

**REPORT AND RECOMMENDATIONS  
TO THE NOVA SCOTIA MINISTER OF ENVIRONMENT AND LABOUR  
FROM THE NOVA SCOTIA ENVIRONMENTAL ASSESSMENT BOARD**

**FOR  
THE REVIEW OF**

**KELTIC PETROCHEMICALS INC. PROPOSED LNG AND  
PETROCHEMICAL PLANT FACILITIES  
GOLDBORO, NOVA SCOTIA  
ENVIRONMENTAL IMPACT ASSESSMENT, FINAL REPORT**

**Submitted by:**

**Nova Scotia Environmental Assessment Board  
February 21, 2007**

Wednesday, 21 February, 2007

Honourable Mark Parent, Minister  
Nova Scotia Department of Environment and Labour  
5151 Terminal Road  
Halifax, NS B3J 2T8

Dear Minister Parent:

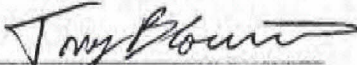
The Hearing Panel of the Nova Scotia Environmental Assessment Board is pleased to present its Final Report and Recommendations regarding the Proposed LNG facility, Petrochemical Plant, Co-generation Facilities and Meadow Lake water supply impoundment of Keltic Petrochemicals Inc. at Goldboro, Nova Scotia. This project was referred to the Environmental Assessment Board on September 1, 2006.

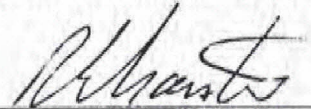
Eleven hearing sessions were held in Guysborough, Sherbrooke and Antigonish from November 20 to November 25, 2006. The members of the Hearing Panel were Tony Blouin, Ray Cranston and Penny Henneberry.

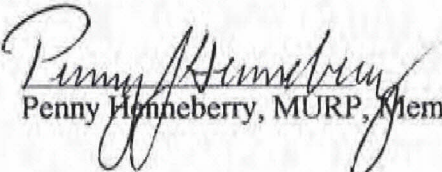
**The Panel recommends that the proposed project should proceed, subject to the recommendations as presented in this Report.**

We would be pleased to meet with you should any questions arise concerning any findings or recommendations in this Report.

Respectfully Submitted,  
Panel Members

  
Tony Blouin, PhD, Chair

  
Ray Cranston, PhD, Member

  
Penny Henneberry, MURP, Member

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## **Acknowledgements**

The Nova Scotia Environmental Assessment Board and Hearing Panel members wish to acknowledge the participation, professionalism and courtesy of the formal and informal Intervenors, members of the public, and representatives of the Proponent at the Environmental Assessment Public Hearings in Guysborough, Sherbrooke and Antigonish. The Chair and Panel members also wish to acknowledge the following individuals for their role in the hearings for the Keltic LNG and Petrochemical Plant project: Mr. Jim Gordon, Nova Scotia Environmental Assessment Board Administrator, for support throughout the process; Mr. Mark Rieksts and Mr. Stephen McGrath, Nova Scotia Department of Justice, for legal advice to the Panel; Ms. Carole MacDonald, administrative support for the hearings and for report preparation; and Ms. Tina Skeir for administrative support services.

## Executive Summary

This report presents the results of public hearings and Panel deliberations on the proposed Keltic liquefied natural gas (LNG) and petrochemical plant and electrical co-generation facilities to be located at Goldboro, Nova Scotia. The Hearing Panel was appointed by the Nova Scotia Minister of Environment and Labour from the membership of the Nova Scotia Environmental Assessment Board. The report provides an introduction, the legal context for the review, the background to the process, and a basic description of the undertaking. The report (Chapter 5) then summarizes the issues, organized under similar topic headings as the Environmental Impact Assessment (EIA) Report submitted by Keltic. Each section provides an overview of the topic, the impacts, mitigations, and follow-up. Input received from the public, Intervenor, and other hearing participants is summarized, and the Panel findings and recommendations are provided. Finally, Chapter 6 addresses issues which do not fit within the previous topic sections.

Environmental assessment is used as a planning tool at an early stage in the project development process. As such, it is typical that the information base relating to project design and construction will be incomplete. However, the Panel finds that there is a great deal of project detail and information which was not available for the conduct of this review, and that many questions had to be deferred to future studies and plans yet to be submitted (Section 6.2, this Report). The Panel also finds that in many respects the EIA Report submitted by Keltic does not adequately address the Terms of Reference issued by the Nova Scotia Department of Environment and Labour (NSDEL).

This review was conducted under the environmental assessment process of the Province of Nova Scotia. There is also an independent federal process under the Canadian Environmental Assessment Act (CEAA) which applies to this project, and which is currently under way. Many comments and requests were received from federal agencies during the provincial review. Some of these issues, which fall outside of the mandate of the provincial process, and can be deferred to the federal process, are identified as such.

The proposed Keltic LNG and petrochemicals project represents a scale and type of development which would be unique in Nova Scotia, and as such would present significant challenges to regulatory agencies having jurisdiction over aspects of the project. NSDEL (Environmental and Natural Resources Division, and Environmental and Monitoring and Compliance Division) has assured the Panel that it has, or can access, the required resources to adequately manage this project. A similar assurance has not yet been received from the Public Safety Division and the Occupational Health and Safety Division. If the project proceeds, this undertaking would significantly alter the socio-economic and bio-physical environment of the proposed project location and surroundings. While some impacts would be positive (employment and investment), other impacts to the environment and on the rural surroundings and way of life would be negative.

This proposed project has implications for a variety of both federal and provincial policies relating to environment and development. The Panel recognizes that a final decision will present significant challenges to the Nova Scotia Minister of Environment and Labour in balancing economic development with the need to ensure environmental sustainability. The scope of this report is necessarily focused on the review of the Keltic proposal, and was conducted within the constraints of the time and resources available to the Panel. While consideration of provincial policy relating to sustainability is beyond the scope of the Panel review of this project, the Panel feels that the Province must carefully consider the larger context. For this reason, a key recommendation is that the Minister determine whether the proposed Keltic project is environmentally sustainable, and make the findings public (Recommendation 6.1.5.1).

On balance, and in consideration of the positive and negative aspects of this proposal, the Panel recommends that the proposed project should proceed, subject to the recommendations as presented in this Report. These recommendations should be attached as conditions of any Ministerial approval for the Keltic project under Section 40(1)(b) of the *Environment Act* and Regulation 26(1) of the *Environmental Assessment Regulations*. The specific recommendations follow.

## RECOMMENDATIONS

The Environmental Assessment Board submits the following recommendations. The Board drew these recommendations from a consideration of Keltic Petrochemical's Environmental Assessment, *Keltic Petrochemicals Inc. Proposed LNG and Petrochemical Plant Facilities, Goldboro, Nova Scotia - Environmental Impact Assessment, Final Report*. The details leading to these specific recommendations can be found in Sections 5 and 6 of this report. The Panel recommends:

### Aboriginal Use of Land and Resources (5.1)

5.1.5.1 That prior to the issuing of any permits, the Proponent conduct further study into the traditional Aboriginal use of the proposed project site lands and that this information be used as baseline information to aid in identifying any areas that must be avoided during construction and operation. These results are to be provided to the Nova Scotia Department of Environment and Labour and other affected provincial departments.

5.1.5.2 That the Proponent enhance ongoing dialogue with the Aboriginal community in its consultation strategy and ensures Aboriginal representation on any Community Liaison Committee.

5.1.5.3 That the Proponent provide a compensation plan for any affected Aboriginal fisheries.

5.1.5.4 That the Proponent prepare a detailed Archaeological Monitoring Plan prior to the issuing of any permits and that the Plan include direction to stop all work on the site in the area of any significant archaeological discovery until authorization to resume work is given by appropriate authorities.

### Socio Economic Implications (5.2)

5.2.5.1 That the Proponent contribute resources to recreational and social opportunities, primarily for its workforce, that could be turned over to the local authorities in order to reduce the burden on local authorities for similar amenities.

5.2.5.2 That the Proponent continue to work with local communities, unions and education/training institutions to ensure that the types of skills required are clearly understood; that the Proponent provide financial incentives to encourage local persons to undertake the necessary training; and that the Proponent adopt a policy to give priority to hiring qualified local workers.

5.2.5.3 That the Proponent develop an Equal Opportunities Employment Strategy that ensures employment opportunities for under represented groups such as women, visible minorities and persons with disabilities.

### **Air Quality / Emissions / Atmospheric Effects (5.3)**

5.3.5.1 That prior to any construction activities, the Proponent supply to NSDEL seasonal baseline data for ambient and peak concentrations of gases and aerosols that may be released from the proposed project, including nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), volatile organic compounds (VOCs) and particulate matter [total suspended particulate (TSP), particulate matter less than 2.5 micrometres in diameter (PM<sub>2.5</sub>) and particulate matter less than 10 micrometres in diameter (PM<sub>10</sub>)].

5.3.5.2 That prior to any construction activities, the Proponent collect appropriate meteorological data at the proposed project site for at least two seasons. The Proponent will statistically and quantitatively compare this new data to Shearwater and Yarmouth climate data used in the EIA air quality dispersion model to ensure that valid data is used in the model. The Proponent will identify details about microclimate issues in the project area that could affect the dispersion model. These findings will be given to NSDEL and other appropriate agencies for review.

5.3.5.3 That an updated air dispersion model be prepared by the Proponent using the updated baseline air quality data and the verified meteorological data that were requested in Recommendation 5.3.5.2. This new model will be used to produce maximum and annual concentration contour maps for the air quality components identified in Recommendation 5.3.5.1. The maps will cover a region with a radius of at least 25 km from the Goldboro project site and include specific VOC contour maps. These findings will be given to NSDEL and other appropriate agencies for review prior to any construction activities.

5.3.5.4 That the Proponent supplies additional air emission data and interpretations to NSDEL prior to any construction activities.

- (a) This data will include chemical characterization of Sable Offshore Energy Inc. (SOEI) gas plant particulates and SO<sub>x</sub> emission data from the SOEI plant.
- (b) Emission data from the proposed petrochemical plant will be provided for SO<sub>x</sub>, O<sub>3</sub>, and known specific VOCs, based on relevant Alberta and Ontario data reflected in Environment Canada's Intervenor submission (p.17).
- (c) The Panel requests that Table 9.6-1 of the EIA report be revised by the Proponent to address air emission errors, inconsistencies and omissions (see section 5.3.3 Identified Concerns/Panel/Emission Data, this report).
- (d) Emission data from the proposed incinerator at the project site will be provided by the Proponent, including emission compounds, concentrations and incinerator hours of operation.



(e) An Incinerator Monitoring Plan will be prepared and implemented (section 6.2, this report).

(f) A complete project inventory of greenhouse gas emissions will be provided by the Proponent, including carbon dioxide, and the CO<sub>2</sub> release equivalents for methane, chlorofluorocarbons, hydrochlorofluorocarbons and sulfur hexafluoride. The Proponent will provide an analysis of greenhouse gas emissions from the proposed petrochemical plant and how these emissions fit with Nova Scotia's greenhouse gas reduction goals.

5.3.5.5 That the Proponent begin real-time ambient air quality baseline monitoring in the community, at the industrial park and in surrounding communities prior to any construction activities. A detailed plan of the monitoring program, as well as a list of the individuals or agencies responsible for overseeing the program, doing the data analyses, and enacting the necessary adjustments will be provided to NSDEL.

5.3.5.6 That the Proponent's communications strategy include procedures to share real-time air quality data and predicted model results with NSDEL and the public.

#### **Noise/Light (5.4)**

5.4.5.1 That the Proponent's Noise Monitoring Program, rather than monitoring noise through complaints, ensure that sound levels meet the lowest levels as established by all levels of government. The plan must not be dependent on impacts on 'sensitive receptors' which are often defined as public uses such as schools and health care facilities (these are not near the project site). The plan must also include methods by which the marine environment will be monitored for noise as a result of construction and operation, including shipping and marine terminal operations.

5.4.5.2 That the Proponent submit a Lighting Design Plan and establish a Light Monitoring Plan for approval by NSDEL prior to the issuing of any permits. The Light Monitoring Plan is to include a means of regularly monitoring bird mortality and lighting levels rather than depending upon complaints from nearby residents and the public.

#### **Surface Water and Wetlands (5.5)**

5.5.5.1 That prior to the issuing of any permits, the Environmental Protection and Erosion and Sediment Control Plans be submitted by the Proponent and approved by NSDEL. These Plans must include sufficient detail to enable NSDEL to ensure that erosion and sediment control measures are adequate, particularly with regard to the proposed removal of organic soils and vegetation from the area to be flooded at Meadow Lake, so as to minimize impacts to the lake and downstream systems.

5.5.5.2 That prior to the issuing of any permits, the Wetland Compensation Plan be submitted by the Proponent and approved by NSDEL. This Plan must include adequate

plans for avoidance, rehabilitation, or compensation for disturbance or destruction of wetlands, in accordance with the Wetlands Policy of NSDEL. A Wetland Compensation Plan is to be added to the list of reports and plans that are to be prepared by the Proponent (Section 6.2, this report).

5.5.5.3 That prior to the issuing of any permits, the Proponent complete an assessment of the impacts of potential dam failure at Meadow Lake to the satisfaction of NSDEL, including possible impacts to Route 316.

5.5.5.4 That prior to any construction activities, the Proponent undertake a phosphorus modeling exercise for Meadow Lake, to assess the present and predict future trophic states of the lake. NSDEL has developed a standard lake phosphorus model which may be used for this purpose. A receiving water assimilative capacity study must also be done for Betty's Cove Brook and any other freshwaters receiving runoff or effluent from the project site.

5.5.5.5 That the water quality monitoring program to be undertaken by the Proponent include standard water quality parameters such as metals, oxygen, pH and total phosphorus, in addition to those proposed. A detection limit of 0.002 mg per litre should be used for total phosphorus. Regular monitoring of Meadow Lake, major tributary streams, and Isaacs Harbour River should begin as soon as possible (prior to any construction activities) and continue for a suitable period after construction and during operations, as determined by NSDEL. Monitoring for mercury is particularly important (see Section 6.3, this report).

5.5.5.6 That the undisturbed buffer zone between wetlands or other waterbodies and adjacent construction activities be increased from 15 metres to 30 metres.

## **Ground Water (5.6)**

5.6.5.1 That the drilled test wells continue to be monitored by the Proponent for water chemistry and coliform bacteria. These test wells must be clearly identified during the construction phase and not disturbed, to allow for long-term monitoring for a suitable period of at least several years during the operational phase, as determined by NSDEL.

5.6.5.2 That the Proponent establish an arbitration and resolution procedure to deal with impacts to wells and drinking water supply for residences near the project area to the satisfaction of NSDEL and Nova Scotia Department of Health Promotion and Protection (NSHPP), to be delivered to homeowners prior to any construction activities. This procedure should specify the types of permanent solutions to be provided in cases where they may be needed.

## **Marine Water (5.7)**

5.7.5.1 That NSDEL and appropriate federal authorities require the Proponent to initiate, prior to any construction activities, a marine water and sediment quality monitoring program, with scope and parameters to be determined by those government authorities.

5.7.5.2 That the Proponent conduct, prior to the issuing of any permits, a receiving water assimilative capacity study for Isaacs Harbour, in accordance with NSDEL regulations for wastewater and stormwater discharge approval.

## **Terrestrial Habitat (5.8)**

5.8.5.1 That NSDEL and NSDNR ensure that mitigative and monitoring measures for wildlife and vegetation are adequate and that they are applied as required, and fully documented in the Environmental Protection Plan (EPP).

5.8.5.2 That bird mortality due to collision with structures be documented by the Proponent, and criteria developed in the EPP to determine when additional mitigative measures must be developed and applied.

## **Fisheries, Aquaculture and Resource Harvesting (5.9)**

5.9.5.1 That the Proponent continue negotiations with all local and Aboriginal fishers (not just lobster fishers) and that a Fishers Income Compensation Plan be developed prior to any permits being issued.

5.9.5.2 That the Proponent ensure baseline data (including water and sediment parameters as determined by NSDEL) is collected and an Aquaculture Monitoring Plan be developed in relation to the current mussel farm and other potential aquaculture users. As well, an Aquaculture Income Compensation Plan shall be developed.

5.9.5.3 That the Proponent complete a more detailed examination of the potential impacts on the salmon migration corridor and the impacts of the Meadow Lake alterations on this corridor prior to the issuing of any permits, with the results to be reported to NSDEL and DFO.

5.9.5.4 That the Proponent develop a detailed communications plan for fishers, and all other boaters and recreational users in relation to shipping traffic, and consideration be given to consulting with Transport Canada to establish a Harbour Master office to ensure safe and timely passage.

## **Aquatic Species (5.10)**

5.10.5.1 That the Environmental Effects Monitoring Plan for the project include representative sampling of sediment and fish tissue for mercury and methylmercury at Meadow Lake, as determined by NSDEL in consultation with Health Canada and the federal Department of Fisheries and Oceans (DFO) (see also Section 6.3 Mercury, this report).

## **Forestry (5.11)**

5.11.5.1 That the Proponent consult with NSDNR and StoraEnso to ensure that StoraEnso's forestry licensing needs are met as a result of the potential loss of forested land from production due to the flooding of Meadow Lake.

## **Geology (5.12)**

5.12.5.1 That as part of the request to collect and analyze additional soil and sediment samples for mercury before construction at the project site and at the proposed flooded area around Meadow Lake (Recommendation 6.3.5.3), the Proponent also measure arsenic in these samples and prepare arsenic concentration contour maps for soil and sediments (<63 µm fraction). NSDEL must be consulted to help prepare a sampling plan and to review the results.

5.12.5.2 That prior to the issuing of any permits, the Proponent verify that the project site is not contaminated with mercury or arsenic. This will be done following the principles of the Nova Scotia Guidelines for the Management of Contaminated Sites, under the direction of NSDEL.

5.12.5.3 That the Proponent develop a Tailings Management Plan prior to the issuing of any permits.

5.12.5.4 That the Proponent carry out seasonal baseline monitoring of pH in surface waters at the project site and at Meadow Lake before any land clearing and construction activities. The Proponent will do seasonal pH monitoring of surface waters at and near the project site during construction and production phases, in order to identify areas where acid-generating rock may have been disturbed. This activity will be included in the Acid Generating Rock Management Plan and will be co-ordinated with surface water monitoring activities requested in Recommendation 5.5.5.5.

5.12.5.5 That the Proponent carry out a marine-suspended-matter contaminant monitoring program prior to any construction activities to study the distribution, composition and movement of suspended particles in waters around local lobster beds and the Country Harbour mussel farm. This monitoring program will be repeated during

the production phase of the project. This program will be part of the Erosion and Sediment Control Plan. Local fishers are to be consulted to establish monitoring sites and NSDEL is to be consulted to design the monitoring program and to review the results.

### **Archaeology (5.13)**

5.13.5.1 That prior to the issuing of any permits or any site disturbance, a complete archaeological assessment of the remainder of the project site be undertaken, including those areas that may be flooded by the damming of Meadow Lake. This is to ensure project design is adjusted accordingly prior to work versus upon a significant archaeological discovery.

5.13.5.2 That prior to any permits being issued, an Archaeological Monitoring Plan be created in consultation with the descendents of Black Loyalists, the Mi'kmaq community and various subject experts including the Nova Scotia Museum and that the plan include a "stop work" clause covering archaeological finds and a detailed communications plan.

5.13.5.3 That the Office of African Nova Scotian Affairs coordinate plans for the erection of a memorial by the Proponent in the Red Head vicinity. In addition, a Visitation Plan be created to allow descendents to have escorted visits to the cemetery, with prior notice, or on pre-determined dates.

### **Transportation (5.14)**

5.14.5.1 That in order to fully address the potential impacts of vehicular traffic, the Proponent continue discussions with the Nova Scotia Department of Transportation and Public Works (NSTPW) regarding the preparation of a Traffic Impact Study for road upgrades, for any roads required for access to portions of the project site that may not be on Project lands (Meadow Lake Dam) and for the proposed road realignment for Route 316.

5.14.5.2 That the Municipality of the District of Guysborough has an opportunity to review the completed Traffic Impact Study and provide comments; that once completed, the Traffic Study be acceptable to NSTPW prior to the issuing of any permits.

5.14.5.3 That the Proponent acquire, at a minimum, an option to purchase the lands required for the development of the proposed Route 316 realignment to ensure that it is a viable proposal and that the Province will not be liable for any land acquisition costs.

5.14.5.4 That the Proponent submit to NSTPW, performance bonds and a commitment regarding the road upgrades and realignment project prior to proceeding with any proposed roadwork, based on industry standards and NSTPW requirements.

## **Health and Safety (5.15)**

5.15.5.1 That the Proponent conduct a baseline Human Health and Safety analysis as a basis for comparison with any future monitoring.

5.15.5.2 That the Proponent consult and work with local and regional protection agencies such as Fire, Ambulance, and Police services and EMO and REET to ensure that the safety concerns and issues associated with industries of this type are fully understood.

5.15.5.3 That as each engineering component design is completed, changed or modified all Health and Safety plans are reviewed and adjusted accordingly by the Proponent to ensure they meet the approval of NSDEL and all other federal and provincial and government departments that may play a role in Health and Safety issues.

5.15.5.4 That the Proponent ensure that appropriate separation distances and protection measures for low level fire sources are identified in the overall site design and report this to the appropriate authorities.

5.15.5.5 That prior to the issuing of any permits, NSDEL and other provincial departments ensure that appropriate inspection and monitoring services are in place and in compliance with regulatory requirements.

## **Public Consultation (5.16)**

5.16.5.1 That the Proponent improve communications with the many stakeholders that were identified by the Proponent and those that identified themselves throughout the Hearing Process, especially those that expressed a lack of communication and involvement, including, but not limited to, residents of Lincolnville, the Assembly of Nova Scotia Mi'kmaq Chiefs and the public.

5.16.5.2 That prior to issuing any permits, the Proponent submit a detailed communications strategy for approval by NSDEL, which outlines the means of improving communications with the public about all aspects of the various projects stages. The strategy shall establish a direct communications link between the Proponent and the public, and provide a means to have all public questions and concerns addressed by the appropriate party. A schedule of further public meetings shall be established. Minutes should be taken for all public meetings, and any meetings of the Community Liaison Committee and must be available for public review. An information kiosk should be set up at the project site to ensure a direct communications link is available.

## **Need For and Alternatives to the Project (6.1)**

6.1.5.1 That the Minister determine whether this project is environmentally (as opposed to economically) sustainable in the sense of sustainability as defined in the Bruntland Report, and make the findings public.

## **Required Studies, Reports and Plans (6.2)**

6.2.5.1 The EIA Report provides a list of studies, reports and plans noted by the Panel which the Proponent has committed to deliver. In addition, the Panel has recommended additional work which will be required (Section 6.2, this Report). The Panel recommends that NSDEL ensure that a complete and accurate list of required studies, reports and plans is developed, and that these documents are provided by the Proponent to NSDEL and other responsible provincial or federal regulatory authorities. It will be the role of each relevant agency to review the appropriate documents prior to the issuing of any permits which would enable the project to proceed. All such studies, reports and plans will be made available to the public once approved.

6.2.5.2 That the Proponent provide to NSDEL and the public a schedule for the preparation and/or review of each required study, plan and report, and a list of public stakeholders and government departments and agencies that could or will be involved with each. NSDEL should create a public web page with this information, and provide online links to studies, plans and reports as they become available.

## **Mercury Baseline Study (6.3)**

6.3.5.1 That the Proponent complete a mercury baseline study prior to the issuing of any permits. The Proponent will develop the sampling plans with NSDEL before doing the study and provide the final study results to NSDEL. The Proponent will:

(a) collect and analyze samples for mercury concentrations in surface water and groundwater at the project site,

(b) collect and analyze seasonal samples for mercury and methylmercury concentrations in surface water, sediment, soils and fish at and around Meadow Lake, and

(c) collect lobster, mussel, sea urchin and clam samples in marine waters within 5 km of the project site and analyze the samples for mercury concentrations. DFO is to be contacted to plan and review this process.

6.3.5.2 That when the construction of all project phases has been completed, the Proponent repeat the mercury study described in Recommendation 6.3.5.1 and report the results to NSDEL.

6.3.5.3 That prior to the issuing of any permits, the Proponent will:

(a) collect additional soil and sediment samples from the project site and from the area that will be flooded around Meadow Lake, and

(b) size fractionate the additional soil and sediment samples to obtain the <63  $\mu\text{m}$  particle size fraction which will then be analyzed for mercury, and

(c) convert the soil and sediment sample results into mercury concentration contour maps for the project site and for the Meadow Lake site.

The Proponent will develop this sampling plan with NSDEL before doing the study and provide the final study results to NSDEL. Arsenic studies will be carried out on these same samples (see Recommendation 5.12.5.1).

#### **Mining (6.4)**

6.4.4.1 That NSDEL confirm with NSDNR the status and rights of any mineral licenses and claims on and around the project site. The Panel does not have jurisdiction to deal with any claims for compensation.



# TABLE OF CONTENTS

<b>Acknowledgements</b> .....	2
<b>Executive Summary and Recommendations</b> .....	3
<b>Section 1 Introduction</b> .....	18
<b>Section 2 Legislative/Regulatory Framework</b> .....	19
<b>Section 3 Background</b> .....	21
<b>Section 4 Description of Undertaking</b> .....	23
<b>Section 5 Environmental Effects Assessment</b> .....	24
5.1 Aboriginal Use of Land and Resources .....	24
5.1.1 Introduction .....	24
5.1.2 Summary of Environmental Impacts/Mitigation/ Follow-up and Monitoring .....	24
5.1.3 Identified Concerns .....	25
5.1.4 Panel Findings .....	26
5.1.5 Recommendations .....	26
5.2 Socio-Economic .....	28
5.2.1 Introduction .....	28
5.2.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring .....	28
5.2.3 Identified Concerns .....	33
5.2.4 Panel Findings .....	38
5.2.5 Recommendations .....	38
5.3 Air Quality / Emissions / Atmospheric Effects .....	40
5.3.1 Introduction .....	40
5.3.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring .....	40
5.3.3 Identified Concerns .....	42
5.3.4 Panel Findings .....	49
5.3.5 Recommendations .....	52
5.4 Noise and Lighting .....	54
5.4.1 Introduction .....	54
5.4.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring .....	54
5.4.3 Identified Concerns .....	56
5.4.4 Panel Findings .....	58
5.4.5 Recommendations .....	59
5.5 Surface Water and Wetlands .....	60
5.5.1 Introduction .....	60
5.5.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring .....	60
5.5.3 Identified Concerns .....	62
5.5.4 Panel Findings .....	64
5.5.5 Recommendations .....	66
5.6 Ground Water .....	68
5.6.1 Introduction .....	68
5.6.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring .....	68
5.6.3 Identified Concerns .....	69
5.6.4 Panel Findings .....	71
5.6.5 Recommendations .....	72
5.7 Marine Water .....	73
5.7.1 Introduction .....	73
5.7.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring .....	73
5.7.3 Identified Concerns .....	74
5.7.4 Panel Findings .....	76
5.7.5 Recommendations .....	76
5.8 Terrestrial Habitat .....	77
5.8.1 Introduction .....	77

5.8.2	Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring	77
5.8.3	Identified Concerns	78
5.8.4	Panel Findings	79
5.8.5	Recommendations	80
5.9	Fisheries, Aquaculture and Resource Harvesting	81
5.9.1	Introduction	81
5.9.2	Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring	81
5.9.3	Identified Concerns	85
5.9.4	Panel Findings	89
5.9.5	Recommendations	90
5.10	Aquatic Species	91
5.10.1	Introduction	91
5.10.2	Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring	91
5.10.3	Identified Concerns	94
5.10.4	Panel Findings	95
5.10.5	Recommendations	95
5.11	Forestry	96
5.11.1	Introduction	96
5.11.2	Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring	96
5.11.3	Identified Concerns	97
5.11.4	Panel Findings	97
5.11.5	Recommendations	97
5.12	Geology	98
5.12.1	Introduction	98
5.12.2	Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring	98
5.12.3	Identified Concerns	99
5.12.4	Panel Findings	101
5.12.5	Recommendations	101
5.13	Archaeology	103
5.13.1	Introduction	103
5.13.2	Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring	103
5.13.3	Identified Concerns	104
5.13.4	Panel Findings	105
5.13.5	Recommendations	106
5.14	Transportation	107
5.14.1	Introduction	107
5.14.2	Summary of Environmental Impacts/Mitigation/ Follow-up and Monitoring	107
5.14.3	Identified Concerns	109
5.14.4	Panel Findings	113
5.14.5	Recommendations	114
5.15	Health and Safety	115
5.15.1	Introduction	115
5.15.2	Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring	115
5.15.3	Identified Concerns	117
5.15.4	Panel Findings	122
5.15.5	Recommendations	123
5.16	Public Consultation	124
5.16.1	Introduction	124
5.16.2	Analysis of Correspondence from the Public	124
5.16.3	Summary of Public Input and Participation	124
5.16.4	Panel Findings	127
5.16.5	Recommendations	127
<b>Section 6 Additional Observations and Concerns</b>		<b>129</b>
6.1	Need For and Alternatives to the Project	129
6.1.1	Introduction	129

6.1.2	Panel Comments .....	129
6.1.3	Identified Concerns.....	129
6.1.4	Panel Findings .....	130
6.1.5	Recommendations.....	131
6.2	Required Studies, Reports and Plans .....	132
6.2.1	Introduction .....	132
6.2.2	Panel Comments .....	132
6.2.3	Identified Concerns.....	132
6.2.4	Panel Findings .....	134
6.2.5	Recommendations.....	134
6.3	Mercury Baseline Study .....	135
6.3.1	Introduction .....	135
6.3.2	Panel Comments .....	135
6.3.3	Identified Concerns.....	135
6.3.4	Panel Findings .....	138
6.3.5	Recommendations.....	138
6.4	Mining .....	140
6.4.1	Introduction .....	140
6.4.2	Identified Concerns.....	140
6.4.3	Panel Findings .....	141
6.4.4	Recommendations.....	141
<b>Appendices .....</b>		<b>143</b>
<b>Appendix A: Letter or Referral from the Nova Scotia Minister of Environment and Labour to the Nova Scotia Environmental Assessment Board .....</b>		<b>145</b>
<b>Appendix B: Membership of the Nova Scotia Environmental Assessment Board and Keltic Petrochemicals Hearing Panel .....</b>		<b>149</b>
<b>Appendix C: Critical Dates Schedule .....</b>		<b>153</b>
<b>Appendix D: Notices of Release of the Environmental Assessment Report and Public Hearing .....</b>		<b>157</b>
<b>Appendix E: Analysis of Public Comments Related to the Keltic Petrochemical Undertaking .....</b>		<b>163</b>
<b>Appendix F: Public Hearing Agenda.....</b>		<b>167</b>
<b>Appendix G: List of Proponent and Intervenor Witnesses Sworn in at the Public Hearing .....</b>		<b>175</b>
<b>Appendix H: List of Acronyms .....</b>		<b>179</b>

## Section 1 Introduction

In August, 2006, the Nova Scotia Minister of Environment and Labour, the Honourable Mark Parent, received the environmental assessment report entitled *Keltic Petrochemicals Inc. Proposed LNG and Petrochemical Plant Facilities, Goldboro, Nova Scotia - Environmental Impact Assessment, Final Report*. The Proponent, Keltic Petrochemicals Inc., proposes to construct and operate a petrochemical complex supported by a LNG (Liquefied Natural Gas) importation and vaporization facility, an electrical co-generation plant, and a water supply impoundment.

