008

Information Request:

I urge the N.S. Utility and Review Board to carefully examine MapleLNG's plans for a dam and how the dam construction and operation could impact the safety of human beings (i.e. local residents) and other species.

MapleLNG Response:

The dam proposed for Meadow Lake is a component of the adjacent Keltic Petrochemicals (Keltic) Project to provide that project's process water needs and is not a component of the MapleLNG project and not being applied for under this Permit to Construct application. Both the Keltic and what was to become the MapleLNG projects were assessed together as part of the Provincial Environmental Assessment (EA) was submitted by Keltic in August 2006. The MapleLNG project was purchased from Keltic by 4Gas and partner Suntera Canada Ltd. in the latter stages of the provincial EA process. Following Provincial EA approval of the August 2006 assessment in March 2007, the Province of Nova Scotia agreed to provide a separate EA approval for the MapleLNG project in recognition that the Proponent for the LNG component of the Keltic assessment was a separate, unrelated company (MapleLNG).

Information Request:


I urge the Board to take a careful look at how Maple LNG plans to deal with gold mine tailings that remain at the site of the proposed LNG plant. If Maple LNG is granted a construction permit, this will necessitate that the gold mine tailings will be stirred up. If this occurs, why will it be allowed to occur?

MapleLNG Response:

A mine tailings management approach has been prepared in accordance with Condition 1.5 of the Environmental Assessment Approval. This approach has been approved by Nova Scotia Environment and will form the framework for a management plan to mitigate the human health and environmental impacts associated with disturbance of the historic mine tailings.

Information Request:

I urge the Board to carefully examine how emissions produced by the proposed LNG facility will impact the safety of people and other species. This includes emissions from LNG tankers. How safe will it be to breathe the air?

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Bethany Keddy	IR Date: May 2, 2008

MapleLNG Response:

Air emissions from LNG ships berthed at the jetty combined with the onshore facility equipment have been addressed in the provincial EA condition 1.4 and approved by NSE. In summary, air emissions modeling was conducted to assess air emission impacts from the project on the surrounding geographical area. The results indicated the contaminants met the applicable maximum ground level concentrations for air contaminants as outlined in the Nova Scotia air quality regulations and Canada's National Ambient Air Quality Objectives.

Information Request:

I wonder how many Board members have actually traveled the twisty country roads that lead to Goldboro? If you have done so, you will realize that increased traffic on these roads as a result of LNG plant construction poses real safety issues. These roads are not ready for a huge increase in heavy equipment traffic.


MapleLNG Response:

A Traffic Impact Study and a Transportation Management Plan have been prepared in accordance with Conditions 1.3 and 1.9 of the Environmental Assessment Approval. Nova Scotia Transportation and Infrastructure Renewal have recently approved these plans.

These plans cover the following items: identification of primary and secondary transportation routes; details of all required road realignments and upgrades; transportation schedules; dust management measures; safety management measures; methods to ensure contractor compliance; monitoring measures; and communication policies.

Information Request:

I urge the Board to take a close look at the sheer size of LNG tankers and the ways in which these vessels pose risks to safety. Local fisherman can tell you about the shoals near Goose Island and Country Island, and I have to say I'm surprised that Transport Canada has given approval for LNG tankers to sail these waters. There is a risk of

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Bethany Keddy	IR Date: May 2, 2008

tankers going aground. There are also risks of explosions, both accidental and intentional. These risks are not acceptable in any populated area.

MapleLNG Response:

Since commercial LNG transport began in 1959, LNG has been safely transported, stored, and delivered to densely populated cities in the US, Europe, and Japan. LNG has an excellent safety record with more than 33,000 carrier voyages covering 60 million miles around the globe without a major accident over a 45-year history (NS EA, 2006).

Ocean-going tanker transportation of LNG has a long record of safe operation. Few accidents have occurred since the first converted freighter delivered a Lake Charles, Louisiana cargo of LNG to the UK in January 1959, none involving a fatality or major release of LNG. The outstanding LNG shipping safety record is attributable to continuously improving tanker technology, tanker safety equipment, comprehensive safety procedures, training, equipment maintenance, and effective government regulation and oversight (NS EA, 2006).

Risk associated with external influences such as acts of sabotage or terrorism of the LNG facility have been reviewed in the landside QRA and determined to be low.


In addition, shipping movements associated with LNG berthing and transit in Stormont Bay have been simulated in collaboration with Transport Canada as part of the TERMPOL process and these simulations have confirmed that with appropriate mitigative measures (ie. qualified pilots and tugs, navigational aids, etc.) ships can safely access the facility.