This proposal was deemed a Class II undertaking, as defined in the Nova Scotia Environmental Assessment Regulations, and hence in September, 2006, the Minister referred the environmental assessment to the Nova Scotia Environmental Assessment Board (NSEAB).

NSEAB is required:

- to review an environmental assessment report referred to the Board by the Minister;
- consult with the public in accordance with the *Environment Act*;
- recommend to the Minister the approval or rejection of a project, or conditions that ought to be imposed upon a project if it proceeds; and,
- perform such other functions and exercise such powers as may be assigned to, or conferred upon the Board by the Governor in Council or the Minister.

This report of the Nova Scotia Environmental Assessment Board concludes the Board's review of *Keltic Petrochemicals Inc. Proposed LNG and Petrochemical Plant Facilities, Goldboro, Nova Scotia - Environmental Impact Assessment, Final Report*, as submitted by Keltic Petrochemicals Inc., 5151 George Street, Halifax, N.S.

The Proponent's proposal is also undergoing a Comprehensive Study under the Canadian Environmental Assessment Act (CEAA). As well, certain components of the undertaking will require federal permits. Although the federal and provincial processes remain independent, information submitted to NSEAB has been shared with the federal authorities.

## **Section 2 Legislative/Regulatory Framework**

### The *Environment Act*

The Nova Scotia Environmental Assessment Board (the "Board") is created pursuant to section 42 of the provincial *Environment Act* (the "*Act*"). The Minister of the Environment (the "Minister") must refer an environmental assessment report for a Class II undertaking received by him to the Board. Pursuant to section 39(1) of the *Act*, the Board upon referral shall conduct a public hearing or review, submit a report, and make recommendations to the Minister to approve the undertaking, reject the undertaking or approve the undertaking with conditions. The Board is given specific authority under section 42(2) of the *Act* to conduct public hearings and carry out other functions assigned to the Board by the *Act*, or as prescribed by the regulations.

The duties of the Board are set out at section 43 of the *Act*, as listed in Section 1, Introduction of this report.

As part of the Board's review of an environmental assessment report, section 44(1) of the *Act* mandates the Board to consult with the public "by inviting written submissions from the public, by conducting a public hearing or review or in such other manner as determined by the Board." Section 44(2) of the *Act* provides that a public hearing conducted pursuant to section 44(1) shall be conducted in accordance with the regulations.

The *Environmental Assessment Regulations* and *Nova Scotia Environmental Assessment Board Regulations* provide the procedural and regulatory framework for the Board to conduct a review of an environmental assessment report, consult with the public, and make recommendations with respect to the environmental effect of an undertaking to the Minister.

### *Environmental Assessment Regulations*

For Class II undertakings, regulation 23(2) of the *Environmental Assessment Regulations* provides that public notices and consultation shall be in accordance with the requirements of the *Nova Scotia Environmental Assessment Board Regulations*.

Regulation 24(2) of the *Environmental Assessment Regulations* requires the Minister to refer an environmental assessment report on a Class II undertaking to the Board.

### *Nova Scotia Environmental Assessment Board Regulations*

Regulation 6(a) of the *Nova Scotia Environmental Assessment Board Regulations* (the "*Board Regulations*") confirms that the Board shall conduct a public hearing pursuant to section 42(2) of the *Act*. Regulation 8 of the *Board Regulations* sets out the purposes of a

public hearing under the *Act* as being (a) to receive submissions and comments from any interested party; (b) to ask questions and seek answers respecting the environmental effect of an undertaking, and (c) to provide information which will assist the hearing panel in the preparation of its report and recommendations to the Minister.

In carrying out the objective of inquiring into the environmental effect of an undertaking at a public hearing, the Board is guided by the definition of the phrase "environmental effect" as set out at section 3(v) of the *Environment Act*:

"3(v) 'environmental effect' means, in respect of an undertaking,

- (i) any change, whether negative or positive, that the undertaking may cause in the environment, including any effect on the socio-economic conditions, on environmental health, physical and cultural heritage or on any structure, site or thing including those of historical, archaeological, paleontological or architectural significance, and
- (ii) any change to the undertaking that may be caused by the environment,

whether the change occurs inside or outside the Province;"

Where the Minister refers an environmental assessment report to the Board, the Board shall submit its report and recommendations to the Minister not later than 110 days following the date of referral to the Board (*Nova Scotia Environmental Assessment Board Regulations*, regulation 34(2)). Under regulation 34(3) of the *Board Regulations*, the Minister may, in writing, extend the 110 day period for the Board to file its report and recommendations, and the Administrator shall advise the Proponent of the extension and the reason for the extension.

Under regulation 26(1) of the *Environmental Assessment Regulations*, within 21 days following receipt of the report and recommendations by the Board, the Minister shall advise the Proponent in writing whether the undertaking is approved subject to any other approval required by an enactment, approved subject to such conditions as the Minister deems appropriate and any other approval required by an enactment, or is rejected.

### Section 3 Background

The Proponent's proposal to construct and operate a petrochemical complex, LNG facility, an electrical co-generation plant and a water supply impoundment in Goldboro was registered with the Nova Scotia Department of Environment and Labour on January 12, 2005.

Terms of Reference for an Environmental Impact Assessment were issued by the Department on April 8, 2005, and Keltic Petrochemicals Inc. submitted the Final Draft Environmental Impact Assessment to the Department on July 31, 2006.

On August 22, 2006, the Minister of Environment and Labour received the environmental assessment report entitled *Keltic Petrochemicals Inc. Proposed LNG and Petrochemical Plant Facilities, Goldboro, Nova Scotia - Environmental Impact Assessment, Final Report*. The Minister referred this undertaking to the NSEAB on September 1, 2006.

A total of three notices relating to public review of the Environmental Assessment Report and announcement of the public hearing were published in *The Royal Gazette*, *The Chronicle Herald*, *The Cape Breton Post*, *The Guysborough Journal* and *Le Courier*.

During the public review period of the environmental assessment report which preceded the public hearing, the Panel received over 1,770 responses including more than 1,500 standardized or "form" letters in support of the Keltic Petrochemicals undertaking. There were five variations of the standardized letters. Each had the following concluding paragraph: *"I also support the use of the Existing Antigonish-Guysborough highway through Erinville as an option to the route proposed by Keltic."* All but two such respondents agreed to this endorsement.

The Hearing Panel and the NSEAB Administrator conducted a site visit on October 23, 2006, accompanied by Keltic Petrochemicals Inc. President, Mr. Kevin Dunn and Keltic Petrochemicals Inc. Board of Directors Member, Dr. Gordie Rudolph. This visit was initiated by the Hearing Panel with the purpose of inspecting the site and gaining a clear understanding of the exact location of various components of the proposed undertaking. The representatives of the proponent were requested to and identified the location of the proposed road work, marine infrastructure, LNG storage, electrical co-generation plant and petrochemical complex as well as the general proximity of Meadow Lake and adjacent properties to the site.

In preparation for the hearings, the Panel hosted a pre-session conference with key hearing participants in Halifax on November 10, 2006 to discuss and plan procedural issues surrounding the public hearing.

The public hearing sessions for the Keltic Petrochemical undertaking were held on November 20, 2006, in Guysborough; November 21, 2006 in Sherbrooke; and November 22 - 25, 2006 in Antigonish.

NSEAB public hearings do not follow the same rules as a court of law, in that the proceedings are informal. They provide a chance for the public to be heard in a fair, open and balanced manner.

Twenty-four formal and informal registered Intervenors made presentations to the Hearing Panel and, during the Open Forums, several presentations, comments and questions were made by those in attendance.

Proceedings were audio taped, and a complete transcript of all sessions was prepared and made available after the close of the hearing.

On December 7, 2006, the Minister of Environment and Labour extended the Hearing Panel's initial deadline of 110 days from referral to NSEAB, by an additional 60 days, thereby authorizing the Panel to submit its Report and Recommendations to the Minister by February 21, 2007. In requesting the extension, the Panel Chair indicated that the Panel had received approximately 7,000 pages of written material to review and analyze, and given the complexity of the proposed project, there was insufficient time to prepare an adequate report.



## Section 4 Description of the Undertaking

As corporate lead in this undertaking, Keltic Petrochemicals Inc. has proposed to construct and to operate a petrochemical complex, LNG importation, storage and vapourization facility, an electrical co-generation plant and a water supply impoundment in Goldboro, N.S. The planned site for these facilities is in the Goldboro Industrial Park on the northeast shore of Isaacs Harbour, Guysborough County. This is adjacent to the Sable Offshore Energy gas plant and the Maritimes & Northeast pipeline.

The facilities are proposed to be situated on approximately 300 hectares of land. Keltic Inc. has optioned Goldboro Industrial Park land, zoned M-3 heavy industrial, from the Municipality of the District of Guysborough. Additional lands have been, and are in the process of being acquired. The key components of the project include:

- marginal wharf,
- marine LNG terminal
- LNG storage
- LNG re-gasification facility
- petrochemical complex
- electrical co-generation plant (200 megawatt)
- water supply impoundment.

The Proponent's plans call for utilization of the marine facilities to both receive LNG and to export its finished product. The petrochemical complex will require imported LNG as well as natural gas liquids from the Sable Offshore Energy gas project to provide a stable feedstock for production of polyethylene and polypropylene pellets. These pellets are to be used in the manufacture of plastic resin products elsewhere in Canada and abroad.

The project has a requirement for a substantial industrial water supply to be used as boiler feed for the petrochemical process and co-generation. This is proposed to be provided by the impoundment of nearby Meadow Lake.

Maintenance and operational facilities associated with water treatment, sanitary wastewater treatment, as well as other facilities are associated with the undertaking, and such requirements have been addressed as part of this environmental assessment.

The undertaking proposes significant realignment of Highway 316 in the vicinity of the proposed site, and the project would place additional demands on the existing highway system to transport people and materials between Highway 104 and Goldboro. Prior to completion of the final Environmental Impact Assessment report and its referral to the Board, on June 16, 2006, the Proponent informed the Department of Environment and Labour that it intended to exclude from the project the initially proposed construction of a 54 kilometre, two lane highway between Highway 104 and Goldboro.

The Proponent has estimated the total capital cost of the investment to be approximately \$4.5 - \$5 billion dollars.

## **Section 5 Environmental Effects Assessment**

### 5.1 Aboriginal Use of Land and Resources

#### 5.1.1 Introduction

Lands located at the project site and in the general vicinity of Guysborough and Antigonish Counties are significant cultural and historical Mi'kmaq areas and traditional activities still continue. The proposed project has the potential to affect traditional uses and cultural resources.

#### 5.1.2 Summary of Environmental Impacts/Mitigation/ Follow-up and Monitoring

##### 5.1.2.1 Existing Environment

As set out by the EIA, Aboriginal Culture is valued greatly in Nova Scotia. Traditional lifestyle activities such as fish harvesting, hunting and other uses of the land continue in and around the Goldboro area. Loss of these areas by the development of the project can have an impact on future traditional use.

##### 5.1.2.2 Environmental Impacts

Impacts on traditional hunting areas, archaeological resources, sea urchin and other traditional fishing areas can be expected either through a complete loss of use of a specific area or an alteration to an existing area.

Section 9.2 of the EIA states that “no component specific impacts were identified.”

Section 9.2.3 of the EIA states that “Effects on traditional Mi'kmaq land uses and resources are expected to be minimal and therefore not significant.”

The report states that during the construction, operation and decommissioning phases there will be no impact on land claims. It also states that the impact on the sea urchin resource is expected to be minimal because other areas, other than those impacted by the LNG Terminal and Marginal Wharf, will allow for continued harvesting.

##### 5.1.2.3 Mitigation

As stated in the EIA “no particular mitigation measures are recommended other than those developed for the biophysical VECs (Table 9.2-1).”

In relation to archaeological resources the EIA does recognize that during construction any artifacts uncovered must be reported immediately to the Nova Scotia Museum (10.3.1).

Three areas of sea urchin habitat were identified as potentially being impacted by the construction of the marginal wharf and the EIA concludes that “No mitigation is suggested for these sites, as there are adjacent sea urchin areas documented by this study that should allow the continued harvesting of this resource by the Mi’kmaq.”

#### 5.1.2.4 Cumulative and Residual Impacts/Accidents

The report states that no cumulative impacts are projected regarding Aboriginal use of land and resources.

#### 5.1.2.5 Monitoring

Details of proposed monitoring related to Aboriginal use of land and resources are not specifically outlined but related monitoring can be found in the EIA in Sections 13.6. Inshore Fisheries Monitoring, 13.7, Freshwater Species and Habitat Monitoring, 13.8 Marine Species and Habitat Monitoring, 13.9 Archaeological Resource Monitoring and 13.12 Other Monitoring Plans.

#### 5.1.3 Identified Concerns

##### *Panel*

Only two site visits were conducted as part of the Mi’kmaq Ecological Knowledge Study (MEK) to review vegetation. These two site visits were specifically related to the road right-of-way that is no longer part of the proposal.

The MEK states on page 17 (EIA report - Appendix 2) “It is obvious that Mi’kmaq continue to undertake resource harvesting activities in a significant manner throughout the study area.”, yet it concludes that the impacts of the project are minimal.

The MEK mentions that several interviews were conducted but does not say how many nor does the report identify the types of questions that were asked.

##### *Intervenors*

##### Assembly of Nova Scotia Mi’kmaq Chiefs

“August is not a great month to try to find knowledge holders about traditional use activities.”

“The MEKS did not involve the necessary field work to identify species of significance and places of cultural significance within the study area.”

“...believes that the Chiefs are on record to say that there is identified within the study area significant Mi’kmaq occupation places within the study area, and that they feel that these need to be thoroughly looked at and more investigations done.”

“The MEK is a method to determine potential Mi’kmaq concerns with a project and it is not meant to be consultative, nor is it a method of notification about a project.”

“As a minimum, training on archaeological resources needs to be done with the contractors, with all contractors during construction. And if archaeological resources are encountered, work should be stopped until there is an investigation by an archaeological mind or a person or body or outfit.”

### *Public*

The following are direct quotes:

“Considering the extent of the project, the future expansion and the lack of study on the new components of the project and lack of identified direct consultation, it would seem mitigation measures or compensation measures should be present.”

“There is no mention in Section 14 of Aboriginal consultation and no details of what steps have been taken nor will be taken to ensure Aboriginal consultation.”

“If direct proper consultation is not held what will happen in the future with the land claims agreements?”

“How will Mi’kmaq communities implement social and cultural rejuvenation and healing programs based on traditional knowledge (if so desired), if their traditional lands keep diminishing and access to harvesting areas denied?”

“What will happen with the future expansion and how that will affect Mi’kmaq heritage and harvest?”

#### 5.1.4 Panel Findings

The MEK study has inherent weaknesses although during the hearings the Proponent stated that they were “completely confident in the evaluation that was done by the firm and certainly would be open to it being reviewed by anybody else.” The panel does not dispute this, yet has reservations about the completeness of the information.

Overall Aboriginal consultation has been limited to the MEK study and it would appear no other Aboriginal involvement or consultation has taken place.

#### 5.1.5 Recommendations

5.1.5.1 That prior to the issuing of any permits, the Proponent conduct further study into the traditional Aboriginal use of the proposed project site lands and that this information be used as baseline information to aid in identifying any areas that must be avoided during construction and operation. These results are to be provided to the Nova Scotia Department of Environment and Labour and other affected provincial departments.

5.1.5.2 That the Proponent enhance ongoing dialogue with the Aboriginal community in its consultation strategy and ensures Aboriginal representation on any Community Liaison Committee.

5.1.5.3 That the Proponent provide a compensation plan for any affected Aboriginal fisheries.

5.1.5.4 That the Proponent prepare a detailed Archaeological Monitoring Plan prior to the issuing of any permits and that the Plan include direction to stop all work on the site in the area of any significant archaeological discovery until authorization to resume work is given by appropriate authorities.

## 5.2 Socio-Economic

### 5.2.1 Introduction

As described in the EIA, the proposed Keltic processing facilities will require approximately 300 hectares of land in close proximity to the existing Sable Offshore Energy Inc. gas plant and the Maritimes & Northeast Pipeline.

As a result of an industrial strategy adopted by the Municipality of the District of Guysborough in 2004, a review of the industrial zoning in both Melford and Goldboro took place. The lack of marine access was identified as a concern along with a need to provide zoning appropriate for LNG and petrochemical facilities, power generation facilities, wind farms and oil refineries. According to the Municipality the Goldboro Industrial Park, owned by the Municipality, consists of approximately 700 – 900 acres (280 - 360 hectares). To create the current industrial park, the Municipality undertook a land assembly project and acquired approximately 40 parcels of land through either negotiation or expropriation. The current site of the project, prior to rezoning, was a mixture of Residential (R-1) and Resource Industrial (M-2) zones which were rezoned to the more appropriate and revamped Heavy Industrial (M3) zone.

### 5.2.2 Summary of Environmental Impacts/Mitigation/ Follow-up and Monitoring

#### 5.2.2.1 Existing Environment

Typical project boundaries encompass the entire area where the effects may be detectable, and the time period for which those effects are expected to last. Project boundaries must be defined to allow consideration of interactions that may occur at distances beyond the defined corridor boundaries, or over the long term. The project location and regional settings are defined by a 25 km radius extending from Country Island (EIA Figure 1.1-1A). However it is clear from the EIA that the project has a more extensive regional context when taking into consideration transportation of goods and personnel as well as the nature of the geography and various requirements such as housing and amenities required to accommodate this proposal.

Guysborough County has seen a decline of its population for several years. Recent statistics show this decline to be significantly less than in previous census years. This decline is primarily attributed to out-migration. Antigonish County on the other hand has experienced an increase in population.

The most significant areas of employment in Guysborough County are in natural resource industries such as forestry, agriculture and fishing , and to a lesser extent, manufacturing. The most significant areas of employment in Antigonish County are wholesale/retail, educational services and health care.

Goldboro and surrounding areas are often described as “untouched” and “remote.” There are several cultural and heritage resources throughout the region. Tourism opportunities

are varied from on-land and on-water activities such as automotive touring, sight seeing, hiking and boating. There are various cultural and heritage associations in the two counties as well as several provincial parks in the region

#### 5.2.2.2 Environmental Impacts

Section 9.3 of the EIA provides a significant amount of detail and statistics that present a review of expected socio-economic and tourism impacts for both Guysborough County and Antigonish County. The following are general excerpts from this section:

The EIA states that “under socio economic we recognize that there would be a large economic benefit from the project or a positive effect from the project. This would come from the creation of jobs and employment as well as spin-offs associated with supplies that would be required or industries that would be related to the development. We considered this positive effect as a significant effect.”

“Socio-economic effects – several significant benefits are expected in the local and regional economy.”

“The disadvantages are off set by mostly socio-economic benefits, which are expected to be long-term and far reaching, i.e., relevant to the local community, the region, and the province of Nova Scotia.”

“About 4,775 people will be employed for varying lengths of time during the many stages of project.”

“There is expected to be an estimated addition of 189 families, at approximately 2.5 persons per family.”

“Given that Antigonish County is at some distance from the Goldboro project site, we expect only minor and short-term impacts on population due to construction activities. It is unlikely that construction workers, given the relatively short peak construction period, will move their families into the area on a permanent basis.”

“Construction activities will serve to help maintain, but not expand, the construction workforce in the Guysborough County area.”

“The relatively short length of peak construction activity combined with the existing ability of the Antigonish County economy to supply construction services suggest that if the construction sector in the County does increase, the expansion will be modest and short-term.”

“The spin-off economic activities associated with the operation of the facility will further improve the employment picture and chances that new people will move into the area.”

“Capacity utilization of community infrastructure and retail and service operations are relatively low and therefore increased economic activity would first serve to absorb surplus.”

“If the labour force age group in Guysborough County is to have a better chance to gain employment at the plant, local programs to upgrade basic education, if not available will need to begin or be expanded, followed quickly by skill specific training.”

#### Tourism

“The new facility will be clearly visible and change the local visual character of the landscape from a rural, mostly natural setting to a landscape with industrial development. This is likely to affect outdoor oriented tourism in the immediate vicinity of the Project site.”

“The increased economic activity in the area caused by the new facility will bring about improvements in accommodations and food services, other personal services, and retail trade.”

“We expect that the increase in population and income levels made possible by the facility will encourage the development of new recreational opportunities and the localized aesthetic impacts will be outweighed by the socioeconomic improvements throughout the county area. The expansion of recreational opportunities can open new aesthetic elements of the area for appreciation by residents and non-residents.”

“On balance, the Project should have minimal adverse effects on tourism near the Project site. Over the long term and on a regional scale, the effects may even be beneficial to the tourism.”

#### Property Value

Section 9.4 of the EIA provides an overview of the expected impacts on land and housing values in the general area and excerpts are as follows:

“Nearby landowners may be affected by air emissions, noise, lights, and an altered view (of a large industrial development), as well as increased traffic, emissions, and noise along routes to the site.”

“The presence of approximately 3,000 workers and the expectation of long-term economic development at and near the site can be expected to increase demand for residential property and therefore potentially increase in property prices, in particular rental rates, during the construction period.”

“Determination of the effect of the facilities’ operation on the value of adjacent and nearby residential properties requires market analysis.”



“Overall effects of the Project’s construction and operation phase on property values are expected to be beneficial.”

### Recreation and Aesthetics

Section 9.5 of the EIA provides an overview of the expected impacts on recreation and aesthetics in the general area and excerpts from the EIA are as follows:

“The resulting change in the visual aesthetics of the landscape can interfere with recreational uses near the Project and may also affect property values and the local economy.”

“The total top elevation of the Project is expected to be approximately 150 to 170 m above sea level for some of the key Project elements.”

“The two high elevation emergency flare stacks are expected to be flaring for about 15 to 20 minutes once or twice a year.”

“The cooling tower is expected to operate 24/7 over the entire year.”

“The facility will be lit during night time.”

“The height of the steam plume depends on wind and weather conditions. Based on experience with other comparable cooling towers, a 100 m high plume, occasionally extending up to 200 m can be expected and is expected to be visible from all communities within a 5 km radius of the facility.”

“The new elements are considered to permanently change the existing visual landscape character from a visually coherent rural landscape to a landscape composed of stark visual contrasts between rural and industrial elements.”

Aesthetics – “When we look at the low number of receptors for this issue, the planned industrial zoning of the area, in other words the municipality had set this location aside for these types of industrial developments, as well as the advantages of the project, we would not consider this as a major significant effect.” (Hearing Transcript – Proponent Presentation).

#### 5.2.2.3 Mitigation

The Proponent makes it clear in the EIA that “as much advance notice as possible should be provided so the local economies and communities can organize themselves to take best advantage of the construction economic activity.” The following are excerpts from Section 10.4 of the Report:

## Construction Phase

“Construction of the facility will, relative to the size of the local economy, bring significant but manageable impacts to the Goldboro area.”

## Population Impacts

“Impacts related to the influx of construction workers into the local community will also be reduced by the project's plan to have major components manufactured off-site and transported to the site for installation.”

## Economic Structure Impacts

“Services, materials and equipment suppliers, and local economic development agencies, in the Counties will benefit from early notice of the types, volume and timing of services and materials required during construction.”

“Impacts related to the influx of construction workers into the local community will also be reduced by the project's plan to have major components manufactured off-site and transported to the site for installation.”

“The higher paying jobs at the facility require special skills. To improve the chances of Guysborough County and Antigonish County residents to win these jobs, local economic development agencies need to be advised in advance of the occupations and skill levels required for the operation of the facility. These agencies need to work with the Proponent to identify labour force recruitment and available training programs that will allow the labour forces of Guysborough County and Antigonish County to take maximum advantage of the new employment opportunities.”

### 5.2.2.4 Cumulative and Residual Impacts/Accidents

Following are quotes from Table 11.1-1 Summary: Effects, Mitigation, and Significance of Residual Effects:

“Socio-economic effects – several significant benefits are expected in the local and regional economy. The over-all significance of predicted effects on the socio-economic environment will be major.”

“The presence of approximately 3,000 workers and the expectation of long-term economic development at and near the site can be expected to increase demand for residential property and therefore potentially increase in property prices, in particular rental rates.”

“Increases in the number of jobs in the Goldboro area will contribute to the importance and viability of rural living in Guysborough County.”

“The increased economic activity in the area caused by the new facility will bring about improvements in accommodations and food services, other personal services, and retail trade.”

“On balance, the Project should have minimal adverse effects on tourism near the Project site. Over the long term and on a regional scale, the effects may even be beneficial to the tourism.”

#### 5.2.2.5 Monitoring

No specific socio-economic monitoring plan is identified in the EIA however under the Environmental Protection Plan there are issues that are expected to contain general and specific mitigation measures for the project during construction and operation.

#### 5.2.3. Identified Concerns

There were significant numbers of written submissions, formal Intervenor and various verbal presentations before, during and following the public hearings. These documents are a matter of public record and for the purpose of this report; examples and excerpts of this information were selected to provide an overall representation of the types of concerns expressed.

#### *Panel*

Much of the report and responses to specific questions often rely upon the standard response “will be determined during the FEED phase of the project.” Therefore, limited information is available to the public and other government departments thus limiting the overall completeness of the review of the proposed project. It is understood though, that the EIA is part of the overall process of project development and that specific details and engineering information depends on the outcomes of each step of the process.

The Panel asked for clarification of various statistics presented in the EIA report and the Proponent provided corrected data:

- The addition of 189 families, at approximately 2.5 persons per family, would provide a population boost of almost 1.6% in the combined Counties, instead of:
- The addition of 30 families, at approximately 2.5 persons per family, would provide a population boost of almost 2.5% in the combined Counties.

Paragraph 7 on page 9-9, section “9.3.2.1 Population Impacts” should read:

- We expect, in order of magnitude terms, about 374 workers at the facility to commute to work from Antigonish County and areas beyond, instead of:

- We expect, in order of magnitude terms, about 280 workers at the facility to commute to work from Antigonish County and areas beyond.

The second sentence in paragraph 9 on page 9-9, section “9.3.2.1 Population Impacts” should read:

- Given the relatively large population base of Antigonish County, the overall impact on population will be just under 1.2% of the current population, instead of:
- Given the relatively large population base of Antigonish County, the overall impact on population will be just under 2% of the current population.

The report clearly comments on pages 9-15 that a market analysis will help determine the effect of the operation of the facility on adjacent and nearby residential property values, yet no market study was conducted. Therefore, there is limited support for the claim that the impact on residential property values will be positive.

Census data were the only source of property value comparisons used for the report and even if a market study is not conducted there are more sources of data available to provide an accurate view of the residential market.

Rapid increase of property values can mean increased property taxes and those with limited incomes can be adversely impacted by this dynamic shift.

When asked, the Proponent indicated that there is no commitment at this time to fund training, but there is “a commitment to meet and to discuss and to find the best way in which we could collectively carry out some training.”

### *Intervenors*

Delia Burge

“A project of this magnitude needs to be located in an area where it can draw from a large labour force.”

“With the proposed project in Goldboro it will turn people away and others will sell out, and move away.”

Construction Association of Nova Scotia

“Keltic has the potential to directly account for nearly one-quarter of the construction industry's activity over the next three to four years, and we anticipate the indirect spin-off activity will also be significant.”

Kathi Ryan

“Keltic has used the lure of jobs to gain residents' approval because that is what is needed in Guysborough County, but jobs -- these jobs will require a skilled labour force which may not be available.”

“Nova Scotia faces a shortage of workers now. Many of them will be brought in from other parts of Canada but does this actually benefit the community around Goldboro?”

Concerned Citizens of Lincolnville

“The Concerned Citizens of Lincolnville is in opposition to the Keltic project for the reasons of destruction of heritage sites and the planned placement of waste into a landfill site which we are seeking to remove from our backyard.”

Dr. Marike Finlay-de Monchy

“I have a dream of people flocking to the Eastern Shore to live, work and vacation for the same reasons they flock to British Columbia.”

“The Eastern Shore is a unique place in the world. It's one of the few remaining stretches of unpolluted maritime posts.”

“If we wish to do something for the youth of our communities, let's improve our education systems, and encourage them in every possible way to get an education, to acquire the skill sets necessary to live and work in the Province.”

Dr. Karin Cope

“There are so few spaces left on earth that are not hugely industrialized, so few coastal zones as quiet as the Eastern Shore.”

“Permanent residents are needed. Not part time workers, not migrant workers, permanent, taxpaying residents, who bring their families.”

“The Eastern Shore is the one part of Nova Scotia where there are no branches of the Nova Scotia Community College within realistic commuting distance.”

“This is one of the most highly regulated industries in the world. Regulations are there to protect us, but they can't secure us entirely.”

Ecology Action Centre

“The assessment does not include the loss of value for residential properties next to site, nor rising property taxes and insurance cost. Thus the analysis is misleading to imply that

rising property values are indicative of a positive change in the lives of the current residents.”

“For the people who wish to stay and continue their traditional lifestyle, rising property values will be a burden, not a benefit.”

“On a temporal scale the project’s benefits versus adverse effects do not balance out for the current and future generations.” *(Keltic’s response- Many of the temporal issues listed are based on opinion and lack factual basis. The cumulative effects assessment of future impacts was based on the best available information and professional experience).*

#### Antigonish Eastern Shore Tourism Association

“AESTA and its Board of 17 Directors elected annually from the tourism industry across the region believe strongly in the tourism potential of the Keltic project in Goldboro to bring visitors to the area and to keep them here longer.”

“It is expected given the scale and development that Keltic Maple project will serve as a significant draw for visitors to Nova Scotia.”

#### Katherine Reed

“The housing market in Antigonish, which is rather unfriendly to people who rent, and who can't afford a lot of money for that.”

“This project is going to have a rather strong impact on the housing market in Antigonish, as did the Sable project, when all the M&NP guys came in and, you know, took up apartments.”

#### Municipality of the District of Guysborough

“We're still fairly dependent on the fishery and the forestry, the energy industry is a new sector that the Council is focusing on.”

“We'd like to see a comprehensive plan for training for both the construction and operational phase within the municipality, and we'd like the Proponents to have a policy to ensure that African Nova Scotia community participates in the employment opportunity both during the construction and the operational phase.”

#### Public

#### Les VanHemert

“I don't have anything against the Keltic project. What I have against the Keltic project is the location. I think the location in Goldboro is just awful, atrocious, horrendous, and I

am appalled at the thought of turning Goldboro into another petrochemical area.” (Note: Mr. VanHemert presented an alternate man-made off shore site as being more appropriate).

#### *Others*

“We believe that the community of Antigonish will benefit, and at the same time, the quality of life will not be lessened, but in fact will improve.”

“In addition, the LNG petrochemical facility holds the promise of long term employment in an area of the province that desperately is in need of economic stimulus.”

“Skilled workers who have left every community in this area to work in areas like Fort McMurray may have an opportunity to return and to contribute their skills to growing Nova Scotia.”

“I’ve come here to express support for the project because of the economic impact that I think it will have on the broader eastern Nova Scotia community.”

“Persons responsible for the locating of the LNG plant in Guysborough must focus on the direct and indirect impact this plant will have on the living conditions of affected communities.”

“This plant will generate much needed economic benefits especially for this area and for all of Nova Scotia and should be given certification as soon as possible.”

“The economic impact on the Nova Scotia economy in general and the eastern Nova Scotia economy specifically would be quite dramatic.”

“The Keltic project proposes heavy industrial development along what is one of the few remaining pristine zones on the North American Atlantic coast.”

“Keltic has committed to playing a role in developing the labour force by communicating labour opportunities and skill requirements and by supporting education and training.”

“In my opinion the construction and operation of this facility will be an asset to Goldboro, Guysborough County and Nova Scotia itself.”

“The actual negative impacts, potential negative impacts and overall environmental alterations all add up to a price that is too high to pay.”

“It is unacceptable for the Goldboro area to be over-run.”

“We must have more specific, clear and detailed information about the environmental impact before we allow this huge project to infiltrate our environment and community.”

“I reviewed the Environmental Report and in my opinion it covered just about everything.”

“It was a good report and it indicated changes that would be made to the area, but with any development there is change.”

“Based on the location of the plant and planned wharf, we don't really see any negative impact on the communities of Goldboro and Isaacs Harbour.”

“The increased truck traffic to the area will likely have an impact on tourism.”

#### 5.2.4 Panel Findings

As onshore development proceeds, the communities may be faced with a host of complex problems. The introduction of rapid economic and demographic change may combine to produce profound changes in community lifestyle and structure. The construction of onshore facilities may create jobs, but may also contribute to later employment problems due to the temporary nature of the work.

There is a potential for jobs and economic development for rural, small town Nova Scotia, due to the processing and shipment of natural gas and associated products. The effects these jobs will have on small communities such as Goldboro and those surrounding the development of the site must be considered.

The project involves construction schemes and advanced technologies which are more than likely to be beyond the experience of small communities. Small rural communities are less likely to be experienced in dealing with large scale technology and complex development.

Landowners, especially those adjacent to the project site and along significant transportation routes, will experience impacts on properties, which may be a decrease in value versus the predicted increase. Lack of a market study does not help us to look at this issue.

#### 5.2.5 Recommendations

5.2.5.1 That the Proponent contribute resources to recreational and social opportunities, primarily for its workforce, that could be turned over to the local authorities in order to reduce the burden on local authorities for similar amenities.

5.2.5.2 That the Proponent continue to work with local communities, unions and education/training institutions to ensure that the types of skills required are clearly understood; that the Proponent provide financial incentives to encourage local persons to undertake the necessary training; and that the Proponent adopt a policy to give priority to hiring qualified local workers.



5.2.5.3 That the Proponent develop an Equal Opportunities Employment Strategy that ensures employment opportunities for under represented groups such as women, visible minorities and persons with disabilities.

## 5.3 Air Quality / Emissions / Atmospheric Effects

### 5.3.1 Introduction

Air quality issues deal with humans and wildlife health concerns, as well as with impacts on regional biota and habitats. Ambient air quality and contaminant emissions resulting from construction, air and land transportation activities, LNG transfer and storage, electric power production and petrochemical processing are identified and discussed. The ocean, local geography, and weather are dominant influences on the dispersion of air emission contaminants. The Sable Offshore Energy Inc.(SOEI) gas plant has an existing impact on air quality and future development at the Goldboro Industrial Park, such as the Keltic project, will have further important impacts.

### 5.3.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.3.2.1 Existing Environment

The location of the proposed Keltic project experiences a temperate continental climate, with modification from marine areas surrounding Nova Scotia. Details of the local weather and climate conditions are discussed in the EIA Report (section 8.4, p. 8-16).

Continuous monitoring of nitrogen dioxide (NO<sub>2</sub>) and sulfur dioxide (SO<sub>2</sub>) near Goldboro was done for 2 months in the summer of 2004 in order to study ambient air quality. Total suspended particulate matter (TSP) and particulates less than 2.5 micrometres in diameter (PM<sub>2.5</sub>) were monitored for three 24-hour periods over 3 months in the summer of 2004 (EIA Report, section 8.4.2, p. 8-23).

Air contaminant dispersion modeling was done for NO<sub>2</sub>, SO<sub>2</sub>, TSP, PM<sub>2.5</sub>, CO and O<sub>3</sub> using Halifax-Shearwater meteorological data (EIA Report, table 9.6-4, p. 9-47). Contaminant footprint contour diagrams within 5 km of the project site are predicted using the model (Figures 9.6-2 to 9.6-11; EIA Report, p. 9-49 to 9.58)

#### 5.3.2.2 Environmental Impacts

Construction activities during the project will release various contaminants, including nitrogen and sulfur oxides (NO<sub>x</sub>, SO<sub>x</sub>), particulate matter and greenhouse gases. Emissions will be from construction equipment, from marine vessels used to deliver equipment and materials, and from private vehicles driven by the labour force. Dust emissions will be generated by excavation and earth-moving equipment and by a concrete batch plant.

During plant operation, there are several activities that could have an impact on air quality, resulting in release of NO<sub>x</sub>, SO<sub>x</sub>, CO, O<sub>3</sub>, particulate matter, and volatile organic compounds (VOCs). Emissions will result from activities related to LNG tankers, wharf

activities, LNG unloading, gas venting during malfunctions, natural gas flaring, re-gassification of LNG to natural gas, liquid extraction from LNG, electricity generation, petrochemical production, waste incineration, vehicular traffic, and equipment leaks and spills.

Estimated air emission inventories are presented in the EIA Report in Tables 9.6-1 and 9.6-2 (p. 9-33 to 9-41). Maximum predicted air contaminant concentrations for NO<sub>2</sub>, SO<sub>2</sub>, TSP, PM<sub>2.5</sub>, and CO are presented in Table 9.6-4 (EIA Report, p. 9-47).

Compounds potentially dangerous to humans and the environment, grouped into the category called volatile organic compounds (VOCs, e.g. methane, ethane, ethene, aldehydes, ketones, petroleum hydrocarbons, benzene, toluene, xylene), are emitted when transporting, transferring and processing raw hydrocarbon materials and are released from equipment and activities that use solvents, fuels and lubricants. Table 9.6-2 reports the VOC release estimate for the Keltic facility of about 300 tonnes per year. A typical European refinery loses between 600 and 10,000 tonnes of VOCs per year where approximately 70% come from equipment such as pipe flanges, pumps, valves and vessels. (<http://www.engineerlive.com/european-process-engineer/interview-opinion/14229/gaskets-and-seals-significantly-reduce-fugitive-emissions.thtmlv>).

#### 5.3.2.3 Mitigation

During the proposed construction phase, equipment will be maintained in good working condition, distances will be minimized, speeds will be restricted, and car pooling will be encouraged. Dust emissions will be controlled by appropriately cleaning and covering areas. Monitoring/control plans and good maintenance will be followed during operational phases (EIA Report, Table ES-1, p. ES-10 to 11; Table 9.6-6, p. 9-60 to 62). Best practices and state-of-the-art equipment will be used where possible.

#### 5.3.2.4 Cumulative and Residual Impacts / Accidents

The main emission source for air contaminants in the Goldboro region is the SOEI gas plant. Emission estimates for the SOEI plant and for the proposed Keltic project are presented in the EIA Report in Tables 9.6-1 and 9.6-2 (p. 9-33 to 9-41). Maximum predicted air contaminant concentration for emissions from the two projects for NO<sub>2</sub>, SO<sub>2</sub>, TSP, PM<sub>2.5</sub>, and CO are presented in Table 9.6-4 (EIA Report, p. 9-47).

An air-monitoring program will be carried out before and during construction and operational phases. Care is required by the Proponent and government agencies to evaluate air quality impacts and interactions between air contaminant components as a larger variety and amount of contaminants will be introduced from a variety of sources (i.e. land/sea traffic, stack types/heights/emission components/amounts/frequencies during LNG transfer/processing, power plant operation, petrochemical production, incinerator, flaring). Scheduling of emissions may be required to minimize cumulative and residual impacts in cases where emission contaminants interact with each other.

Accidents and malfunctions can affect air quality and do occur in industrial complexes. A variety of emergency plans will be developed during project design. A discussion of risk analyses, leaks, fires, and explosions are included in the EIA Report in section 9.21. It is in the best interest of the Proponent to develop and maintain a high degree of readiness by selecting safe equipment and maintaining it properly, training operational and emergency measure personnel in emergency procedures, and developing simulation models and exercises. Real-time air monitoring with alarm systems is required at the project site and in surrounding areas to ensure early detection of accidents and malfunctions that affect air quality.

#### 5.3.2.5 Monitoring

Particulate monitoring during construction is not planned, however it may be done if required (section 13.1.1; p. 13-1, EIA Report). In a previous section, the EIA Report states that typical monitoring activities would include dust studies (Section 2.4.1.9, p.2-44). In a response to Health Canada question HC 19, Keltic replied that dust monitoring during construction will be part of the Environmental Protection Plan (EPP). Mercury vapour monitoring will be done when construction activities occur in mercury-contaminated soils (*Keltic response to questions HC 19 and 20*).

Background VOC monitoring will be done both pre-construction and pre-operation. During plant operations, a VOC monitoring program will be designed, taking into account the dispersion modeling results for specific VOC compounds (*Keltic response to question HC 23*).

During operations of the industrial complex, air contaminant monitoring at the LNG facility is not deemed necessary by the Proponent. Carbon dioxide, NO<sub>x</sub> and water vapour monitoring is proposed for the co-generation facility. Stack monitoring and real-time ambient air quality monitoring for NO<sub>x</sub>, SO<sub>2</sub>, and TSP will be done at the petrochemical plant. Real-time monitoring will likely be done periodically during the year, as required by the approval process, and reported to regulatory authorities and the public. Real-time monitoring of VOCs is not planned (EIA Report, section 13.1.2, p. 13-1).

Details of the air-monitoring program will be in the Environmental Protection Plan (EPP), which will be completed during the design stage of the project. The EPP will be submitted to Health Canada for review as well as to other federal and provincial regulators in order to ensure it is sufficient to protect human health (*Keltic response to question HC 63*).

### 5.3.3 Identified Concerns

#### *Panel*

#### Ambient Air Quality

The terms of reference for the EIA Report required that data be obtained for present-day ambient and peak concentrations of gases and aerosols that will be released from the proposed project, including nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), volatile organic compounds (VOCs) and particulate matter [total suspended particulate (TSP), particulate matter less than 2.5 micrometres diameter (PM<sub>2.5</sub>) and particulate matter less than 10 micrometres diameter (PM<sub>10</sub>)] (EIA Report appendix 1, p. 15). These data are required by the EIA Terms of Reference to establish existing baseline conditions for air quality, and to be used in air quality models that are required to predict concentrations and regional 'footprints' for emission contaminants around the proposed project and throughout the year.

Ambient air quality data were collected in 2004 for NO<sub>2</sub> and SO<sub>2</sub> over a 2 month period, and for TSP and PM<sub>2.5</sub> for 3 days over 3 months (EIA Report, section 8.4.2, p. 8-23). There is no discussion of ambient air quality data for N<sub>2</sub>O, NO, SO<sub>3</sub>, CO, O<sub>3</sub>, VOCs, and PM<sub>10</sub>. These data are required by the EIA terms of reference and must cover all seasons of the year.

### Modeling

The dispersion model developed for the EIA Report (section 9.6.2.3, p. 9-43) was based on meteorological data from Halifax-Shearwater and from Yarmouth. Weather station results nearer the project site had missing data and the Proponent thought they were unrepresentative due to micro-climatic effects. No quantitative analyses were done to determine if the weather data from a region 160 km away accurately represents the conditions at Goldboro and therefore whether the dispersion model was valid.

The EIA terms of reference required that appropriate modeling be done using baseline data for specific compounds (EA appendix 1, p. 12). Results were presented for NO<sub>2</sub> and SO<sub>2</sub> as well as for TSP and PM<sub>2.5</sub> for summer conditions only. There was no error analysis done to evaluate whether the summer baseline data is valid for the entire year. Even though baseline data was not available for CO, dispersion model results were discussed for CO with no explanation of how baseline values were selected. No modeling results were presented for N<sub>2</sub>O, NO, SO<sub>3</sub>, O<sub>3</sub>, PM<sub>10</sub> and specific VOCs (EIA Report, section 9.6.2.5, p. 9-44 to 59).

### Emission Data

When the panel asked for all required air emission data (Response to EAB Questions, question EAB 31) Keltic responded that total emission data was in Table 9.6-1 and 9.6-2 (EIA Report, section 9.6.2.1, p. 9-33 to 41). These tables did not contain data for SO<sub>3</sub>, O<sub>3</sub> and specific VOC compounds.

A number of inconsistencies and errors were identified in the emission tables. In Table 9.6-1, all TSP was considered to be equal to PM<sub>2.5</sub>, however in Table 9.6-2, TSP was presented as equivalent to PM<sub>10</sub>. Table 9.6-1 reported no SO<sub>2</sub> emission from flaring at the ethylene plant, while Table 9.6-2 reported 24 lb/hr. NO<sub>x</sub> from all sources was reported as

917 lb/hr in Table 9.6-1 and as 577 lb/hr in Table 9.6-2. Ethylene plant flaring data in tons/year were incorrectly calculated in Table 9.6-2. In Table 9.6-1, the flare flue gas flow was listed at 6 billion cubic metres per hour. For a stack diameter of 6 m, this would suggest the exit gas was traveling at hundreds of kilometres per hour.

SOEI gas plant data in Table 9.6-1 and 9.6-2 showed that there was no SO<sub>2</sub> in flare gas. Is it correct that the gas plant can remove 100% of the SO<sub>2</sub> during their flaring operation?

#### Incinerator

The Panel asked for details about air emissions from the plant incinerator and was referred to section 2.5.10.19 of the EIA Report, p. 2-144 (Responses to EAB Questions, question EAB 26). The EIA Report states that the incinerator will release high concentrations of SO<sub>x</sub>, TSP and NO<sub>x</sub>. Emission information for contaminant concentrations, flow volumes, and annual hours of operation for the incinerator was not included in the emission tables (Tables 9.6-1 and 9.6-2; p. 9-33 to 41). There was no information about organic compounds that will be in the waste burned in the incinerator and no information about carbon compounds (e.g. specific VOCs) that will be emitted from the incinerator.

#### Sulfur Species

The EIA Report terms of reference asked for information on sulfur oxide compounds (SO<sub>x</sub>) (appendix section 1; p. 10 to 11). The EIA Report did discuss SO<sub>x</sub> compounds in 2 sections (p. 2-144, p. 9-26), however included only sulfur dioxide (SO<sub>2</sub>) when discussing ambient air quality, modeling and industrial plant emissions. It is unclear why SO<sub>3</sub> emissions were ignored during discussions dealing with ambient air quality, modeling and industrial plant emissions. Sulfur trioxide (SO<sub>3</sub>) is an important component of acid rain.

#### Greenhouse Gases

The EIA Report terms of reference requested that an inventory and discussion of greenhouse gases and their impacts be provided for the project, including carbon dioxide, and the CO<sub>2</sub> release equivalents for methane, chlorofluorocarbons, hydrochlorofluorocarbons and sulfur hexafluoride (appendix section 1; p. 16). The Proponent did not provide this inventory and discussion.

#### *Intervenors*

##### Ambient Air Quality

The Aquaculture Association of Nova Scotia asked that more detailed discussion be given regarding background data, including wind data (Intervenor Submissions, section 9).

## Modeling

Health Canada requested clarification regarding how the predicted (model) values in Table 9.6-4 were calculated (Responses to EAB Questions, question HC 6). They requested references regarding model inputs, including assumptions and uncertainties. Health Canada would like to see modeling of various scenarios including a worst-case scenario and recommends that the Proponent redesigns the model based on advice from Environment Canada. References were not provided as requested. Keltic's response to the question did not respond to the request to redesign the model with advice from Environment Canada.

Nova Scotia Department of Environment and Labour asked for a detailed air dispersion modeling report that included specific VOCs, and information regarding local impacts that these specific VOCs would have on the environment (Hearing transcript Nov. 22, p. 81).

An Intervenor asked about the distribution of air emissions during the various phases of the Keltic project and how far these emissions will extend over the region. Citizens as far away as 40 kilometres from the existing Sable Gas facility have expressed concerns about changes in air quality due to the gas plant (Marika letter to EAB).

## Emission Data

Environment Canada (EC) asked for a more complete estimation, characterization and analysis of air emissions, especially for VOCs. They want more details regarding the fate and potential effects of contaminant air emissions. Emission estimates for the cooling tower, the incinerator and parts of the petrochemical facility have not been provided. EC identified several documents that set out applicable best-available techniques, best management practices, and appropriate objectives for certain contaminants and would be helpful in assessing and managing air emissions (Hearing transcript Nov. 25 p. 43).

Health Canada requested that the Proponent provide a characterization of emissions from all facility operations, including locations, emission rates, specific chemicals released etc. in order to gain a better understanding of the potential impact this project may have on air quality (Responses to EAB Questions, question HC 1). Included in this characterization should be all locations and substances that may be released in the event of an accident or power failure (such as Section 2.5.9.6 [Air Emissions and Controls] which states that "if the in-tank pressure is too high LNG vapours will be vented to the atmosphere", and Section 2.5.9.9 [infrastructure and support Systems], which states that "BOG (boil off gas) will be temporarily vented to the high pressure vent stack when it exceeds the vapour handling system capacity during upsets such as equipment malfunction or power failure").

Another Intervenor requested a breakdown of all air emissions, all chemicals released, emission rates, release locations, etc. It was noted that there was not enough information

in the EIA Report; e.g., incinerator emissions were not reported (Hearing transcript Nov 23, p. 58).

Nova Scotia Environment and Labour (NSDEL) requested that the Proponent undertake stack testing to ensure a proper calibration between the monitors that are on the ground and the actual emissions from the stacks (Hearing transcript Nov. 22, p 81).

#### VOCs

Environment Canada requested that specific VOCs and toxic air emissions need to be specified and that more modeling be done for specific compounds. Speciated VOC data is available from Alberta (e.g. NOVA facility for benzene, 1,3-butadiene, ethylene, methanol, styrene, toluene, and xylenes) and from Ontario's Point of Impingement standards. Modeling these results should be a necessary part of the EIA Report (Intervenor Submissions, section 8, p. 17 to 18).

Health Canada requested more details on specific VOCs (question HC 4). Keltic stated that background VOC monitoring will be done before construction (*Keltic response to question HC 23*).

#### Particulates

Health Canada asked for details about dust travel distances during construction. Keltic responded that more modeling is needed, however, they did not state why their modeling results in figures 9.8-8 and 9.6-9 were not adequate (*Keltic response to question HC10*).

#### Incinerator

Health Canada asked about the composition of the tar burned in the incinerator and whether there will be monitoring of products/byproducts in the incinerator emissions (i.e. PAHs, dioxins and furans) (question HC 8). Keltic did not provide details about PAHs, dioxins and furans).

#### Greenhouse Gases

Environment Canada requested a complete inventory of direct and indirect greenhouse gas emissions. This inventory should include separate emission estimates from each proposed significant project component and phase. Keltic did not provide these details. (Hearing transcript Nov. 25, p.46).

#### Monitoring

The Guysborough County Regional Development Agency (GCRDA) requested real-time air quality monitoring in surrounding communities and northeast of the plant downwind from summer southwest winds (Hearing transcript Nov 24, p.116-117).



Health Canada requested that air-monitoring locations be identified, i.e. at the stack, in the facilities, at the property boundaries, near sensitive off-site receptors etc. (question HC 1).

An Intervenor requested that air quality monitoring be done inside project buildings (Hearing transcript Nov 23, p. 58).

Health Canada requested clarification regarding the nature and extent of any proposed air quality monitoring inside on-site facilities where workers will be present. No specific details were given (Keltic response to question HC 3).

NSDEL was concerned that there was no requirement for permanent ambient VOC monitoring. They stated that VOC monitoring should be required as part of the approval for the ambient air monitoring network (question NSDEL 28).

NSDEL requested that the Proponent establish a continuous permanent and real-time air-monitoring network (question NSDEL 27).

Nova Scotia Health Promotion and Protection was concerned about details for an air-monitoring program (question NSHPP 3).

GCRDA asked that real-time ambient air quality baseline monitoring be started in the community, at the industrial park and in surrounding communities before construction. They also wanted to know which regulators were responsible for overseeing the monitoring and follow-up programs (question GCRDA 1).

Nova Scotia Department of Environment and Labour requested that there be installation and maintenance of a continuous and permanent real time air-monitoring network that would include VOCs. (Hearing transcript Nov. 22, p 81).

### *Public*

#### *Ambient Air Quality*

A member of the public was concerned because the EIA Report concluded that the area has limited importance to recreation and tourism, and that the area is rural and relatively undeveloped. This does not mean that air quality controls and safeguards should be less stringent. The effects on the land, water and health of the potentially affected people are still important to those people.

There are concerns that even though regulatory standards may be met, there may still be deterioration in air quality due to the contaminant emissions. The public has a right to know to what extent air quality may potentially be affected under worst-case conditions (contaminant types and concentrations), even if concentrations meet regulatory standards (Cross Letter).

## Modeling

A member of the public asked if air modeling done using Shearwater weather data was valid. A local weather station must be installed immediately to determine if Shearwater data can be reliably used in the dispersion model (Cross letter).

A question was asked about flaring patterns as they relate to prevailing winds. Keltic responded that wind factors are taken into account by the air quality dispersion model, which uses five years of Shearwater meteorological data. There was no mention whether that 5-year data set is appropriate, as it was collected 160 km from the project site (Keltic response to question CC 29).

Model results show projected air quality concentrations within about 5 kilometres of the Keltic site. A member of the public questioned the Proponent's conclusion that off-site air quality impacts are expected to be insignificant. The questioner felt that more work is needed on intermediate and longer range transport of air contaminants. A member of the public from Dartmouth has observed air plumes from the Imperial Oil refinery and from Tufts Cove power station that were carried for distances 15 to 20 km, depending on wind conditions. Odour from emissions at the Neenah (former Scott Paper) plant in Abercrombie can be smelt tens of kilometres from the plant. The member felt that ground level and upper air modeling over distances of tens of kilometres should be carried out under guidance from Environment Canada, for all stacks, for all contaminants, and for the combined worst case scenario (Cross Letter).

## VOCs

A concerned citizen questioned how VOCs, furans, dioxin, and other toxins will be kept away from drinking water; soil and air (question CC 44).

A member of the public asked for more information on concentrations and types of VOCs and stated that it is a significant omission not to include VOCs in the overall facility impacts. They continued with a comment that the EIA Report mentioned continuous fugitive emissions (non-stack), with no listing of expected chemicals or concentrations. Such facilities should be state of the art, with all available technological features required to control and reduce all types of emissions, including fugitive emissions (Cross Letter).

## Particulates

A concerned citizen asked for proof that all particulate matter from the Keltic and SOEI projects would exist as  $PM_{2.5}$  (Table 9.6-5 in the EIA Report). They also asked if the particulate matter had been characterised with respect to composition of organics and metals, as well as particle size (Cross letter).

A concerned citizen stated that even though the SOEI gas plant reported that air quality is not an issue, a black film has been found over vehicles, homes, and clotheslines. Is the air safe for residents and wildlife? (question CC 31)

## Incinerator

The public was concerned that incineration of organic wastes can produce toxic breakdown products such as dioxins and furans. These potential products are not discussed in the EIA Report. In addition, waste fuels are to be burnt in the cracking furnaces and power generation plant. What contaminants are present in the waste fuels and what contaminants will be released to the air? (Cross letter)

## Monitoring

The public requested that an ambient air quality monitoring network be established, starting as soon as possible, on a local and regional scale. Just because this area is in a rural setting and sparsely populated does not mean that the effects are 'minimal' and insignificant for those potentially affected, a fact that seems to be ignored in Table 9.6-6 (Cross letter).

There may be a cumulative air quality effect from the number and types of emissions combined with that from the SOEI gas plant. A state-of-the-art monitoring system should be in place, as well as ambient monitoring both locally and regionally. Results should be made available to the public on a regular basis.

## Mitigation

In a number of places, the Proponent commented that certain mitigative measures will not be taken because the emissions will meet regulatory standards. This approach is not in keeping with current public concerns about the environment, and does not show due diligence for a state-of-the-art facility that should not only meet but also exceed regulatory guidelines when possible (Cross Letter).

### 5.3.4 Panel Findings

#### Ambient Air Quality

The Proponent monitored NO<sub>2</sub> and SO<sub>2</sub> for only 2 months. Ambient and peak air quality concentration data are not presented for other NO<sub>x</sub> and SO<sub>x</sub> compounds, or for CO, O<sub>3</sub> and VOCs, as was required by the EA terms of reference. The Proponent's response that there were no existing data for the area is not acceptable. In order to describe ambient and peak air quality conditions, such data is mandatory, and if it does not exist, it must be collected.

The Panel concludes that baseline air quality data must be collected as required.

#### Modeling

The air quality dispersion model was developed for the EIA Report without using appropriate baseline data. The model was developed using meteorological data from

Shearwater and Yarmouth stations, with no quantitative analyses to prove whether the Shearwater and Yarmouth data was valid for climate conditions at Goldboro.

There is a need to collect local meteorological data over at least two seasons and to verify that the Shearwater and Yarmouth data are valid in the dispersion model.

These is a comparison of meteorological data between stations at Shearwater and Sherbrooke, however there was no wind data shown for the Sherbrooke station (EIA Report, p. 8-19).

The Panel understands that the air dispersion model will be extremely sensitive to wind conditions, therefore it is mandatory that local wind data be collected and tested in the air dispersion model for the Keltic project.

Guysborough County climate data was rejected by the Proponent because it was thought to be affected by microclimate effects. This points out that such effects do occur in the region, however there was no discussion to determine whether these effects are significant at the project site. A microclimate evaluation is necessary to determine whether the air dispersion model is valid.

The Panel concludes that the model development must be redone after obtaining acceptable ambient and peak air quality data for all components and after gathering reliable meteorological data for the project area.

#### Emission Data

Emission details and verified dispersion patterns have not been provided as requested. The EA process must identify areas where people, wildlife and biota may be affected by air quality. The Panel requests that the new air dispersion model requested above be used to prepare air quality plume/footprints (maximum and annual concentration contour maps) over a radius of 25 km around the Keltic site. The Proponent identifies communities in this zone as affected by the project (EIA Report, section 14.4.1, p. 14-3). The concentration maps are to be done for NO<sub>2</sub>, NO<sub>3</sub>, N<sub>2</sub>O, SO<sub>2</sub>, SO<sub>3</sub>, CO, O<sub>3</sub>, VOC species (as identified in Alberta and Ontario examples), TSP, PM<sub>2.5</sub>, and PM<sub>10</sub>.

The Panel requests that Table 9.6-1 (EIA Report, p. 9-33 to 9-36) be revised to address air emission errors, inconsistencies and omissions (i.e. add data for SO<sub>3</sub>, PM<sub>10</sub> and VOC species) and be reviewed by federal and provincial government experts.

In the EIA Report (section 9.6.3, p. 9-59), the Proponent concluded that the effects on air quality are not expected to be significant because the site is fairly isolated and the effects of air emissions are expected to be insignificant at off-site locations. The Panel finds this conclusion to be invalid until adequate baseline and verified meteorological data is collected and an updated air dispersion model is used to provide emission contour maps.

Detailed emission data is required for SO<sub>3</sub>, not just SO<sub>2</sub>.

## VOCs

Requests were made for more detailed emission information regarding potential VOC species that may be released from the Keltic project. Contour footprint plots for specific VOCs are needed as part of the EA process, using existing VOC data and an updated version of the air dispersion model. These results will be compared to the background VOC monitoring data that will be done before construction (question HC 23).

## Particulates

The Panel finds conclusions for discussion of the impact on air quality (EIA Report, section 9.6.3) to be overly optimistic and unsubstantiated. The Proponent stated that more modeling was needed to evaluate the distance that construction dust will travel. This implied that modeling results in figures 9.8-8 and 9.6-9 were not adequate (question HC 10).

There is inconsistent use and discussion regarding size fractions of suspended matter. There is no evidence to confirm that equating TSP to PM<sub>2.5</sub> and/or PM<sub>10</sub> is valid. The Panel requires consistent discussion regarding TSP, PM<sub>2.5</sub> and PM<sub>10</sub>.

There is a need to characterize the organic species and metal composition of particulate matter to provide baseline data before the project begins. In addition, this is to be repeated during and after construction and production phases.

## Incinerator

Data is required for emission types, amounts and annual hours of operation for the proposed incinerator. An Incinerator Monitoring Plan (question HC 8) needs to be included in the list of reports and plans (section 6.2, this report).

## Greenhouse Gases

A detailed inventory of CO<sub>2</sub> emissions and CO<sub>2</sub> emission equivalents for methane, chlorofluorocarbons, hydrochlorofluorocarbons and sulfur hexafluoride is required.

The project does not enhance the goals of using renewable resources, minimizing acid rain and reducing greenhouse gas emissions, as is increasingly supported by citizens and governments.

## Monitoring

Real-time ambient air quality baseline monitoring needs to be started in the community, at the industrial park and in surrounding communities, before construction.

On page 2-44 of the EA report, it states that typical monitoring activities would include air quality monitoring of dust. This is contradicted on page 13-1 where it says typically, dust is not monitored during construction.

The Proponent responded to a question about analyzing the monitoring results by saying that the Environmental Management Team will be responsible. This team is not identified in the EIA Report.

## Mitigation

State-of-the-art mitigation steps are to be taken for all project phases, regardless whether air quality regulations have already been met.

### 5.3.5 Recommendations

5.3.5.1 That prior to any construction activities, the Proponent supply to NSDEL seasonal baseline data for ambient and peak concentrations of gases and aerosols that may be released from the proposed project, including nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), volatile organic compounds (VOCs) and particulate matter [total suspended particulate (TSP), particulate matter less than 2.5 micrometres in diameter (PM<sub>2.5</sub>) and particulate matter less than 10 micrometres in diameter (PM<sub>10</sub>)].

5.3.5.2 That prior to any construction activities, the Proponent collect appropriate meteorological data at the proposed project site for at least two seasons. The Proponent will statistically and quantitatively compare this new data to Shearwater and Yarmouth climate data used in the EIA air quality dispersion model to ensure that valid data is used in the model. The Proponent will identify details about microclimate issues in the project area that could affect the dispersion model. These findings will be given to NSDEL and other appropriate agencies for review.

5.3.5.3 That an updated air dispersion model be prepared by the Proponent using the updated baseline air quality data and the verified meteorological data that were requested in Recommendation 5.3.5.2. This new model will be used to produce maximum and annual concentration contour maps for the air quality components identified in Recommendation 5.3.5.1. The maps will cover a region with a radius of at least 25 km from the Goldboro project site and include specific VOC contour maps. These findings will be given to NSDEL and other appropriate agencies for review prior to any construction activities.

5.3.5.4 That the Proponent supplies additional air emission data and interpretations to NSDEL prior to any construction activities.

(a) This data will include chemical characterization of Sable Offshore Energy Inc. (SOEI) gas plant particulates and SO<sub>x</sub> emission data from the SOEI plant.

(b) Emission data from the proposed petrochemical plant will be provided for SO<sub>x</sub>, O<sub>3</sub>, and known specific VOCs, based on relevant Alberta and Ontario data reflected in Environment Canada's Intervenor submission (p.17).