Information Request:

I ask the Board to study safety issues with respect to the marine terminal where liquid natural gas will be unloaded.

MapleLNG Response:

Please see above response.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Bethany Keddy	IR Date: May 2, 2008

Information Request:

What is Maple LNG's fire fighting plan? At this time, Goldboro and the surrounding communities are served by a volunteer fire department. Members of the fire department (i.e. volunteer firefighters) are scattered over a rural area and can not get to the fire hall in just five minutes. Furthermore, this volunteer fire department is not trained or equipped to deal with the likes of a major explosion and subsequent fire at an LNG facility. A major explosion could result in a gas or other toxic leak that might do physical harm to firefighters (as well as other local residents), making it impossible for firefighters to even attempt to fight a fire. Is Maple LNG planning to establish a full time fire department with appropriate equipment?

MapleLNG Response:

The MapleLNG facility will have dedicated fire fighting capabilities.


Information Request:

As far as I know, Maple LNG has not secured an LNG supplier. (Or perhaps Maple has simply not made this information public.) Is it possible that Maple LNG's project design may be altered further, pending negotiations with an LNG supplier? Also, does Maple LNG have all mitigation measures carefully planned and accounted for, or could additional mitigation measures result in altering the project's design?

MapleLNG Response:

Any alterations to the current project design will require an evaluation of the impact of these changes to the current permits, QRA and other approvals. If revisions to design are needed, they will have to be submitted to the applicable regulatory agencies for approval. In general, LNG terminals are designed to process LNG with varying compositions and from a variety of sources.

All proposed mitigation measures have been approved by both the Provincial and Federal Departments of Environment. Any changes to these mitigation measures have to be approved by the responsible Environment agency.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Mr. Arthur McLaughlin, P.Eng.	IR Date: April 18, 2008 & May 5, 2008


Information Requests April 18, 2008:

1. *The Ervine report mentions there are several small pits that are rather shallow and about a meter in diameter. It also mentions there are many trenches, some of them more than 10 meters in length.*
 - a) *Do these pits and trenches pose any safety hazards in the development of the project and in site preparation for the storage tanks?*
 - b) *How does Maple propose to infill these pits and trenches?*
 - c) *Are these pits and trenches easily infilled during the site preparation process?*

2. *The Ervine report also references several shafts that are currently up to two meters in depth.*
 - a) *What is shaft as opposed to a pit or a trench?*
 - b) *Do these shafts presently pose a safety risk?*
 - c) *Are they usually infilled and levelled during site preparation?*

3. *In Jacques Whitford's report, reference is made to test Pit No. 9 where exposed mine tunnels were discovered. Apparently, when Jacques Whitford were exacting for Test Pit No 9 they went through the roof of an opening and tunnels were visible. Any possibility of subsidence would be a very great concern.*
 - a) *Has Maple determined the length, width and direction of these tunnels?*
 - b) *Does these tunnels pose a safety hazard?*
 - c) *Have the concerns relating to Test Pit No. 9 been clarified?*
 - d) *It is costly process to level and infill these tunnels?*

4. *The Jacques Whitford report states on page 4 that the tanks are 80 meters in diameter.*
 - a) *What is the height of the tanks above ground?*

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Mr. Arthur McLaughlin, P.Eng.	IR Date: April 18, 2008 & May 5, 2008

- b) *It is noted that the geodetic elevation of the tank base is above 15.0 meters; would this be the level above mean sea level?*
- c) *Will these storage tanks be considered pressurized vessels and, if so, how would over pressure be relieved?*

MapleLNG Response:


With regards to questions 1 – 3, the Jacques Whitford (JW) and Ervine geotechnical reports were preliminary reports that indicated the ‘presence’ of surface features indicative of historic mining activities such as shafts, trenches and pits. To date, no further site investigations have been conducted. The level of effort and degree of detail of the JW study was reflective of the stage of project development at that time.

Regarding question #4, the tank dimensions are located in Annex 2.B1 (LNG Storage Tank Lay-Out) of Volume 2 (Conceptual Design) in the application documents. The current tank designs are based on a diameter of approximately 80 m and a height above ground of approximately 49 m. All dimensions will be confirmed by a tank engineering contractor at a later stage of design.

The approximate geodetic elevation of 15 m noted in the JW report is the level above mean sea level. These design details and dimensions are subject to change as our project advances to the next stage of detailed design.