(c) The Panel requests that Table 9.6-1 of the EIA report be revised by the Proponent to address air emission errors, inconsistencies and omissions (see section 5.3.3 Identified Concerns/Panel/Emission Data, this report).

(d) Emission data from the proposed incinerator at the project site will be provided by the Proponent, including emission compounds, concentrations and incinerator hours of operation.

(e) An Incinerator Monitoring Plan will be prepared and implemented (section 6.2, this report).

(f) A complete project inventory of greenhouse gas emissions will be provided by the Proponent, including carbon dioxide, and the CO<sub>2</sub> release equivalents for methane, chlorofluorocarbons, hydrochlorofluorocarbons and sulfur hexafluoride. The Proponent will provide an analysis of greenhouse gas emissions from the proposed petrochemical plant and how these emissions fit with Nova Scotia's greenhouse gas reduction goals.

5.3.5.5 That the Proponent begin real-time ambient air quality baseline monitoring in the community, at the industrial park and in surrounding communities prior to any construction activities. A detailed plan of the monitoring program as well as a list of the individuals or agencies responsible for overseeing the program, doing the data analyses, and enacting the necessary adjustments will be provided to NSDEL.

5.3.5.6 That the Proponent's communications strategy include procedures to share real-time air quality data and predicted model results with NSDEL and the public.

## 5.4 Noise and Lighting

### 5.4.1 Introduction

Noise was identified as a Valued Ecosystem Component (VEC) and will have varying influences on the area of the project during all phases of development. Lighting was discussed jointly and separately from the topic of Noise, but not dealt with as a VEC.

### 5.4.2 Summary of Environmental Impacts/Mitigation/ Follow-up and Monitoring

#### 5.4.2.1 Existing Environment

As identified in the EIA, the nearest occupied properties are some 300-500 m from the site boundary lines. Under section 8.5.1 of the EIA the site is described as “being semi-rural in nature. However, its actual location is in an industrial park which is currently the site of the SOEI Gas Plant (Figure 1.1-1).” Noise testing was done at the current property and “given the limited noise sources in the area, this sample can be considered representative of typical noise levels in the area of the Project.” (EIA p. 8-23)

Section 8.5.2 describes the site “as having virtually no artificial lighting sources. The surrounding community has artificial lighting sources consistent with those found in sparsely populated rural communities. Existing ambient light levels were not monitored; however, as with noise levels, they would be typical of a semi-rural environment, with some slight impacts from the flare stack at the SOEI Gas Plant.” (EIA p. 8-24)

#### 5.4.2.2 Environmental Impacts

Section 9.7 of the Report deals with the impacts of noise and excerpts are as follows:

##### Noise

“As with any major development project, noise from construction activities is an inevitable reality. The construction of Keltic’s facility will span a period of some 33 months, and will involve site preparation (blasting, earthmoving, etc.), followed by the erection of major industrial components. The well-being and comfort of nearby residents, as well as indigenous wildlife, is a concern.” (EIA p. 9-63)

“There are also concerns as to the impacts from construction activities that generate noise emissions transmitted through the underwater environment.” (EIA p. 9-64)

“Although there is not an extensive use of the near-shore waters by cetaceans and seals (Section 8.8.6), these species may be susceptible to damage from the underwater noises generated using conventional pile-driving techniques.” (EIA p. 9-64)



“Noise impacts on marine mammals during operation is not expected to be significant as most noise generated (i.e. ship engines) would be of a lower frequency than pile driving and other marine construction practices.” (EIA p. 9-65)

“Overall effects of noise during the Project’s construction and operation phase are not expected to be significant (Table 9.7-3). Stormont Bay is not a significant area for marine mammals. The effects of construction noise on marine mammals therefore are expected to be minimal. The nearest occupied residences are 300 to 500 m away from the Keltic site. Any projected noise that reaches these properties will be significantly decreased. Effective noise abatement will be employed to reduce operation-related noise effects at the nearest residential receptors to levels within regulatory guidelines.” (EIA p. 9-66)

#### Lighting

“Light will be emitted from all components of the Project. The most noticeable will be from the Marine terminals, especially when vessels are at berth. This area is in the direct view plane of the communities of Goldboro, Isaacs Harbour, and Drum Head.” (EIA p. 9-24)

“It is anticipated that no direct lighting impacts from this site will impact the residents of the area, although there will be some inevitable ‘skyglow’ which will be noticeable, given the typical dark skies of a rural area.” (EIA p. 9-25)

“While the lighting levels have not been designed at this stage, they will be set to provide a low level of general lighting sufficient for security cameras. This level is not expected to provide task lighting and high masts with multi-unit high intensity fixtures will be avoided as much as possible. Where high mast lighting is required the illumination fixtures will be selected to direct light downward.” (EIA p. 9-24)

#### 5.4.2.3 Mitigation

##### Noise

“Work activities will be planned so as to create minimal disruption in the evening and night time hours, and construction activities at the wharf and marine terminal areas will be discussed with local fishermen so as to minimize potential impacts on the commercial fisheries. A summary of mitigative measures for noise impacts can be found in Table 10.8-1.”

##### Lighting

No mitigation measures are identified for impacts from lighting.

#### 5.4.2.4 Cumulative and Residual Impacts/Accidents

As identified in EIA Table 11.1-1, the following excerpts outline the Proponent’s

conclusions:

#### Noise

“Noise emissions from site preparation (moving earth, blasting) and from construction of industrial components - Adverse in nature and determined to have minimal impact.”

“Construction-related nuisance impacts such as elevated noise and dust levels will be of short duration and are considered unlikely to negatively affect property values.”

“Potential for increase in noise levels; levels to remain within regulatory standards.”

#### Lighting

No cumulative and residual impacts were identified for lighting.

#### 5.4.2.5 Monitoring

Section 13.2 – Noise and Light Monitoring outlines that “noise monitoring will be conducted if complaints arise as a result of construction activities or truck traffic through Goldboro and/or other communities during construction. A traffic/vehicle management system may be implemented if noise threshold levels are exceeded.”

No light monitoring plans were identified.

#### 5.4.3 Identified Concerns

##### *Panel*

Many of the noise predictions at the site boundary exceed Provincial limits [Keltic response - *As noted on page 9-66 of the EIA, a fully developed noise monitoring plan will be put in place, and noise levels at nearest occupied property will not exceed 55 dBA, which is the lowest level cited in the NS Guideline (night time/holiday Table 9.7-1)*

##### *Intervenors*

Dan McDougall – Municipality of the District of Guysborough

“The public expressed concerns with the impact this project would have on the general health and well being of area residents. Air quality, noise, odour and emissions are of particular concern for residents and the Municipality would request that the developer consider appropriate best available technology to minimize any negative impacts on the community and in particular on the health and well being of residents and the environment. The Board should ensure that effective methods and regulations are in place to address these issues.”

## Nova Scotia Department of Environment and Labour

“In the Table on Page ES-12, the Proponent indicated that the project would meet noise levels recommended by CMHC. Yet, we could not determine the numerical levels of these guidelines. The document does not compare them to the Department’s Noise Guidelines. The expectation would be that the project, as a minimum, should provide at least the level of protection provided by the Department’s guidelines.”

## Ecology Action Centre

“The visual landscape and the low level of noises and lights in the area clearly indicate that the area is not industrially developed and, therefore, effects from the construction and operation of the Keltic project and site will be major.”

“The EIA does not cover what would be the cumulative vibration and noise impacts of the added Keltic facilities’ multiple flares. The mitigation measure of offering a telephone number for complaints (section 10.8) should include what actions will be taken by the Proponent. Will they stop and review their operations? Will they stop after 100 calls or after 10? What measures can be taken to stop the vibrations and noise once the site is operational?”

“There is no assessment of the effects of the noise and vibration impact of increase traffic from trucks and car, both during construction and operation, on the local enjoyment of property, community health and social cohesion, impacts to agricultural animals, etc. This is also lacking from the noise coming from ships as they come into port, and how this will affect the human population but also the seabirds nesting a kilometre or less away from the traffic.”

“The EIA admits that there are people whose property will be negatively affected by the externalities of the construction and operation of the project – noise, truck traffic, dust, lights, etc.”

## *Public*

Noise and Blast Attenuation – “The report did not address the construction of earthen walls to attenuate noise and possible explosive events away from populated areas. These berms could be located along the perimeter of the plant and LNG site and would reflect noise and shock waves up into the atmosphere.”

“I am against this project as well as my husband for the following reasons...(It will) cause a lot of traffic and noise and pollution.”

“The damage to our roads by the influx of multitudes of additional vehicles cannot be overstated; never mind the horrendous extra noise, especially of heavy trucks, as they loudly honk and squeal brakes negotiating Goldboro’s many dangerous curves.”

“During construction we will see a clearcut of hectares of land, blasting, water table interference, a fundamental change to the Isaacs Harbour waterway, air pollution, sea water pollution, soil erosion, light pollution, and noise pollution at levels we have not yet experienced in the area.”

“As to my understanding of what I have learned through my research the lights and noise will never stop.”

### *General*

“There appears to be no discussion of the potential combined effects associated with noise from the LNG terminal, the petrochemical plant, and the cogeneration plant. Health Canada is requesting that noise from all facility operations be characterized to determine whether they will exceed applicable criteria at the nearest off-site residences/most sensitive receptors (i.e. seniors’ home/daycare/school if applicable).”

Section 13.2.2 Noise and Light Monitoring, Operations – The EA states that “the Proponent will initiate a monitoring program which will consist of sampling noise levels over a 24-hour following commissioning. Noise sampling will be conducted quarterly and the results evaluated on an annual basis.” Health Canada is requesting clarification as to where the samples will be collected; on-site or off-site near sensitive receptors.

“Section 9.7.2 Operation Phase, Petrochemical Plant – The EA states that “when the Keltic Facility becomes operational (2009), a fully developed noise monitoring program will be implemented to confirm that noise levels at the nearest occupied properties do not exceed the Canadian Mortgage and Housing Corporation (CMHC) recommended LEQ (24-hr) of 55 dBA.”

Section 2.4.2.4 Lighting, and Section 9.5.2.4 Visual Impacts, Lighting – There is no discussion regarding the potential human health effects associated with sky-glow. Sky glow is defined as “the brightening of the night sky due to man made lighting” (IDA, 2002). At this time, there is not enough information in the EA for Health Canada to determine whether the presence of light/sky glow will have an adverse effect on nearby residents.”

“Health Canada recommends that operational noise levels be assessed in accordance with Health Canada Draft Guidance on Noise Assessment for CEAA Projects.”

#### 5.4.4 Panel Findings

The Proponent identifies Noise as a Valued Ecosystem Component within the biophysical Environment under table 7.2-1 – *Basis for Selection of VEC's* and deals with it throughout the report as a VEC topic and even combines it with the topic of Lighting. Yet, in response to a comment from Ecology Action Centre, “The VEC of Light should be separate from the VEC of Noise”, the Proponent states “Noise and light are not VECs. They are pathways of effect on VECs. VECs are not always selected as ecosystem

indicators, and very often are selected based on economic considerations.” This is confusing and while lighting is initially discussed with Noise it is dropped near the end of the report and not discussed under impacts or mitigation.

The Proponent appears to be opting to place the onus on neighbour complaints in order to trigger an investigation into noise rather than ensuring noise is kept to a minimum.

Within the report varying distances are provided regarding proximity of residential properties. “The nearest residence will be approximately 1.2 km distant from the site.” “The nearest occupied properties are some 300-500 m from the site boundary lines.” Sound studies must be consistent and distances must be more accurately defined.

There is not enough detail provided in regards to the impacts of light. If sound is a Valued Ecosystem Component then consideration should be given to light as a VEC as it too can be part of the biophysical environment.

Health Canada identified many issues in their submission which are presented in this report, and this is very valuable information. The federal environmental assessment process will likely address these matters during federal review and permitting processes.

#### 5.4.5 Recommendations

5.4.5.1 That the Proponent’s Noise Monitoring Program, rather than monitoring noise through complaints, ensure that sound levels meet the lowest levels as established by all levels of government. The plan must not be dependent on impacts on ‘sensitive receptors’ which are often defined as public uses such as schools and health care facilities (these are not near the project site). The plan must also include methods by which the marine environment will be monitored for noise as a result of construction and operation, including shipping and marine terminal operations.

5.4.5.2 That the Proponent submit a Lighting Design Plan and establish a Light Monitoring Plan for approval by NSDEL prior to the issuing of any permits. The Light Monitoring Plan is to include a means of regularly monitoring bird mortality and lighting levels rather than depending upon complaints from nearby residents and the public.

## 5.5 Surface Water and Wetlands

### 5.5.1 Introduction

The proposed Keltic project will impact water resources in several ways. Process and domestic water supply for the facilities will be provided by an impoundment to be created through damming of the outlet from Meadow Lake where it flows into Isaacs Harbour River, flooding an area of 140 hectares. Land clearing and construction for the terminal wharf, LNG storage, and petrochemical complex will impact a number of wetlands and ponds, with some to be infilled. Downstream effects from project construction and operations will include impacts on fresh and marine waters from construction site runoff, stormwater runoff from facilities, treated wastewater effluent, and accidental spills or releases. Lakes, rivers, ponds and wetlands provide important habitat for a range of aquatic species, as well as supporting terrestrial species as a water source, and also provide groundwater recharge. Wetlands in particular can remove contaminants from water, and are biologically very productive areas.

### 5.5.2 Summary of Environmental Impacts / Mitigation / Follow-up and Monitoring

#### 5.5.2.1 Existing Environment

There are a number of lakes, rivers, ponds and wetlands in the vicinity of the Keltic project site and surrounding area. Some ponds and wetland areas will be directly impacted by project activities on the proposed site. Meadow Lake has been proposed as the water supply for the Keltic project, both for drinking water and domestic supply, as well as for process water for the petrochemical complex. Approximately 1200 m<sup>3</sup> per hour will be required. Meadow Lake drains via Isaacs Harbour River to the head of Isaacs Harbour. Many of the lakes and rivers in the area are currently used for fishing and other forms of recreation.

Meadow Lake is situated north of the proposed LNG and petrochemical facilities in a relatively undisturbed setting. The lake is approximately 104 hectares in area with a maximum depth of 2 metres, and currently has some use for recreational fishing. Water quality data indicate that the lake has elevated levels of aluminum, iron and manganese. Historically, some gold mining activity apparently has occurred within the watershed. Over 40% of the Meadow Lake basin is wetland, with large areas of raised bog, fen and marsh surrounding the lake.

Other lakes within the project area also show elevated metals concentrations, likely related to past mining activities. Conductivity is low due to the underlying geology. Colour is elevated in many waterbodies, likely due to humic wetland or bog drainage.

Six ponds are located on the Red Head peninsula, which will be the site of the marginal wharf and LNG terminal. These ponds range from fresh to brackish water.

Twelve wetlands occur on the Keltic site, ranging from coastal ponds to marsh, bogs and fens. Other parts of the project site are typically poorly drained and wet, although not technically wetlands. Most (8 of 12) of the wetlands are peat systems.

#### 5.5.2.2 Environmental Impacts

Meadow Lake – Creation of the dam, impoundment, and access road have the potential for impacts through physical disturbance, sedimentation via runoff, loss of aquatic and terrestrial habitat, and operational impacts as the impounded lake is drawn down to meet water needs during annual periods of lower precipitation. The impoundment will raise the level of the lake by 2 metres, doubling the current maximum depth. Approximately 140 hectares of wetland and brush-forest will be flooded. A drawdown of up to 2 metres is projected during operations, implying that this 140 hectare area will be periodically flooded and drained. Formation of methylmercury is a common impact of flooding of organic soils and vegetation.

Large areas of bog and fen will be inundated as a result of creation of the Meadow Lake impoundment, resulting in loss of these systems. Keltic proposes the removal of vegetation and organic soils prior to flooding, to reduce the potential for methylmercury formation. Impacts to ponds include infilling two of the Red Head ponds.

Construction activity at the Keltic site will include grubbing and stripping of topsoil and overburden. Any wetland within the cleared areas will be destroyed, and runoff from cleared areas has the potential for siltation of downslope watercourses due to stormwater runoff. During the operational life of the project, stormwater runoff will continue to have the potential to carry sediment or other contaminants into area watercourses. Vegetation and soils grubbed from both the Keltic site as well as the Meadow Lake impoundment area have the potential for erosion or leachate from stockpiles to enter watercourses. Keltic indicates that removed vegetation and soil will be temporarily stored onsite and then reused as needed.

Road construction due to the realignment of Route 316, and construction of access roads within the project site as well as to the Meadow Lake dam site, has the potential for runoff of sediment or any spills to adjacent watercourses. Runoff from concrete production could introduce lime to watercourses, raising the pH. Disturbance of any mine tailings on the project site could release metals into runoff water.

Chemical spills and leaks/releases from production activities can reach surface waters. Acid-bearing rock exposure and acid mine drainage can affect surface water pH.

#### 5.5.2.3 Mitigation

The Proponent has described the removal of organic soil and vegetation as a mitigation for methylmercury formation. This mitigation activity is to be carried out largely in winter, presumably to avoid breeding seasons for aquatic species and to carry out disturbance at times when soils are frozen and runoff is at a minimum. This mitigation is

also stated to address reduction in aquatic dissolved oxygen levels due to organic breakdown in flooded areas. Provision will be made for continued fish passage in the design of the dam structure such as a fishway, and some suggested design details are provided by Keltic in response to question EAC-73.

Water residence time in the created Meadow Lake reservoir will be approximately 6 days, which is proposed to allow sufficient flushing to reduce the potential for mercury accumulation. All lands to be flooded at Meadow Lake are Crown land, and will be acquired during permitting processes.

Mitigative measures for stormwater runoff include establishment of settling ponds to reduce sediment prior to release, and use of sediment fences to avoid transport of sediment off of construction sites. Fifteen (15) metres buffer zones are proposed around waterbodies, and 150 metre buffer zones for storage of fuels, oils and chemicals. The EIA Report indicates that further details on mitigation methods are to be provided in the Environmental Protection Plan will be submitted.

Physical works in the water are to be conducted outside of fish spawning and migration seasons. Fish habitat compensation and wetland compensation plans have yet to be determined with the appropriate regulators.

#### 5.5.2.4 Cumulative and Residual Impacts / Accidents

For the creation of the dam and Meadow Lake impoundment, residual impacts are projected to be minor. Accidents could include dam failure. No cumulative impacts are projected for Meadow Lake.

#### 5.5.2.5 Monitoring

Details of proposed water monitoring are specified in EIA Report Table 13.3-1 (surface water) and 13.7-1 (fish).

### 5.5.3 Identified Concerns

#### *Panel*

Phosphorus data collected by the Proponent does not allow any conclusion as to the present trophic status of the lake, as a detection limit of 0.1 mg per litre was used (0.2 was erroneously reported in the EIA). Un-impacted surface waters in NS are often below 0.010 mg per litre of total phosphorus (10 micrograms - oligotrophic range upper limit). An appropriate detection limit would be 0.002 mg per litre. Several of the levels reported in EIA Table 8.6-5 were 0.1 mg per litre (100 micrograms per litre), which would indicate eutrophic to hyper-eutrophic conditions, which are unlikely in a relatively pristine lake.



The proposed monitoring program for Meadow Lake should include appropriate parameters such as metals, oxygen, pH and total phosphorus, in addition to those proposed, to assess present and future water quality and trophic status.

There is inconsistency or lack of clarity in the EIA Report regarding the size of Meadow Lake, and the area to be flooded. Keltic has clarified (Keltic response to question EAB-52) that Meadow Lake is approximately 104 hectares, and with a 2 metre rise approximately 140 hectares will be flooded, for a new area of 244 hectares. Figure 9.6-1 has been provided by the Proponent in response to Panel question EAB-89, showing the lake and area to be flooded.

Construction of an access road to Meadow Lake will have impacts on the lake and on Isaacs Harbour River, such as siltation, if not properly mitigated.

Biodiversity of Meadow Lake may be impacted as a result of habitat disturbance from impoundment.

#### *Intervenors*

The Ecology Action Centre (EAC) and NSDNR questioned inconsistent figures in the EIA Report on the area of Meadow Lake and the impoundment area. The EAC has also pointed out that the EIA states that 42% of the Meadow Lake basin is wetland which will be impacted, and that the NS Wetlands Directive requires avoidance, mitigation, and compensation for impacted or destroyed wetlands. EAC also referred to the federal Wetlands Policy. They noted the lack of available information regarding wetland compensation plans, and that the project is in conflict with policies to preserve wetlands. The EAC questions the lack of information on fish passage mitigation, destruction of waterfowl nesting sites, and wetlands. Lack of information on the impacts of dam failure is also questioned. The adequacy of water supply is questioned should the hydrology of Meadow Lake and the watershed, or the project water demand, change in future. Overall impact to wetlands is cited as a significant concern, and the NS Wetlands Directive is noted.

Health Canada has identified methylmercury as an issue for the Meadow Lake impoundment, and has provided recommendations to address the potential for contamination of fish, sediments and water.

NSDNR has identified a lack of information on the ecosystem value of all wetlands to be impacted, and that details of application of the “no net loss” policy are vague and do not meet the Terms of Reference. They request that a wetlands compensation plan be prepared and accepted by NSDEL and NSDNR prior to any construction start-up.

NSDEL has questioned the lack of justification and rationale for selecting Meadow Lake as the preferred water supply option, and have indicated that effects must be fully addressed in approvals processes and in pre- and post- development monitoring. They

also indicate that there is insufficient baseline data on the wetlands, and particularly on the sphagnum species present in bogs.

Transport Canada has noted that a navigational impact assessment has not been completed yet for Meadow Lake, Isaacs Harbour, or Isaacs Harbour River, and no conclusion on public right to navigation has been determined.

The federal Department of Fisheries and Oceans (DFO) has identified a lack of information on the amount of fish habitat to be created or lost at Meadow Lake, and lack of detail on the access road, dam and water intake structure designs at Meadow Lake. Lack of information on fish sampling was also noted, as well as a lack of analysis on the potential for eutrophication of Meadow Lake and lack of analysis of the operational impacts of water withdrawals. DFO states that Meadow Lake is likely a holding-staging area for adult salmon in summer. They also note that flooding of wetlands has the potential to release nutrients and contribute to significant eutrophication of Meadow Lake, with consequent oxygen depletion and possible fish kills.

Environment Canada (EC) notes that use of existing rights-of-way as much as possible will minimize access and damage to wetlands, and have noted the federal policy on wetlands conservation which advocates no net loss of wetlands function. EC notes the lack of wetland functional analysis, and certain baseline information. EC finds that the mitigation measures described are vague. They have asked that pipelines avoid wetlands whenever possible, and that horizontal directional drilling be considered as an installation method for pipelines to avoid wetland impacts. Access for all terrain vehicles (ATVs) and resulting damage to wetlands is a concern along rights-of-way and access roads. EC recommends that the buffer zone for wetlands and waterbodies should be increased from 15 metres to 30 metres.

#### *Public*

Meadow Lake impoundment issues raised include: wetland and habitat flooding; impacts on birds; impacts on fish and fish habitat. Concern was also expressed regarding the general impacts to wetlands.

Concern was expressed that any air emissions from the facility which could generate acidic deposition could impact the pH of surface waters.

#### 5.5.4 Panel Findings

Meadow Lake – Creation of the dam, impoundment, and access road may have significant impacts on Meadow Lake, Isaacs Harbour River, Isaacs Harbour, and on associated aquatic and terrestrial habitats and species. Mitigations cited by Keltic include the EPP and Erosion and Sediment Control Plan (both to be developed during the subsequent FEED stage). Reference is also made to NSTPW and NSDEL practices and guidelines. Without sufficient detail on mitigation methods, it is impossible to adequately assess the likelihood of residual impacts resulting from the impoundment.

Operational impacts of varying water levels due to draw-down are also difficult to predict without operational details. Adequacy and enforcement of provisions in the EPP will be critical to ensure minimal residual impacts.

Removal of vegetation and organic soils from the area to be flooded at Meadow Lake has the potential to significantly impact the lake and downstream systems. The assertion that conduct of this activity during winter will minimize impacts could not be adequately assessed by the Panel. The Panel could not determine the relevance of the suggested precedent of the Tower Road Dam project in New Brunswick, as the NB Department of Environment was unable to provide documentation on this project for preparation of this report. Storage of vegetation and organic soils, particularly peat, has the potential for leaching of organic material to adjacent watercourses, with impact on oxygen levels due to Biological Oxygen Demand (BOD).

The assertion that a previous dam structure at Meadow Lake produced no significant effects was not supported by any quantitative information, but by the observation that present conditions are likely similar to those prior to construction of the previous dam. This may be true, but cannot be demonstrated.

The Proponent has asserted that the flooded 144 hectares of the Meadow Lake impoundment will constitute new aquatic habitat. The projected drawdown of up to 2 metres will mean that up to 144 hectares will be periodically uncovered and then re-flooded. This suggests that sustainable aquatic habitats may not be able to establish within the flooded zone, and that ongoing residual impacts on fish and biodiversity may persist to some degree.

Impacts to wetlands from the Meadow Lake impoundment are to be addressed through compensation to be determined with appropriate authorities, but no details are provided on the compensation proposed. Full details must be available to regulators to enable assessment of the adequacy of compensation and determination if adequate wetland can be created or restored. Fish habitat compensation plans for Meadow Lake fall under the jurisdiction of DFO and can be adequately handled through the federal CEEA Comprehensive Study and regulatory processes.

The Proponent has indicated that there would be no significant impact on their facilities from a dam failure, and that no other individuals would be impacted. However, they have also stated that an assessment of dam failure impacts has not yet been completed. At a minimum, dam failure would have physical impacts on downstream systems due to sudden peak flow, and would disrupt the water supply for the Keltic project for an unknown period. Route 316 crosses Isaacs Harbour River via a bridge structure that could possibly be impacted by a dam failure.

The Proponent has noted that Meadow Lake is already highly productive, and that the increased water volume and flushing rate will reduce the potential for increased eutrophication. However, data provided on phosphorus do not allow adequate assessment of the current trophic state of Meadow Lake, and future monitoring plans

should include sufficient phosphorus sampling to address eutrophication potential. A lake phosphorus model would be of use in analyzing and predicting future trophic impacts.

Impacts of the construction of new roads, including the extensive realignment of Route 316 and a required access road to the Meadow Lake dam site, are not discussed in much detail in the EIA Report. These activities have the potential to impact adjacent watercourses, and the EPP must adequately address required mitigation methods.

Discharges from the petrochemical plant and the LNG facility have not been determined at this time. It will be important during the permitting phase for full details on effluent quality and quantity to be predetermined. Provisions in the facility design and mitigative methods for effluent and wastewater treatment and discharge must be sufficient to ensure that receiving waters are not significantly impacted.

The Proponent has proposed a 15 metre buffer zone for watercourses. NSDNR requires a 20 metre buffer for forest harvesting operations. Construction for roads, pipelines and heavy industrial facilities carries at least as much potential for impacts to waterbodies as forest harvesting. The recommendation by Environment Canada to increase the buffer zone to 30 metres has merit.

#### 5.5.5 Recommendations

5.5.5.1 That prior to the issuing of any permits, the Environmental Protection and Erosion and Sediment Control Plans be submitted by the Proponent and approved by NSDEL. These Plans must include sufficient detail to enable NSDEL to ensure that erosion and sediment control measures are adequate, particularly with regard to the proposed removal of organic soils and vegetation from the area to be flooded at Meadow Lake, so as to minimize impacts to the lake and downstream systems.

5.5.5.2 That prior to the issuing of any permits, the Wetland Compensation Plan be submitted by the Proponent and approved by NSDEL. This Plan must include adequate plans for avoidance, rehabilitation, or compensation for disturbance or destruction of wetlands, in accordance with the NS Wetlands policy of NSDEL. A Wetland Compensation Plan is to be added to the list of reports and plans that are to be prepared by the Proponent (Section 6.2, this report).

5.5.5.3 That prior to the issuing of any permits, the Proponent complete an assessment of the impacts of potential dam failure at Meadow Lake to the satisfaction of NSDEL, including possible impacts to Route 316.

5.5.5.4 That prior to any construction activities, the Proponent undertake a phosphorus modeling exercise for Meadow Lake, to assess the present and predict future trophic states of the lake. NSDEL has developed a standard lake phosphorus model which may be used for this purpose. A receiving water assimilative capacity study must also be done

for Betty's Cove Brook and any other freshwaters receiving runoff or effluent from the project site.

5.5.5.5 That the water quality monitoring program to be undertaken by the Proponent include standard water quality parameters such as metals, oxygen, pH and total phosphorus, in addition to those proposed. A detection limit of 0.002 mg per litre should be used for total phosphorus. Regular monitoring of Meadow Lake, major tributary streams, and Isaacs Harbour River should begin as soon as possible (prior to any construction activities) and continue for a suitable period after construction and during operations, as determined by NSDEL. Monitoring for mercury is particularly important (see Section 6.3, this report).

5.5.5.6 That the undisturbed buffer zone between wetlands or other waterbodies and adjacent construction activities be increased from 15 metres to 30 metres.

## 5.6 Ground Water

### 5.6.1 Introduction

Groundwater is an important resource for residents of the area surrounding the proposed Keltic project, as a source of drinking water and domestic supply. Groundwater can also serve as a conduit for the migration of substances discharged to the surface or soils, and it plays an important role in water storage and recharge to surface water streams and wetlands.

### 5.6.2 Summary of Environmental Impacts / Mitigation / Follow-up and Monitoring

#### 5.6.2.1 Existing Environment

Direction of groundwater flow was established at the Keltic site using 14 newly-drilled test wells. A well survey was undertaken to identify water wells within 1 km of the site. Approximately 32 dug wells and 8 drilled wells were identified within the community of Goldboro. Fourteen of these wells were tested for water chemistry and coliform bacteria, as well as a newly drilled well offsite as a benchmark. The dug wells showed soft water characteristics with low dissolved solids, low alkalinity and low pH. Possible influence of road salt or sea spray was noted. Aluminum and pH were generally outside drinking water guideline limits, and dug wells showed positive total coliform levels, likely due to their design. Drilled wells had soft to slightly hard water, with low dissolved solids alkalinity, and neutral pH. Aluminum, iron and manganese were outside drinking water limits, and one drilled well showed coliforms. Chemistry for drilled wells was similar to the drilled benchmark well.

Water quality at several of the drilled test wells showed levels of aluminum, iron, manganese, or arsenic concentrations exceeding Canadian Council of Ministers of the Environment (CCME) guidelines for drinking water or aquatic life, and three had detectable levels of chloroform, possibly due to air contamination.

Abandoned mine workings in the project area may have an influence on groundwater flows, and there is some evidence of connection to the sea along the coast.

#### 5.6.2.2 Environmental Impacts

Predicted impacts are summarized in EIA Report Table 9.9-1, and include contamination due to spills, disturbance of mine tailings, siltation and yield reduction due to blasting and vibration, well level reductions due to site trenching and disturbance, and reduction in surface or groundwater flows.

#### 5.6.2.3 Mitigation

The test wells drilled are intended to serve as long-term monitoring stations for groundwater, and as such should not be disturbed during construction.

Mitigations are summarized in Table 9.9-1 and 10.10.1, and include avoidance of blasting within 500 metres of residential wells, conducting a pre-blast well survey, restoration or provision of temporary potable water as needed, proper materials handling and storage to avoid spills or leaks, avoidance of mine tailings, and operation of Meadow Lake dam to ensure continuous minimal flow in Isaacs Harbour River (which should ensure groundwater recharge).

#### 5.6.2.4 Cumulative and Residual Impacts / Accidents

No cumulative effects are predicted for groundwater. Residual effects following mitigation are predicted to be minimal. Accidents affecting groundwater could include fuel spills during construction, spills or chronic leaks during operations of fuels, feedstocks, product or other materials stored onsite. Groundwater may also be impacted by firefighting operations.

#### 5.6.2.5 Monitoring

Monitoring related to groundwater is to include interviews with well owners not yet contacted, documentation of un-inspected wells, sampling of wells not yet measured, and continuation of sampling at all wells to detect any temporal changes in water quality. Key wells yet to be identified are to be monitored on an ongoing basis during facility operations. An arbitration and resolution procedure to resolve problems is to be prepared; temporary potable water provided where necessary; and repair or replacement of any wells adversely or permanently affected.

The existing seven onsite monitoring wells will be expanded, pending final site and facility design. A long-term monitoring plan will be devised to monitor groundwater for water quality and groundwater levels on and beyond the plant site, including additional test wells within the community of Goldboro. Selected streams will also be monitored where there is surface-groundwater interaction.

Groundwater monitoring stations will be installed up and downstream of the Meadow Lake dam to assess any effects of the impoundment on groundwater levels and flows.

### 5.6.3 Identified Concerns

#### *Panel*

The Panel asked how many wells will be selected for ongoing monitoring, and how they will be chosen. The response indicated that the number and locations have not been specified, but that criteria will be established to choose a suitable number of wells which can be monitored long-term. They also pointed out that the primary monitoring wells will be those located on and off site up-gradient from any private wells. Further details will be available upon final design (*Keltic response to EAB-106*).

The Panel questioned the uncertainty in number of wells and number of drilled vs. dug wells. The response indicates that NSDEL records are not complete, and that ownership information is not available due to privacy legislation. Some of the identified well locations are at seasonal residences; in other cases the owners could not be contacted. Access was not possible without owner consent, and so the numbers are estimates (*Keltic response to EAB-154*).

#### *Intervenors*

The Ecology Action Centre questioned the timeframe for prediction of impacts, given the long migration times for contaminants in groundwater. The Proponent acknowledged there may be considerable variability in groundwater movement, and made a commitment to do further monitoring (timeframe unspecified) to help assess future residual impacts (*Keltic response to EAC-54*). The EAC also expressed concern for health implications of any spills to groundwater particularly via old mine workings. The Proponent acknowledged the need to avoid old mine workings, and repeated commitments to spill prevention and monitoring (*Keltic response to EAC-53*).

The Municipality of the District of Guysborough raised concerns over groundwater and drinking water impacts, and asked that any project approval be conditional on monitoring and full mitigation of any drinking water impacts. The Proponent affirmed the commitment to monitoring and mitigation of any negative impacts to drinking water (*Keltic response to MDOG-2*).

NSDEL asked that the Environmental Protection Plan and Environmental Monitoring Plans include groundwater protection, monitoring and contingency plans, and the Proponent affirmed these commitments (*Keltic response to NSEL-1, NSEL-3*). NSDEL also indicated during the hearings that conditions could be placed on approvals ensuring protection of groundwater and replacement of any affected water supplies.

#### *Public*

A member of the public questioned impacts on groundwater in other areas with comparable developments of this type. The Proponent responded that groundwater will not be affected by the project, but confirmed their commitment to replace any affected potable water sources (*Keltic written response CC-80*). This response does not address the question asked, and seems self-contradictory.

A member of the public asked what will happen to well water when the site is cleared, and the response reiterated the commitment to compensation (*Keltic response to CC-113*).

A number of citizens raised general concerns over possible impacts to groundwater and well supplies in written comments.



A participant at the hearings raised a concern over migration of contaminants from former mining sites through groundwater into marine water with associated impacts on fisheries.

Ms. Delia Burge requested that two wells on her property at Drum Head be included in the long-term monitoring program.

#### *Other*

NS Health Promotion and Protection asked, in the case of resolution of water quality or quantity issues, for permanent solutions for the provision of potable water regardless of pre-event quality, and noted that provision of bottled water is not considered a permanent solution. The Proponent indicated a commitment to arrive at permanent solutions, but did not specify what those may be (Keltic response to NSHPP-1).

Health Canada raised concerns over mercury and particularly methylmercury which may be transported in groundwater (and in other ways). The Proponent's response did not make direct reference to groundwater (Keltic response to HC-36). Health Canada also asked why no local wells had been analyzed for mercury. The response indicated various reasons, and made a commitment to sample some wells for mercury as part of the future monitoring program (Keltic response to HC-44, HC-60). Health Canada indicated they would like to review the spill control plan and the groundwater monitoring program.

#### 5.6.4 Panel Findings

All of the identified domestic drinking water wells within the Goldboro area lie in locations down-slope from at least portions of the Keltic LNG or petrochemical facility sites in terms of groundwater flow. This raises the concern over impacts of any spilled or leaked substances from any of the proposed facilities that might enter the groundwater and migrate towards these wells.

The newly-drilled test wells were monitored for water chemistry but not for coliform bacteria. It may be useful to monitor these wells for total and fecal coliforms on at least one occasion to establish that the background water quality for drilled wells is free from bacteria.

There is a great deal of uncertainty expressed within the EIA Report regarding impacts on water wells, due to uncertainty in site design and sources, intervening overburden and geology, distance, age and type of well. Construction practices at the site may also determine degree of impacts. No discussion is provided on specific wells predicted to be at risk, or degree of risk. The prediction of minimal significant impact to groundwater is not justified with this level of uncertainty. The Proponent has responded that there will be no impact on quantity or quality, and then provided a discussion on the likelihood of impacts in dug vs. drilled wells, and the locations of each. Their conclusion is that impacts to local well water supplies generally are not expected to be significant (Keltic response to EAB-86).

The discussion in Table 9.9-1 under ecological and social context indicates that possibly impacted watercourses and groundwater have no importance to local fisheries and water supply. This does not acknowledge the ecological significance of these waters apart from fisheries use, nor does it recognize the use of groundwater for domestic supply.

#### 5.6.5 Recommendations

5.6.5.1 That the drilled test wells continue to be monitored by the Proponent for water chemistry and coliform bacteria. These test wells must be clearly identified during the construction phase and not disturbed, to allow for long-term monitoring for a suitable period of at least several years during the operational phase, as determined by NSDEL.

5.6.5.2 That the Proponent establish an arbitration and resolution procedure to deal with impacts to wells and drinking water supply for residences near the project area to the satisfaction of NSDEL and Nova Scotia Department of Health Promotion and Protection (NSHPP), to be delivered to homeowners prior to any construction activities. This procedure should specify the types of permanent solutions to be provided in cases where they may be needed.

## 5.7 Marine Water

### 5.7.1 Introduction

Marine waters surrounding the Keltic project site may be directly impacted by coastal construction and marine terminal operations, or indirectly through runoff from inland construction and operations. Coastal marine waters provide habitat for a wide variety of marine species, in addition to those with commercial importance (see Section 5.9 Fisheries, this report).

### 5.7.2 Summary of Environmental Impacts / Mitigation / Follow-up and Monitoring

#### 5.7.2.1 Existing Environment

Isaacs Harbour is a long, narrow inlet adjacent to Country Harbour in Stormont Bay. Isaacs Harbour receives freshwater input through Isaacs Harbour River draining from Meadow Lake. Isaacs Harbour is relatively open at its mouth, with winter waves in the 1-2 metre range expected. Currents at the mouth of the harbour in the project vicinity are predicted to be in the 10 cm per second range, due to tidal and coastal current. Marine bottom along the coast tends to be scoured cobble beach, with finer sediments offshore. Some evidence exists of elevated metal content including mercury in sediments of Isaacs Harbour near the sediment surface likely due to past mining activity. No data on marine water quality was provided in the EIA Report. The area provides habitat to a range of species, discussed under 5.10 Aquatic Species (this report).

#### 5.7.2.2 Environmental Impacts

Direct disruption of approximately 32 hectares of marine habitat will result from construction of the marine terminal wharf, with some possible disruption of surrounding areas. The wharf will cut off up to 45% of the entrance to Isaacs Harbour, with possible resulting changes to circulation patterns at the mouth of the harbour. Shipping traffic may have some degree of impact on marine waters, through ship discharges. Introduction of invasive or non-native species is a possible impact. Any spills of materials from the marine terminal or inland facilities may impact marine waters if allowed to enter the ocean. Accidental release of LNG is predicted to have limited marine impact since the material will eventually vapourize and dissipate at the surface. Ecological impacts are judged to be minimal in significance. While this may be true on a regional scale, at least 32 hectares of habitat will be destroyed by the marine terminal infilling.

Discharge of treated wastewater from the treatment plant outfall and untreated stormwater may have some impact on marine water quality.

### 5.7.2.3 Mitigation

Marine habitat compensation will be required by DFO. The possibility of a habitat enhancement project in Fisherman's Harbour is discussed, through the creation of small rock-pile habitats for lobster over an area of approximately one square kilometre. This proposal will require approval from DFO as the federal agency responsible for fisheries management.

Mitigation designed to protect freshwaters is also proposed as suitable to protect marine waters, relating to issues such as proper materials handling and storage, spill control, sediment control such as booms and silt curtains, etc. These are summarized in EIA Report Table 10.10.1. Mitigation for marine waters is also presented in Table 10.15-1.

Re-ballasting of ships offshore is proposed to mitigate introduction of invasive and non-native species, in accordance with current navigational regulations.

Wastewater will be treated and discharged in accordance with regulatory requirements.

### 5.7.2.4 Cumulative and Residual Impacts / Accidents

No cumulative impacts are predicted for marine waters. Residual impacts are predicted to be minimal for marine waters, acknowledging that some habitat will be lost. Ship discharges and spills will be mitigated to the extent required by regulation, as will wastewater discharge.

### 5.7.2.5 Monitoring

Marine species and habitat monitoring, including sediment, may be required following final design of the wharf and terminal. No marine water quality monitoring is proposed.

## 5.7.3 Identified Concerns

### *Panel*

The floor of Dung Cove, between the marginal wharf and LNG storage facility, is believed to be covered with tailings (EIA Report, p. 9-122). All Dung Cove samples exceeded Canadian Council of Ministers of the Environment (CCME) guidelines for mercury concentrations in sediment (p. 8-144). Construction activities and storm conditions could disturb the contaminated sediments, exposing marine life to the contaminants (e.g., clams, lobsters, mussels, sea urchins, etc.).

### *Intervenors*

The Ecology Action Centre expressed concern over insufficient detail on the marine impacts on species, habitat and productivity of runoff, leaks and releases from the terminal and vessels (questions EAC-42, 43, 44). The EAC also questioned the impact of

the marginal wharf on circulation patterns (question EAC-70). The EAC raised concerns generally on the coastal impacts of the project, and on how impacts may be felt far into the marine environment, and on the need for integrated coastal management.

The Ecology Action Centre asked for more information on mitigation measures because of the levels of arsenic and mercury in goldmine sites, and the link of some mines to the ocean (question EAC-56). The Proponent confirmed that this arsenic and mercury, which may be attached to sediment particles, can become mobilized if these tailings become disturbed.

The Aquaculture Association of Nova Scotia was concerned that an incomplete description for the marine environment in the proposed project region is presented. They felt there was a lack of information on the physical marine environments (i.e. winds, waves and currents) and on the ecosystems in Country Harbour and Isaacs Harbour estuaries. The pristine nature of the water quality must be maintained. Contaminated particles can compromise the quality of mussels produced in Country Harbour near the project. They requested that a long-term monitoring program be instituted to study contaminants in suspended particulate matter. (Intervenor submissions, section 9).

NSDEL noted the need for modeling the impacts of wastewater emissions on the receiving environments (question NSEL-43), and for the discharge of cooling water (question NSEL-46). DFO also questioned the impact of cooling water (question DFO-3.7). Keltic noted that the cooling water system is re-circulating, not once-through, with make-up water volume of 1200 cubic metres per hour which would presumably be the discharge volume as well.

DFO questioned what standards would apply to marine effluent discharges. Keltic responded that CCME guidelines for protection of aquatic life would apply, in addition to any specific regulatory requirements (Keltic response to question DFO-3.15).

Environment Canada, in their presentation at the Hearings, noted the need to further characterize marine discharges in terms of volumes and loadings (Hearing Transcript Nov. 25, P. 44).

### *Public*

A citizen raised concern in a written submission regarding the marine impacts of wastewater and stormwater effluent (question CC-70). This concern was later repeated as an Intervenor.

DFO questioned what standards would apply to marine effluent discharges. Keltic responded that CCME guidelines for protection of aquatic life would apply, in addition to any specific regulatory requirements (Keltic response to DFO-3.15).

#### 5.7.4 Panel Findings

The Panel questioned the lack of marine water quality data in the EIA Report. The response made reference to the Sable Offshore Energy Project EA, which indicated that marine water quality is good, with no contaminants. No detail or data was provided.

The lack of proposed marine water quality monitoring is a concern. The potential for contamination due to construction or operational disturbance and spills, as well as the presence of a treated wastewater outfall to be located south of the marine terminal, indicate that some tracking of marine water quality over time is required.

The Panel questioned what possible changes to circulation patterns may result from the marginal wharf. The response indicated that no specific current modeling has been done, but further consultation with Transport Canada is required on wharf design (Keltic response to question EAB-121).

The Panel questioned whether an assimilative capacity study had been conducted for the Isaacs Harbour receiving waters where treated wastewater effluent will be discharged. The response was that this study must await the final design and determination of effluent quality and quantity, but that biological oxygen demand (BOD) will be the major parameter to be assimilated (Keltic response to EAB-82). Stormwater discharge is also to be covered by the assimilative capacity study (Keltic response to question EAB-111).

#### 5.7.5 Recommendations

5.7.5.1 That NSDEL and appropriate federal authorities require the Proponent to initiate, prior to any construction activities, a marine water and sediment quality monitoring program, with scope and parameters to be determined by those government authorities.

5.7.5.2 That the Proponent conduct, prior to the issuing of any permits, a receiving water assimilative capacity study for Isaacs Harbour, in accordance with NSDEL regulations for wastewater and stormwater discharge approval.

## 5.8 Terrestrial Habitat

### 5.8.1 Introduction

Terrestrial resources include habitat for various bird and wildlife species, and plants including trees. Of particular importance are any species identified as rare or at risk.

### 5.8.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.8.2.1 Existing Environment

The existing environment is described in EIA Report Section 8.8. The Keltic site including the LNG terminal includes marine shoreline habitat, inland forest habitat, and wetlands (discussed under 5.5 Surface Water and Wetlands, this report). There is evidence of previous disturbance at the site due to agriculture (peninsula) and forestry cutting (mainland). The site provides habitat for a variety of shoreline plants, coniferous and some deciduous tree species, and shrubs. Habitat was noted for waterfowl, semi-aquatic freshwater mammals, deer, owl and other bird species. A single rare plant species (horsetail - *Equisetum variegatum*) was noted. The Meadow Lake site includes primarily coniferous forest with wetland and bog areas. Habitat for birds, waterfowl, raptors and deer was noted.

Several species of amphibians and reptiles were observed, as well as 116 species of birds, of which 62 were considered to possibly breed on the site. Roseate terns, a rare species in Canada, breed on Country Island. No individuals were noted within the project site. Twenty one (21) species of mammal were noted within the site, including 2 marine species (seals). Bats were not observed but may inhabit the area. Moose were also not observed, but may occur in the area.

Two “at-risk” species may be affected by the project: Roseate Tern and Short-eared Owl.

Forest resources are described as non-merchantable due to small size and terrain constraints (see section 5.11 Forestry, of this report).

#### 5.8.2.2 Environmental Impacts

The EIA Report predicts habitat disturbance at the Keltic site will result in a loss of up to 380 hectares of terrestrial habitat, as well as 47 hectares of habitat at the terminal area and adjacent coastal strip. In addition, 295 hectares of habitat and vegetation will be removed at the Meadow Lake site. Wildlife habitat will be lost as a result throughout this area with resulting impacts on mammals, amphibians, reptiles and birds. Habitat for the rare plant (horsetail) may be disrupted. Effects on raptor birds include both direct habitat loss as well as loss of habitat for prey species. The Roseate tern colony at Country Island is considered to be sufficiently remote (over 9 km) that no impact is predicted. Habitat

for aquatic furbearers and other small mammals will be lost. Disturbance of the terminal area is predicted to reduce or eliminate winter use by deer.

Operation phase impacts include introduction of non-native species of plants and birds due to altered habitats, and bird mortality due to collision with lighted structures. Increased human activity will discourage re-establishment of most mammal populations.

#### 5.8.2.3 Mitigation

Mitigation is summarized in EIA Report Tables 9.10-1 and 10.11-1. Vegetation clearing is to occur outside of bird and mammal breeding season to reduce impacts. Minimizing use of lighting is suggested to reduce impacts on migratory birds. Minimizing areas to be cleared and use of progressive construction periods are suggested. Overall effects on terrestrial habitat are described by the Proponent as “not expected to be significant.” As there is no current forest harvesting on the sites, and the forest resource is not considered to have commercial potential, impact on forestry is predicted to be minimal. Avoidance of the Country Island Roseate tern colony by project and shipping personnel is proposed to avoid impacts.

#### 5.8.2.4 Cumulative and Residual Impacts / Accidents

Residual impacts are presented in EIA Report Table 11.1-1. Residual terrestrial impacts following mitigation are projected to include loss of habitat, loss or displacement of birds and wildlife, impacts of dust and noise on vegetation and wildlife, impacts of light on birds, and effects of clearing at Meadow Lake. The significance is judged to be minimal or minor except for loss of habitat and displacement of wildlife, which are medium in significance.

#### 5.8.2.5 Monitoring

Terrestrial habitat monitoring is proposed to continue for 3-5 years following commissioning and operation of the facilities. The monitoring program is proposed to include a bird census and mortality monitoring, vegetation monitoring for replanted or restored areas, and wildlife monitoring.

### 5.8.3 Identified Concerns

#### *Panel*

None.

#### *Intervenors*

Environment Canada expressed concern over possible impacts to migratory birds and to the Roseate tern colony at Country Island, and confirmed that foraging habitat will be lost due to coastal construction. Reference was made to the Roseate tern recovery strategy,



which should be used in considering project siting. Environment Canada also indicated that additional detail on survey methods for the terrestrial studies would be helpful. The Ecology Action Centre questioned the impacts on the Roseate tern due to loss of habitat at the marginal wharf site.

The Assembly of NS Mi'kmaq Chiefs questioned whether an adequate survey had been done to identify species of significance to the Mi'kmaq.

Environment Canada noted that rehabilitation of terrestrial habitat following project decommissioning cannot be considered a benefit of the project, as argued by the Proponent. EC also asked for further assessment of impacts on birds.

#### *Public*

One correspondent expressed concern over impacts to moose populations (acknowledged to be limited in number) in the Meadow Lake area.

#### 5.8.4 Panel Findings

The Panel questioned how much of the Keltic site will be cleared or grubbed. Keltic responded (Keltic response to EAB-119) that 75-80% of the site for the LNG and petrochemical facility will be cleared. In addition, 140 hectares will be flooded at Meadow Lake (Keltic response to EAB-52), with additional surrounding areas impacted. The EIA Report describes terrestrial impacts as not significant. While this may be true in a regional sense, the local impacts on terrestrial ecosystems at the project site and Meadow Lake must be viewed as significant.

The Panel questioned what methods would be used to restrict access to Country Island to protect the Roseate tern colony, but the response (Keltic response to EAB-123) did not provide any information.

Environment Canada asked in their submission that further assessment work be conducted in regard to project impacts on birds. Migratory birds are an area of federal jurisdiction, and further opportunities to address issues related to birds and migratory species may be provided through the federal CEAA process which applies to this project. EC also identified the need for further consideration of cumulative effects in terrestrial environments in relation to migratory birds, wetlands and wildlife.

If a project of this scale is to proceed on a greenfield site, then loss of terrestrial habitat for birds, wildlife and plant species is unavoidable. The only fully effective mitigation would be selection of an alternate site which is already disturbed by large-scale industrial activity. While the proposed LNG-petrochemical site is located adjacent to the SOEI facility, it greatly exceeds the footprint of that existing facility. The site disturbance at Meadow Lake is also significant in a relatively undisturbed area.

### 5.8.5 Recommendations

5.8.5.1 That the proponent ensure that mitigative and monitoring measures for wildlife and vegetation are adequate and that they are applied as required, and fully documented in the Environmental Protection Plan (EPP) and reported to NSDEL and NSDNR.

5.8.5.2 That bird mortality due to collision with structures be documented by the Proponent, and criteria developed in the EPP to determine when additional mitigative measures must be developed and applied.

## 5.9 Fisheries, Aquaculture and Resource Harvesting

### 5.9.1 Introduction

Many rural areas of Nova Scotia are often founded upon the harvesting of natural resources. The fishery and aquaculture industries have provided employment for many generations and the Guysborough area continues to provide employment to those who wish to continue with their traditions.

### 5.9.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.9.2.1 Existing Environment

As provided by the EIA under Section 8.11:

“Commercial fishing and aquaculture are two important economic activities that occur within the marine environment of Stormont Bay. Commercial fishing occurs almost entirely outside of the estuaries of Country Harbour and Isaacs Harbour and aquaculture occurs only within Country Harbour. Recreational fisheries in the area are small but diverse, and include both freshwater and estuarine components. Brook trout are the primary recreational species. They are fished both in many of the lakes, rivers and streams that flow into Stormont Bay and in the inner parts of the estuary. Smelt are often fished recreationally under the ice in the upper estuaries. Commercial lobster fishing is the only harvesting that occurs in close proximity to the Project.”

Section 8.11 of the EIA describes in detail the freshwater (various tributaries ponds and lakes) and marine environments in and around the project site and Guysborough coastal areas. Many species of fish, crustaceans and bi-valves are harvested as a recreational catch or commercial fishery. The proposed Keltic Facility is located near the coastal waters of Stormont Bay, Country Harbour, and Isaacs Harbour (Figure 1.1-1a).

“There is a diversity of marine habitats in Stormont Bay and surrounding area that includes freshwater, estuarial, nearshore, and deepwater environments. These habitats are defined by vegetation, type and variability of ocean substrate, and shoreline and bottom topography. Habitat type is influenced by a number of factors including nutrient input, water temperature and salinity, depth and stability of the water column, tidal action, and wave action caused by wind and currents.”

“The nearshore marine habitats of Stormont Bay and the estuarial habitats of Country Harbour and Isaacs Harbour (Figure 1.1-1a) support a variety of marine organisms. Species include algae, phytoplankton, zooplankton, marine invertebrates, and estuarial, freshwater, and pelagic fish (refer to Tables 8.12-5 and 8.12-6).”

### 5.9.2.2 Environmental Impacts

Section 9.13 of the EIA provides the details of environmental impacts and excerpts are as follows:

“Information on harvesting was obtained primarily through discussion with local residents.”

“Background information was also provided by the Guysborough County Coastal Resources Mapping Project. Numerous consultation meetings with the commercial fishermen who fish within Stormont Bay were held by Keltic and project consultants.”

“Marine impacts of construction will be concentrated in the wharf and terminal areas, either as a result of construction or facilities equipment being transported to the site, or actual construction of the wharf and terminal.”

“Potential operational impacts are associated with Project-related vessels entering and leaving the bay, but may also be related to other marine traffic traveling around the proposed marginal wharf into and out of Isaacs Harbour.”

“The construction of the marginal wharf on the Red Head peninsula will result in the filling in of Ponds 4 and 5 at that Project site (Figure 8.12-7). There is no recreational, Aboriginal, or commercial fishery associated with these ponds. No Projected interactions with fishery resource uses are expected.”

#### Crusher Brook

“There have never been any fish found in this tributary and there is no known fishery of any kind associated with this watercourse. No Project-related interactions with fishery resource uses are expected.”

#### Un-Named Tributary to Red Head Pond

“... small first-order tributary is located a short distance east of the SOEI gas plant road. No fish have ever been collected or observed in this drainage feature during any Keltic survey. No Project-related interactions with fishery resource uses are expected.”

#### Betty's Cove Brook

“A first-order headwater tributary of Betty's Cove Brook originates in the northwest corner of the Keltic Site. Although there is no indication that there is a fishery in the on-site reaches of this watercourse, the headwaters no doubt contribute to the fishery which exists further downstream, and which includes species such as brook trout and American eel. There is no existing commercial or Aboriginal fishery associated with Betty's Cover Brook so that no Project-related interactions with fishery resource uses are expected.”

## Meadow Lake

“The activities associated with the construction of the dam and the intake structure will involve clearing of some of the shoreline vegetation.”

## Aquaculture

“Aquaculture operations are located entirely within Country Harbour and no construction activities or transport of equipment will occur near these operations. Release of sediments or contaminants to the water column from construction is also anticipated to be minimal, and thus no impacts on aquaculture operations are expected.”

“Overall, works and activities associated with the construction and operation phases of the Project are not expected to have significant adverse effects on marine or freshwater fisheries, aquaculture or harvesting of fish resources (Table 9.13-1). The area for the planned wharf and marine terminal is not a major fishing area and represents only a very small portion of the lobster habitat in the Stormont Bay.”

“Project-related vessel movements will be infrequent and are not expected to cause significant interference with the navigation of local fishing vessels.”

“There is very little commercial or recreational use of freshwater fishery resources at and near the Project site. Given that the effects on freshwater fish habitat are also expected to be insignificant it is concluded that no significant effects on freshwater fisheries are to be expected.”

### 5.9.2.3 Mitigation

As stated in Section 10.14.1 of the EIA the following represent the proposed mitigation:

“Marginal Wharf development – not applicable - The marginal wharf is not a major fishing area.”

“Decrease in marine fishery related earnings as a result of loss of fish habitat with construction of wharf and terminal - Implementation of habitat compensation in accordance with DFO requirements.”

“DFO will require replacement of three to five times the area of fish habitat lost with habitat of similar or higher type and quality. A potential compensation area in Fisherman's Harbour has been identified (see Appendix 14) where a habitat augmentation project could provide approximately one square kilometre of lobster habitat, similar in quality to that lost to construction.”

“Disturbance of freshwater fisheries (recreational fishing) as a result of disturbance and habitat alteration on-site, at Meadow Lake, and in Isaacs Harbour Creek - Implementation of habitat compensation in accordance with DFO requirements.”

“Meadow Lake - to minimize in-water works, cofferdams will be established at both the dam site and the intake location.”

“Disruption of marine fishing activities from LNG and cargo vessels in the bay - Fishermen will be notified of ship arrival so they can shift gill nets in the central part of the bay.”

“Impacts on navigation from the narrower entrance to Isaacs harbour created by the marginal wharf – Not applicable - The harbour narrows to a similar width 500m further into the harbour.”

“Marine fish may be attracted by facility lights at night and may perceive noises at a distance from the operation - Monitoring programs to be followed.”

“Disturbance of freshwater fisheries (recreational fishing) as a result of the Meadow Lake Impoundment (water level fluctuations); low flow conditions in Isaacs Harbour River - Operation of fish ladder at Meadow Lake dam; Operation of dam to provide for minimum flow in Isaacs Harbour River.”

#### 5.9.2.4 Cumulative and Residual Impacts / Accidents

All of the following are listed as adverse impacts, with varying degrees of residual impact, as represented in Table 11.11-1.

“Disruption of marine fishing activities from equipment transported to site and actual construction of wharf and terminal – minimal residual effect.”

“Decrease of marine fishery-related earnings as a result of loss of fish habitat from construction of wharf and terminal – minimal residual effect.”

“Disturbance of freshwater fisheries (recreational fishing) as a result of disturbance and habitat alteration on-site, at Meadow Lake, and in Isaacs Harbour Creek – minimal residual effect.”

“Disturbance of fishing activities from LNG and cargo vessels in the bay – minor residual effect.”

“Marine fish may be attracted by facility lights at night and may perceive noises at a distance from the operation – minimal residual effect.”

“Disturbance of freshwater fisheries (recreational fishing) as a result of the Meadow Lake Impoundment (water level fluctuations); low flow conditions in Isaacs Harbour River - minimal residual effect.”

### 5.9.2.5 Monitoring

“Section 13.6 of the EIA states that monitoring of inshore fishing activity is difficult because reporting of specific fishing locations is not required for most fisheries and individual catches are considered confidential by DFO. However, since lobster is the primary species caught in Stormont Bay, a monitoring catch-rate program will be implemented in conjunction with local fishermen. Details of such a program will need to be developed in consultation with local fishermen and DFO.”

### 5.9.3 Identified Concerns

#### *Panel*

Question: Will pre-construction statistics of fishing/aquaculture and land impacts be maintained to track impact and will this data be utilized for appropriate compensation should the results change due to facility impact? *[Keltic - Current DFO data will be used in the analysis. It is logical that if aquaculture and fishery revenue changes due to impact from the Project, compensation will be forthcoming. Lost production would be one consideration, and would require documentation of production in the time period prior to the loss.]*

Question: If impoundment reduces biodiversity (p. 9-97), what is the basis for concluding there will be no significant impacts? *[Keltic - This was a statement about impoundments in general. In the specific context of Meadow Lake, American eels, nine-spine sticklebacks, white suckers, and yellow perch are not sensitive to the potential effects of impoundment (potentially slightly diminished DOs, which will be mitigated or eliminated by grubbing). Brook trout will continue to exist when water temperatures are suitable for the species, and they will retreat to thermal refuges in the inlet or around spring holes when the water is too warm. The other species documented was the Atlantic salmon, which use the lake only as a migratory corridor.]*

Question: Will pre-construction statistics of fishing/aquaculture and land impacts be maintained to track impact and will this data be utilized for appropriate compensation should the results change due to facility impact? *[Keltic- Current DFO data will be used in the analysis.]*

Question: Traditional Aboriginal use continues in study area yet only those impacts of the project site are mentioned. Why hasn't further impact analysis been undertaken? *[Keltic response referred back to the MEK Study].*

#### *Intervenors*

##### Ecology Action Centre

“Fishermen will also lose access to fishing grounds because of the new facility and the passage of tankers in and out of the harbour. The Proponent should make the information

on compensation to local fishermen publicly available.” *[Keltic - A compensation plan will be developed with the input of DFO and local fishers.]*

“The impacts on fisheries, current and future, is not sufficiently covered in the EIA considering that “the value of these fisheries is linked to the productivity of the area which is influenced by the habitat quality of the marine environment that supports primary producers, prey, and predatory species. Changes to the marine environment, particularly within the vicinity of the proposed Petrochemical wharf, will have adverse effects upon habitat and productivity” (8-128). The report’s assessment focus for fisheries is narrow, and dismisses its effect on the future fishery which is in contradiction with the multiple efforts made in the last few decades by the local fishermen to manage a sustainable and more diverse fishery.”

“The assessment of the fish and fishery impacts based on oil spills calculations (8.11) is misleading. The report needs to clearly make the distinction between how an LNG spill on water differs from an oil spill, and consider the nature of the substance being released. The effects of such spills are not only on the fish, but those practicing both commercial and recreational fishing in the area. Considering that “...the coastal Study Area for the Keltic Project was delineated to extend approximately 30 km on either side of the proposed project site in Goldboro...” (8-98), the impacts of LNG leaks or spills are not assessed in depth throughout this 30 km radius.”