The LNG tanks are not considered pressurized vessels. The LNG is stored at atmospheric pressure however, during normal operation boil-off gas (BOG) may be produced by warming the LNG via sources such as energy of pumping and heat leak into the tanks and process pipe-work. BOG is collected in a BOG header that balances the pressures between the tanks. A variety of options are available for the handling of BOG once it reaches the BOG header and are described in the application documents. In general, normal routing of BOG is to the BOG compressor/condenser to recover all BOG and eliminate loss to the atmosphere. Only in the case of an emergency may flaring or venting be an option.

A more comprehensive combined geotechnical and geophysical investigation program will be conducted during the next stage of design. The results of this study will be reviewed not only by MapleLNG and our EPC contractor but also by Lloyd's Register, the certifying authority selected by the UARB and we can confirm that the final design of the tank foundations and construction of the foundations and tanks will be fully approved by the appropriate parties.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Mr. Arthur McLaughlin, P.Eng.	IR Date: April 18, 2008 & May 5, 2008

Information Requests May 5, 2008:

I enclose a copy of a letter provided to me by MapleLNG dated April 29, 2008, in response to my letter to your Board of April 18, 2008, a copy of which is also enclosed.

Maple has adequately addressed the fourth question posed in my letter.


However, Maple acknowledges that the first three questions posed in my letter regarding the effects of former mining activities at the site “are indeed critical questions that will be answered prior to any site development.”

I would recommend to the Board that it should not issue a permit to construct until these significant safety issues at the site are fully addressed.

Although Maple states that an investigation program will be conducted during the next stage of design, I would submit that the safety issues I have raised should be clearly identified to the Board before a permit to construct is issued. This is necessary in order that the Board can specify the safety issues and procedures that must be followed as a condition of the permit.

MapleLNG Response:

MapleLNG acknowledges this comment and believes that we have addressed these comments in our response above.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Ms. Trudi Rhynold	IR Date: April 24, 2008

Information Request:

The dam proposed to produce power for the LNG facility poses a threat to the ecosystem, as well as to the safety of the residents who live down stream through flash flood possibilities and changes to the watershed and water table. This dam is only to be used exclusively for power for the Industry, not for clean power for the community, or the province, which still requires changes from the coal based infrastructure currently in use.

MapleLNG Response:


The dam proposed for Meadow Lake is a component of the adjacent Keltic Petrochemicals (Keltic) Project to provide that project's process water needs and is not a component of the MapleLNG project and not being applied for under this Permit to Construct application. Both the Keltic and what was to become the MapleLNG projects were assessed together as part of the Provincial Environmental Assessment (EA) was submitted by Keltic in August 2006. The MapleLNG project was purchased from Keltic by 4Gas and partner Suntera Canada Ltd. in the latter stages of the provincial EA process. Following Provincial EA approval of the August 2006 assessment in March 2007, the Province of Nova Scotia agreed to provide a separate EA approval for the MapleLNG project in recognition that the Proponent for the LNG component of the Keltic assessment was a separate, unrelated company (MapleLNG).

Information Request:

Emissions produced at the facility contain the substance PAH, among others, which could cause cancer. These substances do not dissipate, but accumulate in the fallout area around the plant. This is a public safety threat.

MapleLNG Response:

Air emissions from LNG ships berthed at the jetty combined with the onshore facility equipment have been addressed in the provincial EA condition 1.4 and approved by NSE. In summary, air emissions modeling was conducted to assess air emission impacts from the project on the surrounding geographical area. The results indicated the contaminants met the applicable maximum ground level concentrations for air contaminants as outlined in the Nova Scotia air quality regulations and Canada's National Ambient Air Quality Objectives. Natural gas combustion produces insignificant amounts of Polycyclic Aromatic Hydrocarbons (PAHs).

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Ms. Trudi Rhynold	IR Date: April 24, 2008

Information Request:

The increased heavy machinery and equipment traffic on rural roads during construction will pose an added concern.

MapleLNG Response:

A Traffic Impact Study and a Transportation Management Plan have been prepared in accordance with Conditions 1.3 and 1.9 of the Environmental Assessment Approval. Nova Scotia Transportation and Infrastructure Renewal have recently approved these plans.

These plans cover the following items: identification of primary and secondary transportation routes; details of all required road realignments and upgrades; transportation schedules; dust management measures; safety management measures; methods to ensure contractor compliance; monitoring measures; and communication policies.

Information Request:


The location of the construction site includes an area of remaining gold mine tailings. The local residents have been told not to ride their ATV's in the area due to the possibility of toxic dust being released into the air. This restriction was placed to protect the residents from the wastes abandoned by earlier industry. This proposed industry would now be allowed to stir it up, even as the local populations are told to stay away from it. This is a hypocritical situation.