“The report does not indicate the time it takes for these vessels to turn around nor what impact this will have on the economic loss to fishing ships delayed from accessing their fishing gear or returning their catch.”

“The Proponent will consider income support for fishermen who can prove the natural habitat has been damaged by the project -- but not if the project prevents fishing by restricting access, or if consumers choose not to buy produce from the petrochemical zone, or if fish decide to avoid the noise, disturbance, and pollution of thousands of vessel transits in the petrochemical zone.”

Guysborough County Regional Development Authority

“DFO and the Proponent consult with the local fishers affected by loss of habitat under (HADD) for the augmentation of lobster habitat elsewhere. We wish to ensure that the plan as proposed in the EA recognizes that augmenting fishing grounds outside of the fishers traditional territory does not necessarily permit the fisher to fish these grounds and as such must be fair to those that are directly impacted.”

“Fisheries compensation for those few fishermen directly impacted by the removal of their traditional lobster fishing grounds should an alternative suitable habitat not be established in their traditional fishing grounds.”



## Municipality of the District of Guysborough

“There is local concern with the impact of this proposed industrial project on the commercial fishery and aquaculture industry within the impact area. There is also concern with impact on recreational fishing in the area. The Municipality would ask that more details be provided on how impacts on the fishery and aquaculture industry will be mitigated.”

## Aquaculture Association of Nova Scotia and Country Harbour Sea Farms

“As representatives of the Aquaculture Association of Nova Scotia, and our member producers, we are not here to oppose the project. We have a number of specific concerns related to the Proponent's effort to date on several areas of potential negative environmental impacts of their project and on the subsequent potential negative impacts which those might have on Country Harbour Sea Farms' ability to conduct its business over both the short and long term.”

“We request of the Board and of the Proponents that the following items be included in the Proponent's Environmental Management Plan. A thorough pre-development scientific evaluation of current baseline contaminant levels in Country Harbour. A more thoroughly characterized evaluation of the risks of operating vessels and moving potentially harmful materials at this location by better describing the physical environment at this site. A more thorough cumulative effects assessment of development on the water quality of Country Harbour. A more detailed marine traffic assessment. Our big concerns here are major spills, single events and/or the cumulative effects of long- term small spills.”

“The quality and the integrity of our product is directly related to the water quality of our leases. In the twenty some years that that location has been used as a shellfish farm there has not been a single closure due to water quality. And I challenge anyone here to look around the province to find other locations that have such a good track record.”

## *Public*

“Right now it is peaceful, lots of wildlife and good fishing. We will lose all this if it comes.”

“How likely are tourists to stay in an area they cannot use for fishing, boating, or birding’?”

“I am a second-generation lobster fisherman. I've read the environmental assessment report, as put forth by Keltic Petrochemicals, and with no fancy words or confusion, my fishing grounds will be gone, period. All I've ever done was lobster fish, all I know is lobster fishing.”

“How may the potential environmental damages relate to the traditional fishing industry, which has been the mainstay to most who have remained in this part of Nova Scotia,

particularly the lobster fishery which has seen substantial increases in local catches over the last few years?" [*Keltic - Fisheries and Ocean Canada have established guidelines for compensation to fishermen.*]

"In a region that is largely dependent on fishing and tourism for its economy this would have strong impacts on the residents."

"How would this project affect the aquaculture operation already in existence in the area, and how may it limit the possibility of future developments of this type?"

"Where we fish, that shoal will be gone as far as lobster fishing goes, as the ships will cut the traps off when they come in and go out. So there will be no point in setting traps there. So when the LNG and Petrochemical people say there will little impact on fishing or the marine life, as I see it, they don't know or haven't a clue about what they are talking about."

"The definite effects will be caused by the construction of wharf facilities and excavation on land. Just the disturbing of silt and sediment could wipe out the bay for lobstering by covering rocky shoals and reefs where lobsters congregate."

"It will only be us fishermen who will see decreases in our catch caused by the construction or accidents around this project. And if we have a loss, how could we individual fishermen fight this corporation with its never-ending body of lawyers?"

#### *Other*

##### Health Canada

"Section 9.5 Impacts on Recreational Opportunities and Aesthetics – No mention is made of the potential for the disturbance of mine tailings areas due to construction activities to affect recreational fishing as a result of the increased mercury (primarily methylmercury) concentrations in fish (as a result of runoff from disturbed soils/tailings to aquatic systems, from the flooding of land for the dam impoundment area, and/or from the disturbance of sediments in local streams/lakes)."

##### Fisheries and Oceans Canada

"Page 8-111 – The document states That "The most notable result of the fish collections in this lake was the capture of an Atlantic salmon during the 2001 surveys - a mature male in spawning condition." and "Although juveniles of most species were collected during the surveys, no juvenile Atlantic salmon were captured during any survey of 2001, 2004, and 2005 in Meadow Lake and associated tributaries." There is no information on the fishing efforts to indicate what this information represents in terms of catch per unit effort. The data for 2001 is not included in the report and the document fails to mention the collection of an Atlantic salmon caught on Isaacs Harbour River, north end in 2004 which measured 12cm as noted in the fish capture data in Appendix 9."

“Page 9-195 – Only the inner Bay of Fundy population of Atlantic Salmon is listed on SARA and is unlikely to be impacted by the project. However, Atlantic salmon populations are low and are a species of interest and concern for DFO. Information provided on salmon is incomplete, and as presented is misleading. There is relevant data available that has not been considered by the Proponent. It is also unclear what effort was deployed to determine the presence of salmon in the system.”

“Page ES-15 – It should not be assumed that the habitat compensation would address any loss of fishing opportunities or earnings. This would depend on the specifics of the habitat compensation plan. Habitat compensation plans focus on compensating for the loss of physical fish habitat and not for the loss of earnings by fishers or disruptions to fishing.”

“Section 8.11.2.2 Commercial Species – There is important information missing from this section. For example there is a single rock crab license in Stormont Bay. Also one half the Nova Scotia sea urchin fishery came from Guysborough County and the sea urchin stock is now recovering from disease, but has not yet reached commercial densities in the area.”

“Section 8.11.2.5 Landings and Values – Class B lobster licenses are allowed 75 traps, not 175. Lobster season opens 19 April and closes 20 June. Lobster landings in Lobster Fishing Area 31B has increased six times from 1997-2006. The sea urchin lease boundaries in Figure 8.11-1 Fishing Areas and Aquaculture near Country Harbour are not correct.”

“Page 9-100 – The Proponent should provide data or information to support statement that “...lobster fishery is the only harvesting that occurs...”

“Page 13-8 – In order for the proposed “monitoring catch rate program” to be effective for comparison purposes, the program would need to be implemented pre-construction.”

“The Proponent should provide more information on any consultation with the fishing community with regard to the marginal wharf. Also the Proponent needs to describe any consultation on the proposed compensation plan.”

#### 5.9.4 Panel Findings

The EIA states that “The other species documented was the Atlantic salmon, which use the lake only as a migratory corridor”- Salmon routes are sensitive and stating they “only” use it as a migratory corridor is significant. If the corridor is destroyed, there is potentially a significant impact on the fish population.

Accurate baseline data will be very important to ensure that any potential requirement for compensation for lost revenues is dealt with appropriately.

The transportation corridor will be narrowed by the construction of the marginal wharf. Add shipping traffic to that and the impact is more significant than presented by the Proponent.

The mussel farm is excluded from compensation considerations as being too far away. Baseline data of sediments and invertebrates in and around the aquaculture facility should be collected and then continual monitoring should be done to ensure potential pollutant detection occurs.

No light monitoring plan is provided in the EIA to address the attraction of fish to light.

The potential impact on sea urchins should not be discounted. According to the Department of Fisheries and Oceans the population may be on a rebound. Sediments in and around sea urchin populations should also have baseline data collected and continual monitoring to ensure the project does not contribute to population deterioration.

The Aboriginal community and its fishery should also be included in discussions regarding compensation. The sea urchin fishery is a traditional Aboriginal fishery and sea urchins will be impacted by the construction of the marginal wharf. The Proponent states that the urchin fishery is weak because the species is impacted by disease, yet Fisheries and Oceans indicate that it is on the rebound. If it is weak at the moment, removing one area from the fishery could have a significant impact on species recovery that has not been taken into consideration.

#### 5.9.5 Recommendations

5.9.5.1 That the Proponent continue negotiations with all local and Aboriginal fishers (not just lobster fishers) and that a Fishers Income Compensation Plan be developed prior to any permits being issued.

5.9.5.2 That the Proponent ensure baseline data (including water and sediment parameters as determined by NSDEL) is collected and an Aquaculture Monitoring Plan be developed in relation to the current mussel farm and other potential aquaculture users. As well, an Aquaculture Income Compensation Plan shall be developed.

5.9.5.3 That the Proponent complete a more detailed examination of the potential impacts on the salmon migration corridor and the impacts of the Meadow Lake alterations on this corridor prior to the issuing of any permits, with the results to be reported to NSDEL and DFO.

5.9.5.4 That the Proponent develop a detailed communications plan for fishers, and all other boaters and recreational users in relation to shipping traffic, and consideration be given to consulting with Transport Canada to establish a Harbour Master office to ensure safe and timely passage.

## 5.10 Aquatic Species

### 5.10.1 Introduction

Aquatic species include fish as well as invertebrates, plants, algae and plankton (microscopic plants and animals). The discussion in the EIA Report focuses on the fish species in Meadow Lake and the ponds in the area of the Keltic project site, as well as on a range of marine species. Species of commercial importance are included, although fisheries issues are discussed in the previous section (5.9 Fisheries, this report).

### 5.10.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.10.2.1 Existing Environment

Meadow Lake has a number of tributaries with headwaters originating at Garry Lake. Meadow Lake discharges via Isaacs Harbour River to the head of Isaacs Harbour. The lake is approximately 104 hectares in area with a maximum depth of 2 metres, and currently has some use for recreational fishing. Water quality data indicate that the lake has elevated levels of aluminum, iron and manganese, possibly in part due to past mining or mineral exploration activities in the watershed. Nine distinct tributaries of various sizes have been identified. These tributaries will all be flooded to some extent upstream of Meadow Lake with creation of the impoundment and water level rise of 2 metres.

Seven fish species were found in sampling at Meadow Lake, dominated by yellow perch and white sucker. One adult Atlantic salmon was captured during the surveys, with no juveniles noted. Local residents reported that Atlantic salmon have used the Meadow Lake system, but flows in some recent years have been too low for migration. However, American eel were also noted and this species is also migratory from marine to freshwater to spawn. A number of insect and other invertebrate species were noted around the lake.

Meadow Lake had a low pH in 2004-2005 ranging from 3.4 to 5.1, which would preclude reproduction of salmon. This acidity may result at least in part from the long-range transport of acidic precipitation originating from more populated areas of North America. Acid deposition is a common problem throughout the Maritimes.

Gold Brook Lake is in the adjacent watershed southeast of Meadow Lake. This lake is also dominated by yellow perch, with brook trout. Brook trout indicate good water quality.

Ocean Lake is a larger lake directly east of Meadow Lake, draining through New Harbour River to New Harbour, which is outside the immediate Keltic project site. Ocean Lake is dominated by white sucker, with killifish and stickleback. Numerous juvenile Atlantic salmon were found in this system, along with brook trout.

Six ponds occur on Red Head peninsula, variously containing eel, killifish, brook trout, mummichog and stickleback. Some of the ponds are brackish (partially salty).

Betty's Cove Brook originates within the Keltic site, draining to the coast at Betty's Cove Pond, and contains brook trout, eel and stickleback.

The project area is located adjacent to a variety of marine environments, with habitat ranging from cobble beaches and intertidal areas to mixed boulder, gravel and sediment bottoms in areas of different circulation energies. Marine species in the area of the Keltic project include commercial species such as sea urchin and lobster, as well as mussels, crab, clams and scallops. Fish species include herring, mackerel, pollock, eel, gaspereau, salmon, cunner, tomcod flounder and smelt. Plant species range from single-celled planktonic algae to benthic algae, kelp, eelgrass and coastal marsh grasses.

A variety of marine mammals including seal, dolphin, porpoise and whales occur on the Scotian Shelf and may inhabit the project area. Seals frequently haul out on the area shoreline, and whales may use the area in pursuit of prey such as herring or mackerel. The EIA Report states that the Stormont Bay/Country Harbour area is not important to cetaceans (whales).

A number of species are migratory, using freshwater systems for spawning, including gaspereau, eel, smelt, sea-run trout, and salmon. These species may use freshwater systems in the project area.

#### 5.10.2.2 Environmental Impacts

Direct impacts to aquatic species will occur where project construction or operational activities disturb or occur on land which drains to the aquatic habitat. No direct impact on Betty's Cove Brook is anticipated. Construction of the marginal wharf at Red Head peninsula will result in the infill and destruction of two brackish ponds which provide habitat for stickleback and killifish, totalling less than 1 hectare.

Impoundment of Meadow Lake will increase the surface area from 104 to 244 hectares, and the maximum depth from 2 to 4 metres. New areas of potential shallow-water (<2m) habitat will be created, possibly increasing fish productivity. Approximately 3,300 metres of tributary reaches will also be flooded. Some refuge and spawning habitat may be impacted. A map has been provided showing the extent of inundation following creation of the impoundment (Keltic response to question EAB-89).

A proposed mitigation to reduce the risk of production of methylmercury from flooded areas is the prior removal of all vegetation and organic soils from areas to be flooded. This removal is proposed to occur primarily in winter to minimise impacts. However, this activity must itself be considered a possible impact, with the risk of sedimentation of adjacent watercourses, Meadow Lake and downstream systems. Construction of the dam at Meadow Lake will impact 170 square metres of habitat directly, with associated construction of the access road and water supply pipeline.

Impacts to freshwater habitat are predicted by the Proponent to be minor.

Construction of the marginal wharf and LNG terminal will result in direct impact and loss of 32 hectares of habitat for fish and other marine species. Habitat is predominantly rock/kelp with some areas of sand/eelgrass. The presence of the wharf may affect circulation patterns in the area, with possible impacts on bottom substrate, sediment deposition and habitat.

Construction activity and ship traffic may disrupt whale or other marine mammal activity in the project area. Discharge of treated wastewater effluent or untreated stormwater may have some impact on fresh and/or marine habitats.

Disturbance of contaminated sediment by ship's propeller wash is possible.

#### 5.10.2.3 Mitigation

Environmental effects and mitigation for freshwater systems are summarized in EIA Report Table 9.14-2.

A 15-metre setback for project infrastructure is proposed to protect watercourses from direct impacts. All wastewater and stormwater will be collected, treated and discharged in accordance with applicable regulations. Stormwater management, erosion control and spill control plans will be put in place.

The Meadow Lake dam will incorporate a fish passage to enable continued fish migration through the system.

Detailed oceanographic modeling is to be conducted on the effects of the marginal wharf and LNG terminal, as part of the FEED process. Habitat compensation will be required by DFO under their "No Net Loss" policy. An outline of a possible habitat project was provided, but details need to be finalized with DFO.

The Proponent states that Stormont Bay and Country Harbour are areas which are not important to marine mammals.

#### 5.10.2.4 Cumulative and Residual Impacts / Accidents

Impacts and mitigations for aquatic species are summarized in EIA Report Tables 9.15-2, 10.15-4, 10.16-1, and 11.1-1.

No cumulative effects are predicted for marine species. Residual impacts include the loss of 32 hectares of habitat including 19 hectares of lobster habitat. Accidents affecting marine species would include leaks, spills or other releases of fuels, hydrocarbons, chemicals or other process materials, and product to lakes and rivers or to marine environments. Spill prevention and cleanup equipment will be maintained on site, and the petrochemical facilities are described as closed-loop systems without discharges.

Use of shallow-draft tugs to manoeuvre ships is predicted to reduce the potential for disturbance of sediment by ships.

#### 5.10.2.5 Monitoring

A catch-rate monitoring program for the lobster fishery is proposed as part of the habitat compensation program. As well, a freshwater fish monitoring program is proposed, involving annual electrofishing at onsite watercourses during construction and periodically following operations (EIA Report Table 13.7-1). Annual description and documentation of aquatic and riparian habitat is also proposed during construction at the project site.

#### 5.10.3 Identified Concerns

##### *Panel*

The Panel questioned the impacts on biodiversity and food populations for fish from the Meadow Lake impoundment. Keltic's response indicated that biodiversity and productivity will not necessarily be reduced, and may increase (Keltic response to question EAB-97).

##### *Intervenors*

The EAC expressed a number of concerns over project impacts on fish and fish habitat, including the need to monitor fish and invertebrates for possible contamination. They also requested further detail on the fish ladder design at Meadow Lake (some detail was provided in Keltic response to question AC-73).

Health Canada requested sediment and water quality monitoring for mercury on those water bodies providing fish habitat, and sampling of fish tissue for methylmercury at Meadow Lake.

DFO raised a number of issues relating to fish and fish habitat, and has requested additional information in a number of areas. DFO and the Proponent both note that additional information can be provided as part of the federal CEAA review.

The Aquaculture Association of NS expressed concern over contamination of sediment from previous mining activity and project activity, and transport and deposition of such materials disturbed by construction or operational activities.

##### *Public*

A number of written submissions from members of the public raised concerns over impacts to fish and fish habitats. One submission also questioned the impact on whales.



#### 5.10.4 Panel Findings

The large number of issues raised by DFO in regard to fish and fish habitat may be addressed through the ongoing federal CEAA review. Management of fish and fish habitat is an area of federal responsibility which can adequately be addressed through federal environmental assessment and approvals processes, and lie outside the mandate of the provincial process.

The discussion of the marine biological environment (EIA Report 8.12.2.3) consists largely of general discussion, and presents relatively little site-specific hard data. Reference is made by Keltic to previous EA studies for the Sable project (Keltic response to question EAB-58), but little of this information is provided in the Report. Keltic's assertion that the area is not important to cetaceans is supported only by a statement that there is no indication that the area represents critical habitat for cetaceans. This does not adequately support the assertion.

#### 5.10.5 Recommendations

5.10.5.1 That the Environmental Effects Monitoring Plan for the project include representative sampling of sediment and fish tissue for mercury and methylmercury at Meadow Lake, as determined by NSDEL in consultation with Health Canada and the federal Department of Fisheries and Oceans (DFO) (see also Section 6.3 Mercury, this report).

## 5.11 Forestry

### 5.11.1 Introduction

The forestry resources of the project site were examined by a forestry consultant who conducted field studies in order to best determine the viability and potential of the existing tree stands.

### 5.11.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.11.2.1 Existing Environment

As presented in the EIA, much of the site that will be utilized by the development of the project is covered by forest that is considered to be of limited commercial value due to its size and volume. A significant portion of the site is expected to be disturbed by clear cutting for the LNG, petrochemical and cogeneration facilities. As well, a portion of the project will also impact those forested areas along the shoreline of Meadow Lake, which will potentially be flooded.

#### 5.11.2.2 Environmental Impacts

Under Section 9.11 of the EIA, the impacts on forestry are expected to be minimal due to the immature age of the forested area that is proposed to be cleared for site development, including the flooding of Meadow Lake.

The project is not expected to affect forestry resources during the construction and operation phase.

#### 5.11.2.3 Mitigation

As identified under Section 10.12 of the EIA the following mitigation is proposed:

The project is not expected to affect forestry resources during the construction and operation phase therefore mitigation is not necessary.

#### 5.11.2.4 Cumulative and Residual Impacts/Accidents

None Identified

#### 5.11.2.5 Monitoring

None identified

### 5.11.3 Identified Concerns

NS Department of Natural Resources provided the following comment in a written submission:

“The largest area of upland Crown land involved with this project will be the flooding associated with the proposed dam at Meadow Lake. This amounts to approximately 295 Ha. of which 122 Ha. are wetlands. The area to be flooded is currently included in the StoraEnso License Agreement, which may ultimately require replacement lands for the Stora license. (The Proponent later clarified that the actual area to be flooded is 140 Hectares).”

### 5.11.4 Panel Findings

None.

### 5.11.5 Recommendations

5.11.5.1 That the Proponent consult with NSDNR and StoraEnso to ensure that StoraEnso’s forestry licensing needs are met as a result of the potential loss of forested land from production due to the flooding of Meadow Lake.

## 5.12 Geology

### 5.12.1 Introduction

A review of geological issues for the project area is reported in section 8.13 of the EIA Report (p. 8-130 to 8-149). Published geological maps, reports, and files were reviewed and interviews were carried out. Core logs from monitoring wells were studied. Field studies were undertaken to gain an understanding of the geology and related issues.

### 5.12.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.12.2.1 Existing Environment

Understanding the distribution of soils and bedrock types is important when considering present and future groundwater conditions (see section 5.6 - Groundwater, this report). Soil types and surficial geology within the Keltic site are shown in Figures 8.13-1 and 8.13-2 in the EIA Report. Bedrock geology is discussed in section 8.13.2 and included in Figure 8.13-3.

Halifax Formation rock present at this site has the potential to generate acidic runoff when sulfide minerals are exposed and oxidized.

Gold mining activities in the Goldboro area occurred during the late 1800's and early 1900's. Details of this history are available in the EIA Report Appendix 12. A number of former mine workings have been identified on the Keltic site (Fig. 8.13-4; p. 8-140, EIA Report). Present-day mining issues are discussed earlier in this report in section 6.4 Mining. Tailing deposits from gold mining activities are found throughout the area (Figure 13-4).

#### 5.12.2.2 Environmental Impacts

The main environmental issues related to the local geology are the abandoned mine workings, the contaminated tailings deposits, and acid-generating sulfide mineralization. Tailings deposits are known to contain high concentrations of mercury and arsenic and are therefore a potential health hazard. During site preparation and construction, dust contaminated with mercury and arsenic may present health problems to workers, residents, and wildlife. The airborne particles can be inhaled directly or migrate downwind to be deposited elsewhere. The mercury may volatilize and be introduced to the area as mercury vapour.

The floor of Dung Cove, between the marginal wharf and LNG storage facility, is believed to be covered with tailings. These deposits are known to contain high concentrations of mercury and arsenic. Construction activities and storm conditions could disturb the contaminated sediments, exposing marine life to the contaminants (e.g., clams, lobsters, mussels, sea urchins, etc.).

### 5.12.2.3 Mitigation

The area will be surveyed to identify mine workings and tailings deposits and to test for acid-generating material. Mine workings will be examined and filled with stone where possible. Tailings sites will be fenced and avoided. Where that is not feasible, these sites will be encapsulated. A Dust Control Plan will be developed to minimize exposure to contaminated dust particles. Sulfide Bearing Material Disposal Regulations will be followed as required.

Contaminated soils that cannot be treated onsite will be disposed of offsite by a licensed hazardous waste transportation company.

An Erosion and Sediment Control Plan will be developed. The NSDEL “Erosion and Sedimentation Control Handbook for Construction Sites” will be followed and the plans will be submitted to NSDEL for review and approval. Mitigative measures will be undertaken to minimize erosion and siltation of the nearby streams and waterfront during land clearing and construction. Traditional methods of erosion control and placement of armour rock will be used to protect shorelines at risk.

### 5.12.2.4 Cumulative and Residual Impacts / Accidents

A potential exists for failure of erosion and sediment control structures due to extreme precipitation events. Such a failure could result in the release of a large quantity of sediment-laden runoff to receiving watercourses with potential adverse environmental effects on fish and fish habitat.

### 5.12.2.5 Monitoring

Under the EPP, a Dust Control Plan, an Erosion and Sediment Control Plan, and an Acid-Generating Rock Management Plan will be developed and followed based on monitoring data.

## 5.12.3 Identified Concerns

### *Panel*

The EIA Report discussed the possibility that there may be many undocumented mine workings and tailings deposits (EIA Report, p 8-139). Before construction begins, care must be taken to survey the region, collect samples and information and prepare geotechnical and contaminant hazard maps.

All tailings samples in Table 8.13-1 exceed the Canadian Council of Ministers of the Environment (CCME) guidelines for mercury and arsenic concentrations in freshwater and marine sediments (EIA Report, p. 8-144). The proposed area has not been evaluated as to whether it is a contaminated site as defined by NSDEL guidelines.

It is not clear whether pH monitoring of lakes and streams (on-site and background locations) will be done before and during construction and production phases to determine if acid-generating rocks have been disturbed (EA report, Table 13.3-1).

### *Intervenors*

NSDEL requested that as a condition to obtain environmental approval, the Proponent should be required to undertake appropriate remediation or site management of all tailings on the site, consistent with the Nova Scotia Guidelines for the Management of Contaminated Sites ([www.gov.ns.ca/enla/contaminatedsites/docs/ContaminatedSiteManagementGuidelines.pdf](http://www.gov.ns.ca/enla/contaminatedsites/docs/ContaminatedSiteManagementGuidelines.pdf)) (question NSEL 50).

The Ecology Action Centre (EAC) asked for more information on mitigation measures because of the levels of arsenic and mercury in goldmine sites and the link of some mines to the ocean (question EAC 56). The Proponent confirmed that arsenic and mercury, which may be attached to sediment particles, can become mobilized if these tailings become disturbed. They added that they did not place the tailings on site and that they intend to avoid tailings areas during construction and operation. In their opinion, environmental contamination by arsenic and/or mercury as a result of Keltic activities will not be a concern.

Health Canada (HC) was concerned that project activities could disturb tailings deposits (question HC 50). The Proponent replied that if tailings deposits had to be disturbed, a tailings management strategy would be developed.

The Aquaculture Association of Nova Scotia was concerned that an incomplete description for the marine environment in the proposed project region is presented. Contaminated particles can compromise the quality of mussels produced in Country Harbour near the project. They requested that a long-term monitoring program be instituted to study contaminants in suspended particulate matter.

### *Public*

A member of the public asked in a letter how the construction and operation of the marginal wharf / LNG terminal will affect erosion rates (Marika letter).

A concerned citizen noted that the EIA Report states it is preferable to excavate bedrock using mechanical rippers and to minimize blasting. He felt that bedrock in the Goldboro area is not amenable to ripping. He notes that the Sable Offshore Project ran into this same problem and in the end resorted to blasting.

A concerned citizen asked how sediment suspended during construction would affect habitat and change sediment deposition along the coast. She wondered if it would cause a decrease in lobster populations, as happened as a result of construction of the Link to PEI. She wanted information about the chemical constituents of these sediments,

considering the gold mining history in the area (question CC 84). The Proponent responded that an Erosion and Sediment Control Plan will be established for the project.

#### 5.12.4 Panel Findings

The EIA Report discussed the possibility that there may be undocumented mine workings and tailings deposits in the project area. The Panel concludes that there were an insufficient number of soil and sediment samples collected and analyzed for contaminants, specifically mercury and arsenic. Before construction begins, a plan must be initiated to survey the region, collect samples and information and prepare contaminant concentration contour maps.

The Panel is concerned by the Proponent's response that environmental contamination by arsenic and/or mercury as a result of the Proponent's activities will not be a concern. They have a responsibility to protect humans and biota from contaminated materials on the site (e.g., contaminated dust, soils and sediments). The project area should be considered to be a contaminated site, as defined under NSDEL legislation, until it is proven not to be.

A Tailings Management Plan needs to be developed during the planning stages, regardless of whether known tailings deposits can be avoided. Newly discovered tailings deposits may be encountered as the project proceeds, and accidental disturbances at tailings sites can occur when an avoidance plan fails.

Surface water pH conditions may be compromised if acid-generating rocks have been disturbed. Table 13.3-1 (EIA Report, p. 13-4) summarizes the proposed surface-water monitoring program which, it is assumed, includes pH monitoring. There is no plan to monitor the pH of lakes and streams at the project site or at Meadow Lake during pre-construction. There clearly is a need to seasonally monitor pH at these sites before the project starts in order to establish baseline pH values. There is no plan to monitor surface water pH at the project site during construction and operation phases. There is a need to do seasonal pH monitoring of surface waters in and near the project site throughout construction and each year during the production phase.

A necessary part of the Erosion and Sediment Control Plan should be a marine-suspended-matter monitoring program to study the movement of contaminated particles due to construction, runoff, storms, and wharf activities. The well-being of marine biota could be at risk if particles contaminated with mercury and/or arsenic are repeatedly injected into coastal waters. The monitoring area should extend to local lobster beds and to the mussel farm in Country Harbour.

#### 5.12.5 Recommendations

5.12.5.1 That as part of the request to collect and analyze additional soil and sediment samples for mercury before construction at the project site and at the proposed flooded area around Meadow Lake (Recommendation 6.3.5.3), the Proponent also measure

arsenic in these samples and prepare arsenic concentration contour maps for soil and sediments (<63 µm fraction). NSDEL must be consulted to help prepare a sampling plan and to review the results.

5.12.5.2 That prior to the issuing of any permits, the Proponent verify that the project site is not contaminated with mercury or arsenic. This will be done following the principles of the Nova Scotia Guidelines for the Management of Contaminated Sites, under the direction of NSDEL.

5.12.5.3 That the Proponent develop a Tailings Management Plan prior to the issuing of any permits.

5.12.5.4 That the Proponent carry out seasonal baseline monitoring of pH in surface waters at the project site and at Meadow Lake before any land clearing and construction activities. The Proponent will do seasonal pH monitoring of surface waters at and near the project site during construction and production phases, in order to identify areas where acid-generating rock may have been disturbed. This activity will be included in the Acid Generating Rock Management Plan and will be co-ordinated with surface water monitoring activities requested in Recommendation 5.5.5.5.

5.12.5.5 That the Proponent carry out a marine-suspended-matter contaminant monitoring program prior to any construction activities to study the distribution, composition and movement of suspended particles in waters around local lobster beds and the Country Harbour mussel farm. This monitoring program will be repeated during the production phase of the project. This program will be part of the Erosion and Sediment Control Plan. Local fishers are to be consulted to establish monitoring sites and NSDEL is to be consulted to design the monitoring program and to review the results.



## 5.13 Archaeology

### 5.13.1 Introduction

Archaeological Resources represent an important legacy to the community of Goldboro, especially to the descendants of Black Loyalists and Mi'kmaq communities.

### 5.13.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.13.2.1 Existing Environment

A detailed archaeological assessment (an historical background study and field survey) uncovered twelve previously unknown sites of interest, three of which are expected to be impacted by the construction of the LNG facility.

Separate from the project related studies, a crew of archaeologists and concerned Lincolnville community members, led by archaeologist Laird Niven, conducted an excavation of the cemetery at Red Head in 2000 and 2001. Several remains were discovered, exhumed and relocated to a new burial ground.

The project site has cultural and archaeological significance for the Mi'kmaq community because the Goldboro and surrounding area was often used as a camping area while partaking in traditional activities such as hunting and fishing. Therefore, the potential exists for artifacts to be present.

#### 5.13.2.2 Environmental Impacts

The EIA concludes that at least three sites of moderate archaeological sensitivity will be impacted by the construction of the LNG and marginal wharf facilities.

The EIA Report also states:

“The construction of the dam at Meadow Lake would result in water level increases that may submerge archaeological resources, if present, particularly First Nations resources.”

“Disturbance of land at the former Red Head Cemetery by marginal wharf and marine facility may potentially occur.”

#### 5.13.2.3 Mitigation

The EIA states that “archaeological mitigation is recommended for the Dung Cove, Hattie's Belt, and Skunk Den Mine sites prior to construction.”