MapleLNG Response:

A mine tailings management approach has been prepared in accordance with Condition 1.5 of the Environmental Assessment Approval. This approach has been approved by Nova Scotia Environment and will form the framework for a management plan to mitigate the human health and environmental impacts associated with disturbance of the historic mine tailings.

Information Request:

The magnitude of the ships used in transporting LNG is also a threat to public safety. The ships produce major CO2 emissions, and are considered terrorist targets. While the small community of Goldboro may itself not appear to be a target, its possible business

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Ms. Trudi Rhynold	IR Date: April 24, 2008

partnership with groups such as the Carlyle Group of Investors, out of Washington DC, makes the possibility of terrorist attack a reality in today's state of the world. I do not believe this is acceptable risk or stress to place upon the people of Guysborough County. The LNG industry has been frantically attempting to land its product up and down the seaboards of the US with much disapproval of the people there for these very reasons. Many projects have already been declined stating too much risk involved to public health and safety. We have been told that, for every project that gets denied in the States, it improves the chances of us getting a facility here, like that is somehow a good thing. I contend that this project is only meant to feed the American gas lines while we accept all of the risks in our backyards. This is not a development intended to provide quality jobs to our citizens, but meant to sneak a dangerous product into the American marketplace through the back door, provided by our NAFTA agreements. The arrangement made with Keltic Petrochemicals to be a feedstock for the proposal is merely a smokescreen, attempting to blind the residents and policy makers with much needed opportunity for employment.

MapleLNG Response:

LNG ship CO₂ emissions are addressed as part of MapleLNG's response to Condition 1.4 as stated in the air emissions response above.

Risk associated with external influences such as acts of sabotage or terrorism of the LNG facility have been reviewed in the landside QRA and determined to be low.


Natural gas exiting the MapleLNG facility is for the North American marketplace, including Canada.

Information Request:

The possibility of accidental or purposeful explosion as such a facility is real. The flawless safety record presented by this industry is untrue. I have found mention of a number of accidents on the website www.timrileylaw.com. I suggest your board investigate the actual number and scale of accidents that have already occurred with this industry, and not taken the industries documentation as the only proof.

MapleLNG Response:

A historic overview of LNG accidents has been addressed in the Provincial EA.

	Nova Scotia Utility and Review Board Public Comments to MapleLNG's Application for Permit to Construct NG-MAPLE-PC-01	
	Information Requested By: Ms. Trudi Rhynold	IR Date: April 24, 2008

Information Request:

I understand that the spill properties of LNG are not the same as oil in that the gas would spread out from a leak, along the ground and settle into low areas. Any life forms caught in the gas cloud would be asphyxiated. When the gas finds an ignition source, the entire cloud explodes. Possibilities of tankers running aground, breaches in infrastructure at the plant or in the pipelines are a huge safety concern. The limited number and the lack of resources of volunteer fire fighters in and around the small community this facility wishes to invade pose a serious threat to the local homes and habitat. The intensity of heat, and the toxins released in possible explosions could be a deterrent to those who would volunteer to protect their neighbour's homes, but not wish to accept the risks involved in fighting massive chemical fires. According to the report "Public Safety and FERC's LNG spin, What Citizens Are Not Being Told" (please find attached); "No other energy infrastructure brings together the four major risk factors that are associated with LNG marine receiving facilities: 1) high energy density, 2) very large inventories, 3) unusual release dynamics associated with extreme cryogenic temperatures, and 4) very large potential impact zones. Studies that examine LNG releases caused only by spills should be carefully questioned, since it is more likely that a major high rate release will not be simply a spill."

MapleLNG Response:

The MapleLNG facility will be designed and constructed such that it meets or exceeds the LNG industry design and operational standards (CSA Z276-07) and codes (Nova Scotia Department of Energy Code of Practice for LNG Facilities) that govern safety at these facilities.

In addition, shipping movements associated with LNG berthing and transit in Stormont Bay have been simulated in collaboration with Transport Canada as part of the TERMPOL process and these simulations have confirmed that with appropriate mitigative measures (ie. qualified pilots and tugs, navigational aids, etc.) ships can safely access the facility.

The MapleLNG facility will have dedicated fire fighting capabilities.