Mitigation identified for the project if there is a discovery of artifacts related to First Nation use is to ensure workers have cultural resource awareness training and to develop a contingency plan for discovery of resources.

The construction of the marginal wharf area may result in the disturbance of potential additional burials at the Red Head cemetery site. Therefore any ground work required to develop the site will be completed with a small backhoe and that excavations are to be monitored by qualified archaeological personnel. Should anything be discovered, then additional consultation with the Lincolnville Black community should be carried out.

If the development footprint changes, there is the potential for disturbances to archaeologically significant sites therefore a reassessment of archaeological resources before construction at target sites and a modification to the existing development plan may be required. "The former cemetery at Red Head is an area of cultural sensitivity and should be monitored carefully during ground disturbance."

"Finally, the potential impacts to sites along Sculpin Cove and on Hurricane Island are not clearly understood at this point and may require mitigation should operation and maintenance of the wharf and shipping in the harbour cause shoreline erosion."

#### 5.13.2.4 Cumulative Residual Impacts

All impacts of the project are identified as being adverse and the residual effects range from unknown, because a particular area has not been surveyed, such as Meadow Lake to one identified as medium (Red Head), with the majority of the others identified as minimum residual impact.

#### 5.13.2.5 Monitoring

None was identified under Section 13.0 Compliance and Effects Monitoring

#### 5.13.3 Identified Concerns

##### *Panel*

None identified.

##### *Intervenors*

Assembly of Nova Scotia Mi'kmaq Chiefs

"... believe that the Chiefs are on record to say that there is identified within the study area significant Mi'kmaq occupation places within the study area, and that they feel that these need to be thoroughly looked at, more investigations done."

"If archaeological resources are encountered, work should be stopped until there is an investigation by an archaeological mind or a person or body or outfit."

## Ecology Action Centre

“The EIA Report identifies the proposed Keltic Study Area as an important archaeological site containing heritage from Mi’kmaq, Black Loyalist and European settlers (8.2). The site holds much history and should be developed as a cultural heritage site, and this unique cultural legacy emphasized and celebrated. Even with its mitigation measures, the project will erase the potential for such local cultural education and heritage experience, and related tourism dollars.”

“The Red Head Cemetery, though the bodies have been excavated and some mitigation measures offered (9.18.1), remains a spiritual site and will become inaccessible to the descendants of the area, because of security, health and safety reasons.”

### *Public*

“Were the remains removed because there was a significant threat of them being washed to sea or were they moved to accommodate the Keltic project?” *[Panel Chair and Keltic clarification- This project was completed prior to Keltic selecting the site. The initiative was led by the members of Lincolnville community.]*

“If there has been compensation -- like, you know, I'm from the community and I have not heard anything about any compensation regarding the heritage sites.”

“Was it environmentally sound for the Municipality to re-zone the fragile Red Head area?”

### 5.13.4 Panel Findings

The only areas examined for archaeological sites were the areas of the marginal wharf development and LNG facility (Figure 8.14-1). More archaeological work is needed to ensure construction will have minimal impact on valuable archaeological resources.

Aboriginal mitigation is not treated equally to other archaeological factors – “cultural awareness training of workers and the development of a contingency plan for discovery of resources” are the only issues identified as mitigation and only for the pre-construction phase.

The Red Head Cemetery Site would appear to have cultural significance to those of Lincolnville and those who may have had descendants buried there. More consultation with the Lincolnville Community is required in order to ensure all concerns are addressed.

Typically, sites of significant sensitivity are protected through special land use zoning such as ‘park land’, “open space” or “environmental open space.” Even though the burial site at Red Head appears to have been completely accounted for in terms of the removal of remains, the Municipality still chose to rezone the area to Heavy Industrial (M3). To

protect sensitive areas such as the Red Head Cemetery, alternative designation and zoning should be used, other than the current Heavy Industrial (M3)

#### 5.13.5 Recommendations

5.13.5.1 That prior to the issuing of any permits or any site disturbance, a complete archaeological assessment of the remainder of the project site be undertaken, including those areas that may be flooded by the damming of Meadow Lake. This is to ensure project design is adjusted accordingly prior to work versus upon a significant archaeological discovery.

5.13.5.2 That prior to any permits being issued, an Archaeological Monitoring Plan be created in consultation with the descendents of Black Loyalists, the Mi'kmaq community and various subject experts including the Nova Scotia Museum and that the plan include a "stop work" clause covering archaeological finds and a detailed communications plan.

5.13.5.3 That the Office of African Nova Scotian Affairs coordinate plans for the erection of a memorial by the Proponent in the Red Head vicinity. In addition, a Visitation Plan be created to allow descendents to have escorted visits to the cemetery, with prior notice, or on pre-determined dates.

## 5.14 Transportation

### 5.14.1 Introduction

Transportation methods play a significant role in the project. Generally, sea transportation is under the jurisdiction of the federal government and land transportation is under the jurisdiction of the provincial government.

### 5.14.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.14.2.1 Existing Environment

The EIA Report Section 8.16 describes in detail the existing road infrastructure that may be impacted by the project.

“Transportation infrastructure that may be used for the following purposes has been included:

- worker and equipment access during construction activities;
- worker access to the LNG and petrochemical plants during operation of those facilities;
- transportation of maintenance equipment and production materials needed during operation;
- transportation of finished products from the petrochemical plants to Highway 104; and
- local traffic.”

“The existing road route most likely to be used to travel from Antigonish to Goldboro is Trunk 7 from Highway 104 to Route 276, Route 276 from Trunk 7 to Route 316, and Route 316 from Route 276 to Goldboro. The travel distance from Highway 104 to the Sable Gas Plant Road by the existing route is about 76.7 km, and the majority of posted speed limits are at or below 80 km/h.”

“Trunk 7 is considered a Trunk road and Routes 276 and 316 are Collector roads. All are two lane paved roads with one lane for each direction of travel. Pavement width typically is between 6.4 and 6.8 m, and gravel shoulders are usually between 1.0 and 1.5 m wide. The roads do not have any control of access and private driveways occur frequently, averaging up to about seven accesses per km.”

“The Trunk 7 section of the route is rated as a Maximum Weight – Spring Exempt road, meaning that trucks can carry maximum registered loads all year. While Routes 276 and 316 are designated as ‘B-Train’ routes, a considerable section of Route 316 from south of Route 276 to north of Goldboro is subject to ‘Spring Weight Restrictions,’ which means that gross allowable weights will be reduced considerably below registered weights for about six to eight weeks each spring.”

“It is essential that a Maximum Weight – Spring Exempt road be provided from Highway 104 to the proposed petrochemical complex. An estimate prepared by NSTPW in 1998 indicated that it would cost about \$8.0 million to upgrade the entire 76.7 km long Trunk 7 - Route 276 – Route 316 Access Route to allow Schedule C load carrying capabilities. Although a current cost estimate is not available, upgrading costs would be significantly higher considering when the previous estimate was prepared.” *[Keltic did provide an estimate in current dollars - Current cost estimates to upgrade the existing Route 316 from the Trans Canada Highway at Lower South River to Goldboro to a Type ‘D’ all-weather highway with a posted speed of 90 kph for a distance of 69 km is \$44 million.]*

#### Speed Zones

“The existing Trunk 7 - Route 276 - Route 316 route has about 65% of the length posted at 80 km/h or less. Table 8.16-1 illustrates distance, posted speed limits, average speed, and travel time for the existing route.”

“The existing Trunk 7 - Route 276 - Route 316 route from Highway 104 at Antigonish to the Sable Gas Plant Road at Goldboro is about 76.7 km long. Assuming one can travel at the posted speed limits, the average travel speed is 81 km/h and the travel time is about 57 minutes.”

#### Traffic Counts

“NSTPW has periodically obtained traffic counts on the Transport Study Area highway sections using automatic traffic counters. Historical count data for many areas in Nova Scotia indicate that traffic volume growth rates are typically about 2 % per year.”

“Estimated 2005 and projected 2015 Annual Average Daily Traffic (AADT) volumes for Study Area roads are included in Table 8.16-2. While volumes on Trunk 7 and Route 316 near Highway 104 are moderate, volumes on all other road sections are low to very low.”

#### Seasonal

“Since volumes in the Study area are generally low, the seasonal variation in average weekly volumes will have little impact on traffic performance.”

#### Collision

“While the combined collision rates for the existing 76.7 km long Trunk 7 - Route 276 – Route 316 Access Route are lower than provincial average rates for Trunk and Collector road classes, collision rates for the existing route are considerably higher than the provincial average rates for two-lane controlled access highways.”

#### 5.14.2.2 Environmental Impacts

“Transportation impacts are expected to be most noticeable during the operations phase, when the existing road system is used for the transport of products by plant workers. Upgrades to the existing road infrastructure will likely be required so that the overall level of effect will not be significant (EIA Table 9.19-1).”

#### 5.14.2.3 Mitigation

The report outlines several potential mitigation options:

- “Ship materials in smaller loads in accordance with spring weight restrictions
- Upgrade the road to allow for maximum weight – spring exempt truck movements
- Stockpile construction, production and finished product materials on site for delivery before and after the spring weight restrictions
- A Flagman at construction site entrance, if required
- Along main transport route, adjustment of travel speed, signage, intersection controls, sight lines”.

#### 5.14.2.4 Cumulative and Residual Impacts/Accidents

Increase in collision rates during construction and operation phase are adverse effects which are defined in the EIA as a minimal residual impact.

#### 5.14.2.5 Monitoring

None identified

### 5.14.3 Identified Concerns

#### *Panel*

“If traffic is anticipated to be higher during construction, why the statement that impacts will be most noticeable during operations?” [*Keltic Response - The Operation Phase traffic over the long term will have more of an impact to local traffic patterns as traffic will be predominately truck traffic as opposed to the Construction Phase where traffic is predominately car based.*]

“Is a traffic management study required?” [*NSTPW Response - It can be a condition of getting access to the highway system.*]

“Previous sections (of the EIA) indicate that the majority of transport of finished product will be by sea. Are there any estimates of what percentage will be by sea and by land?”  
*[Keltic response - 90% sea 10% land]*

“If there are upgrades required as a result of the traffic impact study, who would fund those upgrades? Would Transportation and Public Works undertake that work?” *[NSTPW Response - Typically, it's the Proponent that's responsible for any road mitigation or upgrades that's required as a result of their development.]*

“And the same would apply to the realignment, if that's done?” *[NSTPW Response - That's correct, yes.]*

### *Intervenors*

#### Ecology Action Centre

“The Proponent should provide more details to ensure that Stormont Bay and Isaacs Harbour area are actually a safe transportation route and docking area for these ships.”

“The assessment of the impacts of the project on the current roads and the changes to the Marine Drive is narrow in scope and does not consider the reality of rural living.”

“The Proponent has changed its proposed road alignment at least three times. Could this be because the location of the site is problematic in ensuring the respect of local citizen's safety and environmental sustainability?”

“Given the length of the route, its poor maintenance and the proximity of rural homes along it, is this road acceptable for the daily commute of traffic to and from a heavy industrial site?”

“Is the proposed location of the Keltic Project the best site given other deep harbour ports which already have the maintained infrastructure capable of handling such vehicular traffic?”

“The roads would have to be upgraded, and you mentioned widening, and all kinds of different things needing to be done. How will this affect neighbouring properties? Will some homes become, now, too close to the highway? Will they lose land? Is the change needed, big enough to impact homes all along these little -- the 316 and 276?” *[Keltic Response – a traffic study would show this]*

#### Dr Karin Cope

“But I also have questions about hazardous materials going up these local roads that we all know are, you know, single-lane roads on their way ostensibly to Montreal.”

#### Dan McDougall – Municipality of the District of Guysborough



“While the Municipality understands that the Provincial Government is working with project developers on any new road alignment(s) the Municipality would request that approval be conditional on municipal review of traffic and road construction plans.”

“The Municipality would ask that the Board ensure the impact of highway changes are considered and a proper mitigation plan is established.”

#### NS Department of Transportation and Public Works

The Department provided many valuable comments and details during the Public Hearing presentation. One very key point that was made provides a basic summary: “There's been no analysis or no study done.” The following are excerpts from the transcript:

“In conclusion, the proposed petrochemical plant and LNG facilities, they will have an impact on the existing road system between Highway 104 and Goldboro. A detailed traffic impact study is required to determine what mitigation measures are required to assure a safe, efficient and economical access route. And the Department of Transportation and Public Works believes that the routing identified in the EIA Report with any upgrades that are identified in a traffic impact study is an acceptable and feasible option for transporting people and material between Highway 104 and the site at Goldboro.”

“I'd like to reiterate that the Department of Transportation and Public Works does believe that the routing identified in the EIA Report using existing highways is a feasible option. The existing highways with upgrades, as may be determined in a traffic impact study, would be able to accommodate the traffic as generated, in a safe and efficient manner.”

“The expectation would be that the Proponent would be, you know, funding the construction, and also, any work required to identify the routing, and getting all the approvals.”

#### *Public*

“How can Keltic be sure it can reroute 316?”

“Who will pay for highway alteration, including maintenance?”

“Why haven't the roads in the area been upgraded?”

“The huge ship traffic conducting business in the harbour compromises people's enjoyment of a peaceful safe haven and leads to the threat of a dangerous destructive waterway.”

“The required upgrading of infrastructure by way of roads and services to the Goldboro site would represent, I'm sure, a great -- a real asset to the people who live in the surrounding areas.”

“The shipping of materials and transportation of personnel during the construction phase alone will have a noticeable impact.”

“We heard that highways would be built when Sable came in. We didn’t even see improvement in the one that exists.”

“How do homeowners access the re-routed portion of Hwy 316?”

“How does the school bus access children inside the re-routed Hwy 316?”

“The residents of the area are driving on dirt roads and were absolutely dumbfounded when it was learned that the Environmental Assessment Board refused to consider Keltic’s offer to build a “free” all weather highway.” *[Note: it was not the EAB that ‘refused’ Keltic’s offer – a letter from NS Transportation and Public Works to the Proponent clarified that the proposed highway did not meet the current Provincial plans for 100 series highway development]*

“The residents of the area have since started a petition to use the gravel road system known as the Antigonish-Guysborough Highway to service the Keltic Project.”

“The damage to our roads by the influx of multitudes of additional vehicles cannot be overstated.”

“It gets pretty slippery down through there on them old twisty, windy, bumpy roads.”

#### *Other*

##### Health Canada

“In addition to the workers, there would also be increased traffic associated with the transportation of construction materials to the site.”

“If road construction and/or upgrades are considered to be part of the scope of the project, further assessment of related activities should be undertaken in the Environmental Assessment report rather than during the FEED phase in order to ensure that any potential cumulative effects are adequately assessed (i.e. noise issues, air quality, potential interaction with surface waters/sensitive habitats).”

##### Fisheries and Oceans

“There are no details on the construction of the water intake facilities or access roads for the Meadow Lake dam and water intake site.”

#### 5.14.4 Panel Findings

Upgrading the existing road network and the proposed rerouting of the Route 316 will cause significant change to the neighbouring communities. Limited information was available in the study to truly reflect on the potential impacts on the surrounding communities and environment.

The Nova Scotia Department of Transportation and Public Works made it clear that the Proponent is responsible for this road rerouting proposal and is responsible for all aspects of land acquisition and road construction. Construction must be done to NSTPW standards, and the costs of acquisition and construction for the new road should not be passed on to the Province.

Increased traffic on roads will have significant impact on current traffic patterns, and will impact current enjoyment of their lands by private property owners along the road. NSTPW has assessed the proposed realignment of Route 316 around the site and the department is not opposed to that realignment.

There may be better ways to route the proposed road realignment, and discussions with Transportation & Public Works will have to take place to ensure that realignment is done properly. A traffic impact study will have to be conducted to provide the required information for proper review and evaluation of use of the existing road network and the proposed road realignment.

During the public hearing, the Proponent changed its wording in its introductory presentation as follows:

Nov 23 – *“So we evaluated the local infrastructure, the roadways for this additional transportation requirement, and we've identified that there may be major upgrades required on this road.”*

Nov 25 – *“We looked at the road infrastructure, and have determined, with consultation with Transportation & Public Works that there may be requirements for additional upgrades but with these minor upgrades it's likely that the infrastructure can accommodate the requirements of the project.”*

A traffic impact study will determine whether the potential upgrades are major or minor. However, this does little to identify the potential impacts on land owners with direct road frontage or on users of the road.

Currently, Route 316 does not have a suitable alignment for Project safety and security purposes and therefore the realignment would appear to be a requirement for the project to proceed.

#### 5.14.5 Recommendations

5.14.5.1 That in order to fully address the potential impacts of vehicular traffic, the Proponent continue discussions with the Nova Scotia Department of Transportation and Public Works (NSTPW) regarding the preparation of a Traffic Impact Study for road upgrades, for any roads required for access to portions of the project site that may not be on Project lands (Meadow Lake Dam) and for the proposed road realignment for Route 316.

5.14.5.2 That the Municipality of the District of Guysborough has an opportunity to review the completed Traffic Impact Study and provide comments; that once completed, the Traffic Study be acceptable to NSTPW prior to the issuing of any permits.

5.14.5.3 That the Proponent acquire, at a minimum, an option to purchase the lands required for the development of the proposed Route 316 realignment to ensure that it is a viable proposal and that the Province will not be liable for any land acquisition costs.

5.14.5.4 That the Proponent submit to NSTPW, performance bonds and a commitment regarding the road upgrades and realignment project prior to proceeding with any proposed roadwork, based on industry standards and NSTPW requirements.

## 5.15 Health and Safety

### 5.15.1 Introduction

Health and Safety concerns are inherent when dealing with large often unknown or unfamiliar businesses and industries. It is important to ensure employees, customers and those neighbouring any facility are safe from risks that may impact their health or overall safety and wellbeing.

### 5.15.2 Summary of Environmental Impacts/Mitigation/Follow-up and Monitoring

#### 5.15.2.1.Existing Environment

Section 9.20 of the EIA Report states “Human health and safety are identified as a VEC in the Terms of Reference for the Keltic project.” This VEC analysis includes two facets of potential adverse effects: (1) public health and safety, and (2) worker health and safety. It is evaluated primarily to address potential health and safety risks to the public and workers associated with routine plant emissions, accidents, malfunctions, and unplanned events. The potential effects on other VECs will be evaluated in a cumulative way to determine whether there are potential effects on human health and safety.”

Under section 8.15, the EIA states that “No assessment of existing human health and safety was undertaken to record baseline conditions. Human health and safety will be addressed based on anticipated project-related effects.”

It must be understood that at the time the EIA was prepared many of the engineering designs were still being developed and that the Proponent did attempt to address potential impacts. Therefore, under various Valued Ecosystem Components, the Proponent did comment on some of the risks or potential health and safety issues.

On page 9-138 of the EIA the spatial boundaries for the VECs relative to public health and safety are determined by:

- “the area impacted by air releases, as identified by potential for releases, or areas of impact identified (Section 9.6); and
- the area potentially affected as a result of the consequence analysis”

“For worker health and safety, the spatial boundaries have been established in the vicinity of the proposed pier, LNG processing and storage area, and the petrochemical complex located in Goldboro Industrial Park and along the northeast side of Isaacs Harbour and from the end of the shipping lane into Isaacs Harbour to the proposed pier. The temporal boundaries for these impacts are during the construction and operational phases.”

### 5.15.2.2 Environmental Impacts

The EIA states that “a preventative health and safety program will be implemented for construction, operation, and decommissioning that ensures that the public and workers are not adversely affected during routine operations, and that contingency plans are in place to prevent impacts during accidents, malfunctions, and unplanned events.”

Table 9.20-2 provides details as to the potential environmental effects related to Human Health and Safety and although the majority listed are identified as potentially adverse the potential significance is often commented on as follows:

“Potential spills, air emissions unlikely to be significant based on modeling results”;

“Unlikely to impact the public due to distances to receptors and duration of construction activities”

“Equipment Materials Storage, Materials Transfer, and Decommissioning and demolition stage has been identified as potentially significant if spills result in vapours or air impacts, or effects on groundwater resulting in impact on private wells”;

One positive impact was identified– Construction of Pier – which may block migration of mine tailings.

The EIA states that “Once decommissioning is complete, no impacts from the Project are expected.”

### 5.15.2.3 Mitigation

The conclusion of Section 9.20.3 of the EIA states that: “most of the site activities that could affect human health and safety are related to dust generation. During construction and demolition activities, a particulate monitoring plan will be implemented to protect workers and nearby residents. In order to assure that construction or operation activities have not impacted drinking water in the area, select private wells will be included in the groundwater monitoring program. These wells will be sampled and analyzed for metals, VOCs, and petroleum compounds, as well as coliforms. While no such impacts are expected, monitoring is planned due to the uncertainty regarding flow characteristics considering the mine workings in the area.”

“The Health and Safety Program for the Project may require additional monitoring and follow up to ensure the safety of the facility workers and the nearby public.”

“Follow-up may also be required as part of the Dust Control Plans and Spill Control Plans if certain conditions are observed that trigger monitoring.”

The following tables in the EIA provide specific details:

Table 10.21-1 Mitigation Measures for Human Health and Safety Effects

Table 10.22-3 Mitigation Measures for Accidents and Malfunctions

#### 5.15.2.4 Cumulative and Residual Impacts / Accidents

Table 11.1-1 (Summary: Effects, Mitigation, and Significance of Residual Effects) details residual impacts. Of the 18 impacts identified by the Proponent, one is listed as positive – potential disturbance of mine tailings from construction of waterfront facilities and pipelines, four impacts are consider minor, with the remainder as minimal.

The remainder of the identified impacts are deemed to be adverse and range from minor to minimal impact.

#### 5.15.2.5 Monitoring

While no one specific monitoring plan is identified specifically to address Human Health and Safety, there are several plans associated with individual VEC's identified by the Proponent.

The Proponent indicates that the Environmental Protection Plan (EPP) and the Emergency Response Plan for the construction and operation phases of the project will be completed prior to construction.

These plans will be submitted to NSDEL for approval, and will include circulation to EC, DFO and other regulatory agencies as required.

### 5.15.3 Identified Concerns

#### *Panel*

The EIA states, "No assessment of existing human health and safety". The Panel asked, "Why not? If you do not record baseline data then how useful are your analysis and assumptions?" *[Keltic Response - The baseline conditions were evaluated through consideration of environmental media to which humans might be exposed: groundwater (drinking water), air, soil, and surface water. Characterization of the existing conditions in these media is provided in the EA, as well as comparison to any applicable human health standards. These media will be monitored during construction and operation of the facility in order to identify any changes that could potentially affect human health and safety.]*

Question: "... that you have the resources and expertise available to adequately monitor, enforce, assess and so on, all of the things that you would have to do to regulate this industry" *[NSDEL Response: Deficiencies that we did have or would have would be addressed in the industrial approval, and we would look at having resources made*

*available through that process to hire, if required, or obtain people from other departments and to compensate those people for their expertise.*

Question: “So just to clarify, you're saying that you have the authority to require resources of the proponent in order to support those activities?” *[NSDEL Response: That is correct. And that's been done in other approvals, as well, especially when it's -- the scope is so broad and it's a large project like this.]*

#### *Intervenors*

##### *Ecology Action Centre*

“There will be flares and there is a Sable Offshore flare in the site, so potentially they are, I guess, sources of ignition, but they would be so high that by that time if there was a leak the methane and the ethane would have mixed to a level where they couldn't be ignited, is that correct?” *[Keltic Response - Yes]*

“The mitigation measures (10.14.2.1) offered will not necessarily compensate for the economic and safety risk incurred by fishermen who must be moved to accommodate the Keltic site.”

“The EIA safety measure (10.23) in case of high waves or storm surges is to detach the vessels from the LNG terminal to avoid spills or infrastructure damage. The report does not state where the ships will go from there, how far into the Harbour they can move away from the terminal, as the space is no more than a kilometre between the terminal and the coast. The safety assessment does not include the risk to fishermen returning from sea into the harbour when these storms occur if their way back is blocked by one of the LNG vessels either in the turning process of floundering in the waters at the entrance of Country Harbour.” *[Keltic Response - Details of ship navigation will be developed during the FEED phase of the Project and will be in compliance with regulatory requirements and industry standards that relate to marine operations and safety. These details will be developed in consultation with appropriate regulatory agencies during the TERMPOL process.]*

“The report states that the “construction of the petrochemical complex may induce potential effects on VECs relevant to human health. These include air quality, groundwater, geology (soil), and surface water” (10-42). Its proposed mitigation measures focus mostly on health and safety for workers, but do not assess the impacts on others.” *[Keltic Response - All emissions for these constituents are below the regulated requirements.]*

“How will residents be informed? What will be the impacts to the fishery, the animals? If the wind is predominantly from the north-west would the endangered Roseate Tern be downwind from any major chemical accident? What would be the effects on this population?” *[Keltic - A quantitative risk assessment (QRA) is currently underway to further evaluate these types of risks.]*



“The health and safety assessment of the proposed routes does not consider the reality that rural roads are also the only means of movement between towns for pedestrians and cyclists.” *[Keltic Response -Keltic is working with NSTPW to ensure that appropriate transportation infrastructure is in place to meet the requirements of the Project and to ensure safe usage by other users. This would include properly posted speed limits and warning signs.]*

“An in depth assessment of health impacts, currently missing from the EIA, should be mandatory prior to obtaining approval.”

Municipality of the District of Guysborough

“Local area residents have expressed concerns regarding impact of the project on Highway 316 and in particular on rerouting in the Goldboro area. Road safety for residents and property owners along Route 316 is imperative.”

“With respect to policing, there are 11 officers in the County. Seven of those officers are funded by the Municipality of the District of Guysborough. That's a fairly high resource based on our population and other indicators, and Council intentionally has funded that resource in order to be able to respond to both the SOEI project as well as future industrial development.”

“We're currently conducting a fire services review with third party consultants to establish minimum core level of service that we'd like to see provided to all our communities including both our residential and business community, and that will include a look at the -- how fire departments need to be resourced to address any service required in our industrial parks.

NS Department of Environment and Labour

“Dam failure is assessed as having no effect on the Proponent's facility, but is not assessed in relation to effects on other properties or public safety. This must be done -if no other property owners involved and not a public safety issue, then this needs to be stated.”

Dr. Elisabeth Bigras

“As a physician, I have read a great deal about the health risks of both LNG and petrochemical factories. The carcinogenic risks of petrochemical plants are by now well established. The impact of the air pollution from petrochemical plants on respiratory health is also well-established. Add to these issues the very real danger of an accidental discharge of LNG or a fire/explosion either on board the ships, in transfer to land facilities, or in the storage facilities, and the prospect of having Keltic as my neighbour is anxiety-causing to say the least.”

“The approval of Keltic will signal the inability of our government to answer the question, why put an LNG terminal here when communities on the US Eastern seaboard will not accept such terminals on their soil--and the gas is for them, not for us! The government of NS will have demonstrated that it is not concerned with the health and well-being of the inhabitants on the Eastern Shore.”

Dr. Karin Cope

“This is one of the most highly regulated industries in the world. Regulations are there to protect us, but they can't secure us entirely.”

*Public*

“Will proposed safety measures be sufficient to prevent leaks and releases etc?”

“Will placing the terminal in NS eliminate the risk of terrorist attack?”

“Will proposed emergency safety measures and strict enforcement of regulations be sufficient to prevent industry leaks and release of dangerous substances such as liquid natural gas, chemicals, and volatile organic compounds that may occur as a result of technological failures? Such failures could result in, at best, as members of the Dutch 4Gas consortium admitted to us at the Keltic open house, “a controlled emission of some gas.””

“In research that you've done, what percentages of accidents have happened with LNG in petrochemical plants to your knowledge?” [*Keltic response: No matter what you do in something of this size there's going to be a certain amount of risk involved, but there are regulatory boards, and regulatory systems are put in place to kind of stop this kind of thing.*]

“...the LNG leaked into the furnace it got into the firebox, found the source of ignition and the explosion occurred in the firebox of the furnace.” [*Keltic Response: In this LNG facility, there is no fired heater anywhere near our LNG re-gasification facilities or the storage tanks.*]

“As with nearly all petroleum facilities, flaring is a requirement for safety issues such as unit upset and overpressure protection. Flares typically burn at low levels continuously with high rates during emergencies and start-up of units. As can be seen with the SOEP gas plant flaring combustion is not always clean when velocities of the gas are inadequate to obtain a good fuel/air mix. Is Keltic going to use steam injection to increase the velocity of the flare gas stream to improve combustion? If steam acceleration is not used what will be the products of combustion in a normal and upset state by unit?” [*Keltic Response - Yes, steam injection (steam assisted) will be employed for higher than normal flow rate flaring. Steam assisted flaring is not possible for emergency flaring. A ground flare will be used for all low flow rate flaring.*]

“The last concern is safety, of course. The threat of a spill, or leak, or explosion, is something we would have to live with every day, for the rest of our lives, no matter how unlikely these things might be. We realize that the Proponents assure everyone that such accidents are extremely unlikely, but the threat still exists, and we, not the Proponents, nor the shareholders, live here, and have to face this ongoing threat.”

“Health issues are not discussed at all. There is no way that this facility can operate without emissions that are harmful to humans, animals and marine mammals. What guarantee do we have, once the plant is in place, that health concerns will be addressed and remedied?”

“LNG safety is a major issue and one that cannot be taken lightly, especially just to provide energy to the U.S.A., and the production of plastics, a non-renewable resource, provides a negative impact on the entire environment.”

“Companies are concerned with profits, not the health and safety of powerless citizens.”

“The submitted documents are not sufficient to prove the environmental safety of Isaacs Harbour Bay in the future” (8.6.and 8.7 draft terms of reference).

“There is always a possibility of my returning to Guysborough County to live permanently.”

“– but I certainly would not move back to a community with an LNG terminal and petrochemical facility that causes destructive environmental and health impacts, both actual and potential.”

“The local air quality will be greatly compromised if the Keltic project goes ahead. Although Keltic’s emissions are expected to meet government regulations, any amount of air pollution contributes to local health problems.”

#### *Other*

##### Health Canada

“The report indicates that a Dust Control Plan will be implemented that will provide specific monitoring requirements and controls to minimize dust (including dusts that may be generated when overburden soils are retained on-site for use in berms and landscaping as presented in Section 2.4.3.2 [Site Preparation/Clearing/Grubbing]). Health Canada is interested in reviewing this plan to ensure monitoring requirements are sufficient to be protective of human health.”

“Section 13.1.1 Air Quality Monitoring, Construction – The EA states that “If concerns are expressed on-site related to occupational health and safety, portable PM10 monitors may be used for real time measurements of PM by field inspectors. If concerns re-expressed regarding dust levels off-site, the Project may elect to employ high-volume

samplers to determine particulate levels at specific receptors.” Based on this section, it appears the Proponent does not intend to conduct dust monitoring during construction except if workers or members of the public complain about dust levels. No mention is made of conducting monitoring during/after blasting events.”

Nova Scotia Tourism, Culture and Heritage

“There is an existing sea kayaking route that runs from Drum Head out to Goose Island, on to Country Island, and up to Coddles Harbour. Thought should be given to the safety of visitors and residents using this route when planning the shipping lane for the proposed Keltic site. The report does identify a number of recommendations to mitigate the impact of these issues identified.”