SCHEDULE "B"

PERMIT TO CONSTRUCT

NSUARB-LNG-MAP-PC-01

NOVA SCOTIA UTILITY AND REVIEW BOARD

**IN THE MATTER OF THE PIPELINE ACT AND THE GAS PLANT FACILITY
REGULATIONS**

- and -

IN THE MATTER OF AN APPLICATION by **MapleLNG LTD.** ("MapleLNG") for a **PERMIT TO CONSTRUCT** a **LIQUEFIED NATURAL GAS ("LNG") PLANT** at Goldboro, Guysborough County, Nova Scotia

WHEREAS MapleLNG applied to the Nova Scotia Utility and Review Board ("Board") by application dated March 11, 2008 for a Permit to Construct;

AND WHEREAS the application seeks approval to construct a LNG plant at Goldboro, Guysborough County, Nova Scotia as described in the application and hereinafter described as the "proposed works";

AND WHEREAS the Board issued Directions on Procedure whereby a public information session was held in Goldboro, Nova Scotia on April 7, 2008 to outline the role of the Board and to answer questions from members of the public concerning same, and whereby members of the public were invited to submit comments on the proposed LNG plant by May 7, 2008;

AND WHEREAS comments were filed by members of the public with the Board by May 7, 2008 and MapleLNG filed their responses to the comments on May 22, 2008;

AND WHEREAS the Front End Engineering Design for the proposed works is underway but is not yet completed;

AND WHEREAS the Certifying Authority for the Board pursuant to s. 22 of the *Gas Plant Facility Regulations (Nova Scotia)* is Lloyd's Register North America Incorporated ("LRNA");

AND WHEREAS the Board has the authority to issue a Permit to Construct pursuant to the *Pipeline Act* and the *Gas Plant Facility Regulations*;

NOW THEREFORE, the Board grants to MapleLNG a Permit to Construct the proposed works, subject to the following terms and conditions:

1. MapleLNG shall ensure that the proposed works are carried out and completed in accordance with:
 - (a) all federal, provincial and municipal laws, and in particular the *Pipeline Act*, the *Gas Plant Facility Regulations* and the *Code of Practice*, as amended from time to time;
 - (b) all applicable codes and standards, as amended from time to time;
 - (c) this Permit, as may be amended; and
 - (d) the application.
2. MapleLNG shall submit to the Certifying Authority, on a timely basis and in complete system packages, all design and materials information relating to components and systems required by the *Gas Plant Facility Regulations*, the *Code of Practice* and applicable codes and standards referenced therein.
3. Components or systems of the proposed works requiring design appraisal are to be identified by MapleLNG or on MapleLNG's behalf by its Independent Contractor and agreed to by the Certifying Authority prior to commencement of construction (the "Identified Components").
4. MapleLNG shall deliver to the Certifying Authority all design and materials information pertaining to the Identified Components as soon as possible and, in any event, before commencing field installation of each such Identified Component. If after review of such information, the Certifying Authority determines that an Identified Component does not or will not comply with the *Gas Plant Facility Regulations*, the *Code of Practice* or the applicable codes and standards referenced therein, the Certifying Authority shall notify MapleLNG and, upon receipt of such notice, MapleLNG shall promptly (and in any event prior to the submission of an application for a License to Operate) remedy any such noncompliance.
5. MapleLNG shall provide reasonable notice to the Certifying Authority of its intended schedule of activities for the proposed works and shall permit a representative from the Certifying Authority to be on site to observe the construction.
6. MapleLNG shall revise the Quantitative Risk Assessment at least 30 days prior to construction to include EnCana Corporation's Deep Panuke project in all applicable sections of the assessment including surrounding land use and risk related to external influences.
7. MapleLNG shall provide a copy of required permits and approvals, including but not limited to those from federal, provincial and municipal Departments, Boards and Agencies, to the Board and the Certifying Authority prior to

commencing construction of those portions of the proposed works which would be subject to such permits and approvals.

8. The Board requires MapleLNG to provide proof, satisfactory to the Board, of liability insurance in a minimum amount of \$20 million (Cdn.) relating to the construction of the proposed works.
9. Within 60 days of the date of this Permit to Construct, MapleLNG shall post a bond or other suitable security in the amount of \$500,000.00, payable to and in a form satisfactory to the Board, to ensure the fulfilment of MapleLNG's obligations with respect to the payment of all fees and costs payable by MapleLNG to the Board.
10. This Permit to Construct may not be transferred or assigned without the written approval of the Board, which shall not be unreasonably withheld.
11. (a) This Permit to Construct may be suspended or terminated by the Board where the Board believes, on reasonable and probable grounds, that MapleLNG or its contractor(s) has contravened or will contravene any of its terms or conditions.

(b) The Board shall give MapleLNG prior notice of its intent to suspend or terminate and a reasonable time period to remedy any breach or default.
12. Unless extended or earlier terminated, this Permit to Construct shall expire on March 31, 2012.

Dated at Halifax, Nova Scotia, this 11th day of June, 2008.

Clerk of the Board