Fisheries and Oceans Canada

“There should be a description of storage tank volumes, tank design and any safety/containment features.”

#### 5.15.4 Panel Findings

It is understood that much of the design and engineering has yet to be completed. However, the Panel concurs with comments regarding lack of information – for example discussion related to air emissions only touches on considering a dust control plan. What about monitoring other potential emissions from the facility during operation?

The Municipality mentioned that a Fire Services Study is being completed to determine minimum core level of service. If this is similar to other municipal unit studies, other municipal units have been identified as providing too many fire services and municipalities have been recommended to down-size. Hopefully those conducting the studies have been made aware of and taken into consideration the potential industrial developments proposed for the Guysborough area especially the newly enlarged industrial park in Goldboro.

Fire services in the District of Guysborough are based on volunteers and the Proponent does indicate there will be on-sight fire services. Training of the local fire and other emergency services for industrial sites should not be solely dependent on local funding.

The EIA and other associated documents do not provide details about the role other regional emergency services such as the Emergency Measure Organization (EMO) and the Regional Environmental Emergency Team (REET) could play in the design and development of the various response/safety plans.

There is concern with such generalized statements as ‘*All emissions for these constituents are below the regulated requirements.*’ With the design still in progress how can this be accurate?

The Ecology Action Centre asked a question regarding the tall flare stacks as a source of ignition being too high to cause an explosion in the event of a leak. The Proponent concurred that dilution would be too great to cause an explosion. But what about the co-generation facility and what about the low level stacks that are utilized during low pressure burn off?

#### 5.15.5 Recommendations

5.15.5.1 That the Proponent conduct a baseline Human Health and Safety analysis as a basis for comparison with any future monitoring.

5.15.5.2 That the Proponent consult and work with local and regional protection agencies such as Fire, Ambulance, and Police services and EMO and REET to ensure that the safety concerns and issues associated with industries of this type are fully understood.

5.15.5.3 That as each engineering component design is completed, changed or modified all Health and Safety plans are reviewed and adjusted accordingly by the Proponent to ensure they meet the approval of NSDEL and all other federal and provincial and government departments that may play a role in Health and Safety issues.

5.15.5.4 That the Proponent ensure that appropriate separation distances and protection measures for low level fire sources are identified in the overall site design and report this to the appropriate authorities.

5.15.5.5 That prior to the issuing of any permits, NSDEL and other provincial departments ensure that appropriate inspection and monitoring services are in place and in compliance with regulatory requirements.

## 5.16 Public Consultation

### 5.16.1 Introduction

Consultation with the public is a means of obtaining input and relevant information useful to Proponents and regulators. There is no single public participation procedure that can cover all developments, all local and regional community interests, and all social, economic and political realities of the day. This section will summarize the public participation process used for this project.

### 5.16.2 Analysis of Correspondence from the Public

A large quantity of written comments and submissions were submitted by members of the public and other government departments. A summary of these submissions can be found under Appendix E.

### 5.16.3 Summary of Public Input and Participation

During the environmental assessment process, the Panel received a wide variety of correspondence from the public, from government agencies both federal and provincial, from the formal and informal intervenors and from a variety of opinions expressed by the various participants during the hearings. Prior to the hearings, more than 1500 form letters were received expressing support for the project. A number of individual letters were received, mostly expressing concern about the project. Government agency submissions, for the most part, requested further information or clarification regarding the project, with some concerns expressed. Local government, business and development agencies were largely supportive of the project. At the hearings, a variety of opinions were expressed. While some have significant concerns and reservations, it was evident that there is general community support for the proposed Keltic project as long as environmental concerns are properly addressed.

#### 5.16.3.1 Identifying the “Public”

The EIA Report identifies the public as those people living in communities affected by the proposed project (section 14.4.1), those with economic and development interests (section 14.4.2), and those with environmental and community planning interests (section 14.4.3).

#### 5.16.3.2 Public Involvement During Planning Stages

Sections 14.2 and 14.5 in the EIA report outline how the public could be involved with assessing the proposal. The public was invited to review and comment on the project registration and scoping documents. They were asked to review and write comments on the terms of reference for the EIA report and for the Canadian Environmental Assessment Agency (CEAA) Comprehensive Study Report (CSR). As with this document, the public

will be able to read the report/recommendations of the federal Comprehensive Study Report when it is released.

A variety of public consultations between interested parties and the Proponent were carried out using public meetings, open houses, handouts, newspaper advertisements and articles, and focus group meetings. The Proponent established a Community Liaison Committee (CLC) which included members of the public, a municipal councillor, and Keltic representatives.

#### 5.16.3.3 Public Concerns

A number of letters and comments submitted to the EAB made reference to how project discussions had divided the community and how it was often difficult or uncomfortable for members of the community to ask questions about environmental impacts and health and safety issues. The perception conveyed to the Panel, was that public meetings were organized and controlled by people who were firmly in support of the project and that there was no forum for dissenting views.

Concerned members of the public stated that many documents were too technical for the “ordinary” or “average” person to understand and respond to. It was also stated that people don't have resources and time to carry out their own research, and it is almost impossible for members of the public to hire experts and consultants for advice and guidance.

In the opinion of some citizens, governments and media have failed to adequately inform people about Keltic's proposed project. There has been very little unbiased information about environmental / health implications and about changes in the community that will arise if the project goes ahead.

It was also suggested that for a project of this magnitude, residents of Guysborough County should have received information in the mail from the provincial and/or municipal governments, explaining the project and the public review process. It was stated that the Municipality did not adequately consult with the public on its land-use and coastal-use plan. There were concerns that the Municipality did not explain why it is willing to sell land to corporate interests, especially land that includes private residential properties that may have been expropriated.

A letter from the public noted that the effects and impacts of the project would be addressed in the future as part of the “Environmental Management Plan.” He hoped that the community will be involved in preparing/reviewing this plan as the local, full-time residents will be the people most affected by the project.

A questionnaire carried out by the Municipality of the District of Guysborough showed that 30 people supported the re-zoning activities at the Goldboro Industrial Park. This represented 1 % of the people living in the District. A concerned citizen pointed out that a petition was signed by over 90% of the local area residents contacted in Coddles

Harbour, Country Harbour, Drum Head, Goldboro, Isaacs Harbour, Seal Harbour and Stormont. They were concerned about industrial re-zoning for the project and the absence of an objective debate over its impacts on the community

The following are excerpts from letters and presentations from the public:

"The public has not been adequately informed about the project's health and environmental implications and even about the procedure to submit written comments. Therefore, how valid are government assessments? Without adequate and widespread public awareness, the process of public input into governmental assessments is no more than a charade."

"We are concerned that our government and a host of local organs, including media outlets, appear to have listened closely to the claims and wishes of the Keltic consortium, but have not ensured that the residents of Guysborough County are well-informed of their rights, nor of the complex mix of costs and benefits that a large-scale industrial project is likely to bring."

"If we cannot freely ask questions, then how can we or anyone else adequately judge whether the Keltic project really will be good for our communities?"

"The constant media support for this project has made the area a hostile environment for those who may oppose it."

"I feel this pre-EA promotional work done by industry has greatly limited the possibility of negative public input, and has clouded the issues surrounding this development."

"I do not believe the general public throughout Nova Scotia has been provided appropriate information with regards to health, safety and environmental risks they are being asked to accept into their communities."

The Municipality of the District of Guysborough had three specific requests related to public participation:

• Minutes and agendas of the citizen liaison committee meetings be provided to the Municipality for both past and future meetings so that they are available for public review.

• Project developers have agreed to participate in the Municipality's Industry Liaison Committee. The Municipality certainly appreciates this and would ask that this be a condition of project approval.

• The developer should establish a community information office in the Goldboro area during construction so that residents have immediate access to officials of the development so that they can respond to environmental and social-economic concerns, etc. The Municipality would ask that this also be a condition of approval."



#### 5.16.4 Panel Findings

The Panel is aware that some people may not have received adequate, unbiased information about the project or enough opportunity to discuss their concerns with environmental experts and government agencies. The number and variety of agencies, documents and deadlines can be intimidating and confusing. Many members of the public do not have time or easy access to study the written documents and many do not have Internet access to download reports and documents and to do online research.

The Panel concludes that some members of the public did not feel free to discuss the issues, and are feeling excluded from the process.

Some concerned citizens thought that perhaps media coverage of EIA Panel hearings would generate publicity. The Panel noted that the hearings did not generate much media coverage.

The Terms of Reference (ToR) for the preparation of the EIA required the Proponent to provide detailed information regarding the 'opportunities that have been, or will be provided to allow the public to express their concerns and receive information on the various phases of project development'. The ToR also requested that the Proponent describe the stakeholders and how they were identified and informed of the project.

The EIA does not provide sufficient detail to determine if adequate steps were taken to ensure stakeholder involvement was sought and that adequate communication took place. Section 2.5.8 states the Proponent's intent: "The records will document the dates and formats for public consultation undertaken, the material presented to the public, the opportunity for receiving public input, the concerns expressed by the public and how these concerns were addressed. It will be made clear how the input from consultations was used in the assessment and what changes to the process or Project were made as a result of comments provided." Many comments from the public appear to indicate that this did not take place. Throughout the hearing process more details did become available through direct questions and answers.

Section 14 of the EIA discusses Public Consultation as a process, but does not provided specific details of this process and does not outline who was consulted: "No one 'public' exists that can be consulted. Rather, different organizations and individuals will have different approaches to the project, whether based on geography, economic interests, and environmental or community planning concerns. The consultation approach must be framed to capture as many publics as possible. Many of these publics will also furnish technical material to the EA". Little or no information regarding these issues is provided in the main EIA document and its associated appendices.

#### 5.16.5 Recommendations

5.16.5.1 That the Proponent improve communications with the many stakeholders that were identified by the Proponent and those that identified themselves throughout the

Hearing Process, especially those that expressed a lack of communication and involvement, including, but not limited to, residents of Lincolnville, the Assembly of Nova Scotia Mi'kmaq Chiefs and the public.

5.16.5.2 That prior to issuing any permits, the Proponent submit a detailed communications strategy for approval by NSDEL, which outlines the means of improving communications with the public about all aspects of the various projects stages. The strategy shall establish a direct communications link between the Proponent and the public, and provide a means to have all public questions and concerns addressed by the appropriate party. A schedule of further public meetings shall be established. Minutes should be taken for all public meetings, and any meetings of the Community Liaison Committee and must be available for public review. An information kiosk should be set up at the project site to ensure a direct communications link is available

## **Section 6 Additional Observations and Concerns**

### 6.1 Need For and Alternatives to the Project

#### 6.1.1 Introduction

The Terms of Reference issued by the Nova Scotia Department of Environment and Labour require the Proponent to “discuss the need for petrochemicals and LNG in Nova Scotia, Canada, and globally.” The Terms of Reference also require the Proponent to discuss alternatives “such as increasing the efficiency of existing petrochemical use, recycling of petrochemicals and reducing petrochemical demands” and “alternatives to LNG importation.”

#### 6.1.2 Panel Comments

In the EIA Report, the Proponent suggests that an increasing demand for natural gas and plastics products will require the importation of LNG. It is suggested that the project meets the intent of the Nova Scotia Energy Strategy (NSDE, 2001) to develop a petrochemical industry based on offshore natural gas liquids.

#### 6.1.3 Identified Concerns

##### *Panel*

The Panel questioned how the project can be sustainable as described by the Proponent when it depends upon a non-renewable resource (LNG). The Proponent’s response described the project as “economically sustainable” in the same sense as any other facility dependent on petroleum or natural gas.

The Proponent did not provide the required inventory of greenhouse gases that will be released by the entire project facilities when operational. As a result, it is not possible to evaluate the impact such a project will have on the overall greenhouse gas inventory for Nova Scotia.

The Panel asked how much CO<sub>2</sub> would be generated by the imported LNG when the gas is combusted at the final user destinations. In a submission to the Panel following the hearings (Undertaking #EAB-4, Panel Exhibit #26), Keltic indicated that 1 billion cubic feet of natural gas (methane) when combusted yields approximately 55 ktonnes of CO<sub>2</sub>. At an initial capacity of approximately 1 billion cubic feet per day (or 9 billion m<sup>3</sup>/yr) of imported gas, the CO<sub>2</sub> equivalent provided by the Proponent for full combustion of the natural gas yields approximately 20,000 ktonnes per year of CO<sub>2</sub>, compared to total Nova Scotian CO<sub>2</sub> emissions of 23,000 ktonnes per year (2004 data – National Inventory Report: [www.ec.gc.ca/pdb/ghg/inventory\\_report/2004\\_report/ann11\\_e.cfm#sa11\\_3](http://www.ec.gc.ca/pdb/ghg/inventory_report/2004_report/ann11_e.cfm#sa11_3))

## *Intervenors*

One intervenor provided a plan for alternate development possibilities for the eastern shore area, based upon low-impact, environmentally sustainable economic activities. This plan was presented as an alternative to the proposed LNG-petrochemical development

### 6.1.4 Panel Findings

**Need for the Project:** The EIA Report does not adequately discuss alternatives to the project such as increasing energy efficiency and energy conservation to avoid the need to import LNG to meet increasing energy demands. While such considerations are outside the scope of the planned project, they are legitimate alternatives to importation of LNG. The EIA Report also does not adequately discuss reduction, reuse and recycling as methods to reduce long-term demand for plastics products. LNG and LNG liquids are non-renewable fossil fuel resources. It is evident that global hydrocarbon resources are finite in extent and that global petroleum and natural gas production will reach (or may already have reached) a peak in production, following which production will level off and subsequently decrease. When a peak in production of a resource is reached and passed, supply inevitably will fail to meet demand, prices will increase, and availability will be reduced. This raises concerns for the long-term viability of the proposed project if LNG supplies become constrained in a competitive world market with increasing prices and declining quantities.

It is not clear how the proposed project meets the intent of the Nova Scotia Energy Strategy (NSDE, 2001) to develop a petrochemical industry based on offshore natural gas liquids. The current proposal is evidently dependant on importation of LNG, not using NS continental margin natural gas, and it is not clear to what extent the project will use Sable Offshore Energy Inc. natural gas as a feedstock. In response to a Panel question, the Proponent indicates that this information will not be available until the FEED stage (*Keltic response to question EAB-9*).

**Sustainability:** Sustainability of the resource base for the project is discussed above. Projections provided by the Proponent indicate greatly increasing global polyethylene and polypropylene demand through 2010. The projected curves do not appear to be sustainable in the long run, based on increases of approximately 3 times and 6 times respectively for polyethylene and polypropylene from 1990 to 2010, with no projected levelling-off after 2010.

The Bruntland Report in 1987 defined sustainability as follows: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Our Common Future, World Commission on Environment and Development, 1987). Systems approaches such as The Natural Step can define conditions which determine sustainability, which include: Nature is not subject to systematically increasing: 1. concentrations of substances extracted from the Earth's crust, or 2. concentrations of substances produced by society. (K-H Robèrt,

2000, *Journal of Cleaner Production* 8: 243-254). If these conditions are not met, then the system is not sustainable. Methane (natural gas) is extracted from the Earth's crust, and the CO<sub>2</sub> produced on combustion is produced by society.

CO<sub>2</sub> emissions: the project will import into North America the equivalent of approximately 90% of Nova Scotia's total annual CO<sub>2</sub> emissions. The Proponent argues that natural gas may displace other more CO<sub>2</sub> intensive fossil fuels. However, experience suggests that energy markets tend to consume the total available quantity of energy resources. Projections provided by Keltic in the EIA Report indicate that demand for natural gas in the US and Canada will equal supply through 2025, with an increasing proportion met by LNG. Imported LNG would only displace other fossil fuels if total fossil fuel demand decreases or remains constant. The greater likelihood is that imported LNG will increase total energy use in North America and total CO<sub>2</sub> emissions when the LNG is combusted at the final end-user destination, whether for home heating, industrial or some other use. This is not consistent with the intent of the Kyoto Protocol, which Canada has signed and ratified.

#### 6.1.5 Recommendations

6.1.5.1 That the Minister determine whether this project is environmentally (as opposed to economically) sustainable in the sense of sustainability as defined in the Bruntland Report, and make the findings public.

## 6.2 Required Studies, Reports and Plans

### 6.2.1 Introduction

Throughout the EIA Report, a number of further studies, reports and plans are listed which are to be prepared by the Proponent, but which were not available at the time of the EAB review of this project.

### 6.2.2 Panel Comments

Use of titles for the listed studies, reports and plans does not appear to be consistent throughout the EIA Report, and some of the listed titles may in fact be duplicates. The Proponent has verified and confirmed the list provided by the Panel (EAB Exhibit #25), but have indicated that some of the listed items form parts of other plans as indicated below.

### 6.2.3 Identified Concerns

Following is the list of studies, reports and plans noted by the Panel which the Proponent has committed in their EIA Report to deliver. The page number of the first noted occurrence of each item is provided. Page references (in brackets) are to the Keltic EIA Report as submitted to NSDEL. In addition, the Panel has recommended additional work which will be required, as noted below.

- EPP – Environmental Protection Plan - Construction and Operation phases(2-44)
- EHSS – Environmental Health, Safety and Security Plan (2-44)
- Public Information and Communications Plan (2-44)
- Spill Management Plan (2-47)
- Emergency Response and Contingency Plan (2-47)
- Waste Management Plan (2-48)
- Water Management Plan (2-59)
- Environmental Management Plan (2-71)
- Environmental Compliance Monitoring Plan (2-72)
- Environmental Effects Monitoring Plan (2-72)
- Toxic-Hazardous Materials Management Plan (2-153)
- Air Quality Modeling Report (9-32)
- Noise Monitoring Program (9-63)
- Erosion and Sediment Control Plan (9-78)
- Stormwater Management Plan (9-78)
- Terrestrial Habitat Monitoring Program (9-88)
- EMP - Environmental Management Plan (9-97)
- Fishery Potential Effects Analysis (9-102)
- Fish Habitat Compensation Plan (with DFO) (9-111)
- Acid Generating Rock Management Plan (9-124)

- Archaeological Survey (Meadow Lake) (9-132)
- Dust Control Program (9-142)
- Erosion Control Program (9-142)
- Worker Health and Safety Program (9-142)
- Traffic Circulation Study (9-197)
- Traffic Infrastructure Study (9-197)
- EMS – Environmental Management Systems (10-1)
- Predicted Noise Level Modeling (10-10)
- Watershed Protection Strategy (10-15)
- Aquaculture Compensation Agreement (10-24)
- HAZOP Studies (10-43)
- Wetland Compensation Plan (11-1)
- Tailings Management Plan (Added by Panel)
- Incinerator Monitoring Plan (Added by Panel)
- Light Monitoring Plan (Added by Panel)
- Marine Water and Sediment Monitoring Program (Added by Panel)
- Receiving Water Assimilative Capacity Study (Added by Panel)
- Archaeological Response Plan (Added by Panel)
- Traffic Impact Study (Added by Panel)
- Fisheries Income Compensation Plan (Added by Panel)
- Aquaculture Income Compensation Plan (Added by Panel)
- Visitation Plan (Red Head Cemetery) (Added by Panel)
- Lighting Design Plan (Added by Panel)
- Groundwater Protection, Monitoring and Contingency Plans
  - requested by NSDEL (Added by Panel)
  - (the Proponent mentions a groundwater monitoring program) (9-82)

The Proponent has indicated that a number of the plans listed will form part(s) of other plans. For example the Environmental Protection Plan will normally include the following:

- Dust control plan
- Erosion and Sediment Control Plan
- Spill Management Plan
- Acid Generating Rock Management Plan
- Stormwater Management Plan

The Environmental Management Plan will include other plans listed above such as:

- Emergency Response and Contingency Plan
- Fishery Potential Effects Analysis
- Toxic-Hazardous Materials Management Plan
- Environmental Compliance and Monitoring Plan
- Environmental Effects Monitoring Plan

#### 6.2.4 Panel Findings

Review of the EIA Report was made more difficult by the fact that so many important associated studies, reports and plans were not available. While it is typical that an environmental assessment, as a planning tool, is conducted early in the planning phases for a proposed project, there is a substantial lack of detail available regarding many aspects of the Keltic LNG/Petrochemical facility proposal. In the EIA Report, and in answers provided to the Panel during the hearings, frequent references were made to the FEED (Front End Engineering Design) phase of the project, which will follow completion of the EA process. Information which is to be developed during the FEED phase was unavailable to the Panel for purposes of this review.

The large number of studies, reports and plans noted here, which are to be developed and delivered after the EA process, will be critically important to provincial and federal regulatory agencies in judging the adequacy of project details and environmental/social protection measures. It will be crucial for regulatory agencies to follow up on all required documents to ensure that they are complete and adequate, and that the public has the opportunity to access these documents. The Environmental Protection Plans for the construction and operations phases of the project will be of particular importance in ensuring that required mitigations are documented, along with appropriate methods and procedures to reduce environmental impacts. Regulatory agencies must ensure accountability of project staff and contractors to implement all required environmental protections. NSDEL (Environmental and Natural Resources Division, and Environmental and Monitoring and Compliance Division) has assured the Panel that it has, or can access, the required resources to adequately manage this project. A similar assurance has not yet been received from the Public Safety Division and the Occupational Health and Safety Division (Transcript, Nov.22, pp 87-88).

#### 6.2.5 Recommendations

6.2.5.1 The EIA Report provides a list of studies, reports and plans noted by the Panel which the Proponent has committed to deliver. In addition, the Panel has recommended additional work which will be required (Section 6.2, this Report). The Panel recommends that NSDEL ensure that a complete and accurate list of required studies, reports and plans is developed, and that these documents are provided by the Proponent to NSDEL and other responsible provincial or federal regulatory authorities. It will be the role of each relevant agency to review the appropriate documents prior to the issuing of any permits which would enable the project to proceed. All such studies, reports and plans will be made available to the public once approved.

6.2.5.2 That the Proponent provide to NSDEL and the public a schedule for the preparation and/or review of each required study, plan and report, and a list of public stakeholders and government departments and agencies that could or will be involved with each. NSDEL should create a public web page with this information, and provide online links to studies, plans and reports as they become available.



## 6.3 Mercury Baseline Study

### 6.3.1 Introduction

Gold mining activities have been carried out over the past century in the general area where the Keltic project is proposed to be located. During the process of mining, elemental mercury was used to isolate gold from the ore. Ten to 25% of the mercury used in this processing was not recoverable, and was left in the soil, sediment and mining waste (EIA Report, p. 8-141). Environments contaminated with mercury are known to pose a potentially serious health risk to people and wildlife. Details can be found in a publication from a recent short course on sources and effects of mercury in the environment: <http://www.mineralogicalassociation.ca/index.php?p=25&page=sc34.php>

### 6.3.2 Panel Comments

Mercury is a toxic metal that can move through the environment via many pathways in a variety of chemical forms. Mercury can be converted to more toxic forms when dams cause areas to flood, allowing specialised bacteria to convert metallic or ionic mercury to methylmercury, a more bio-available and toxic form of mercury.

### 6.3.3 Identified Concerns

#### *Panel*

#### Mercury in Tailings, Soils and Sediments

Mercury-contaminated tailing deposits and mine workings are identified in the proposed project area (EIA Report, p. 8-141 to 8-145). In addition to known deposits, it is reasonable to expect that undocumented tailings and mine workings may also be present in the project area and around the Meadow Lake water supply site. There is a concern that mercury could be released into the environment if contaminated deposits are disturbed during construction and production phases. This remobilized mercury has the potential to become a serious health hazard for residents, workers and wildlife.

On page 9-116 in the EIA Report, the Proponent concluded that sampling programs "found no areas of mine waste contamination within or near the proposed construction site." This is in error, as Figure 8.13-4 (p. 8-140) shows tailing sites in the Keltic project area and the Proponent reports that there are three tailings disposal areas within the Keltic site (p. 9-122).

On page 9-116, the EIA Report stated that contaminated sediments were not present in the proposed marginal wharf or LNG terminal area. On the contrary, the EIA Report described Dung Cove to be flooded with tailings (p. 9-122). All Dung Cove samples exceeded Canadian Council of Ministers of the Environment (CCME) guidelines for mercury concentrations in sediment (p. 8-144). Dung Cove is immediately adjacent to the proposed marginal wharf and LNG terminal area (p. 8-54).

In Table 11.1-1 of the EIA Report (p. 11-13), it is reported that sediment contamination was not identified in the marine habitat. In fact, contaminated sediments in Dung Cove were clearly identified (p. 8-144). The Proponent acknowledged that the release of mercury from Dung Cove to the ocean “will likely remain a concern throughout the life span of the plant site” (p. 9-124).

The EIA Report mentioned sediment samples were taken by other agencies in 2005 (p. 8-118). It concluded that the sample locations were too far away and would not provide useful information. The Panel believes that mercury data from samples and studies in the general area could serve a purpose and should be included as part of a baseline study.

#### Mercury in Biota

The EIA Report acknowledged the need for a benthic invertebrate survey (p.13-3). The Panel believes it would be prudent to measure background mercury concentrations in lobsters, mussels, and clams in the project vicinity. Mercury concentration data for biota in the immediate area needs to be gathered and reviewed (e.g. from other agencies such as Canada Food Inspection Agency, Environment Canada (EC), Department of Fisheries and Oceans (DFO), Nova Scotia Environment and Labour (NSDEL), and Nova Scotia Department of Natural Resources (NSDNR)).

#### *Intervenors*

##### Mercury in Surface Waters

Health Canada questioned why mercury-sampling procedures are given for surface waters (EIA Report, p. 8-28), but yet mercury concentrations in surface waters are not reported in Table 8.6-5 (p. 8-32). The Proponent responded that some of the surface waters were in known tailings areas and would most likely have elevated mercury levels. They added that data for these samples were not necessary because these contaminated areas would be avoided. Next, they answered that Meadow Lake samples were not studied for mercury because it was understood that no mining activities took place in this watershed and therefore mercury was not a concern. Further to this, the Proponent stated that mercury analyses were not done on other surface samples because there was no reason to believe that mercury would be a problem and/or present in these water bodies. However, they acknowledged that water samples in the area contain mercury "as these water samples were all collected within or very near the boundaries of the Keltic plant site in a region where gold mining and recovery operations were know (*sic*) to have occurred in the past" (Keltic response to question HC 42).

Health Canada questioned why mercury results for surface water samples (snow melt and ditch samples) were not included in Table 8.6-7 (p. 8-37). The Proponent reported that data were missing because of an editorial omission. They did not provide the missing data. They reported that brook samples were analyzed for mercury and the results were in Table 8.6-9 (p. 8-40); however, the table does not contain mercury data (Keltic response to question HC 42).

Environment Canada requested that a comprehensive study of surface water baseline conditions should be provided (9.0 Supplementary Comments, p. 43, section 8, Environment Canada Review, Intervenor Submissions, Volume #2).

#### Mercury in Groundwater

Health Canada questioned why mercury-sampling procedures were given for groundwater (p. 8-53), when mercury concentrations in groundwater from wells within 1 km of the plant site boundaries are not reported in Table 8.7-2 (p. 8-52). Keltic answered that the petrochemical process does not involve mercury and that tailings deposits will not be disturbed by project activities. They conclude, "As such, mercury was not a concern" (Keltic response to question HC 44).

#### Mercury in Tailings, Soils and Sediments

The Proponent said it would avoid disturbing tailings deposits during construction and operational phases, and therefore concluded that mercury issues would not be a problem for the Keltic project. A number of Intervenor concluded that this was not an adequate mitigation plan (question DFO 2.24; question EAC 56; question NSHPP 2; question NSEL 50)

DFO stated that more sediment contamination data is required. The Proponent suggested this is not necessary since there is no indication of contamination in sediments exceeding CCME guidelines. This is a contradiction; the EIA Report stated mercury concentrations within the project area do exceed CCME guidelines for sediments in fresh water and seawater (p. 2-48; p. 8-144). The Proponent stated that they have enough information to conclude that the risk of disturbing contaminated sediments is low (Keltic response to question DFO 2.15).

DFO requested that sample location details be provided so that chemical data could be interpreted. The Proponent provided a sampling map; however, it did not contain the necessary sample location details (Keltic response to question DFO 3.16).

#### Methylmercury Production in Flooded Areas

Health Canada and DFO raised questions about the potential for methylmercury production in the area flooded by damming Meadow Lake. The Proponent responded that records do not show mining activity at or near Meadow Lake, thus suggesting that mercury methylation will not be an issue. They plan to remove a substantial amount of the organic matter from the proposed flood area and concluded that this will fully mitigate methylmercury production (Keltic response to question HC 36; question DFO 1.14)

Health Canada asked that mercury and methylmercury concentrations for soils in the area to be flooded be provided as part of the baseline study. They recommended sampling fish tissue from Meadow Lake for methylmercury to determine baseline concentrations

and to perform fish tissue monitoring into the future to determine whether concentrations are changing. They recommended conducting an ecological risk assessment of potential mercury exposure to fish (question HC 36).

#### 6.3.4 Panel Findings

The Panel finds that the reasons Keltic gave for not conducting a thorough mercury baseline study are not convincing. A thorough mercury study, as required by the Terms of Reference, should include collection and analyses of surface water, groundwater, and soil and sediment samples in the Keltic project area and in the area to be flooded around Meadow Lake. Seasonal baseline methylmercury analyses for surface water, sediments, soils and fish from Meadow Lake are needed. Mercury analyses of marine biota such as lobster, mussels and clams in the area adjacent to the project site are required.

The Panel recommends that inconsistent conclusions regarding the occurrence of contaminated soils and sediments (see section 6.3.3 above) be corrected in subsequent plans, reports and presentations.

The Panel concludes that there are an insufficient number of mercury concentration results reported for soil and sediment samples on the Keltic project site and around Meadow Lake where flooding is proposed. The Panel recommends that a mercury concentration contour map be prepared for soil and sediment samples.

The Panel contends it is reasonable to assume that mining records may be missing and undocumented mining activity could have taken place in the Meadow Lake area. Removing a portion of the organic matter from the flood area may still leave enough organic matter to support methylmercury production.

The Panel is concerned that tailings deposits could be disturbed during construction and requests that a Tailings Management Plan be developed prior to construction, and that this plan be included in the list of documents and plans in section 6.2 of this report.

#### 6.3.5 Recommendations

6.3.5.1 That the Proponent complete a mercury baseline study prior to the issuing of any permits. The Proponent will develop the sampling plans with NSDEL before doing the study and provide the final study results to NSDEL. The Proponent will:

- (a) collect and analyze samples for mercury concentrations in surface water and groundwater at the project site,
- (b) collect and analyze seasonal samples for mercury and methylmercury concentrations in surface water, sediment, soils and fish at and around Meadow Lake, and

(c) collect lobster, mussel, sea urchin and clam samples in marine waters within 5 km of the project site and analyze the samples for mercury concentrations. DFO is to be contacted to plan and review this process.

6.3.5.2 That when the construction of all project phases has been completed, the Proponent repeat the mercury study described in Recommendation 6.3.5.1 and report the results to NSDEL.

6.3.5.3. That prior to the issuing of any permits, the Proponent will:

(a) collect additional soil and sediment samples from the project site and from the area that will be flooded around Meadow Lake, and

(b) size fractionate the additional soil and sediment samples to obtain the <63  $\mu\text{m}$  particle size fraction which will then be analyzed for mercury, and

(c) convert the soil and sediment sample results into mercury concentration contour maps for the project site and for the Meadow Lake site.

The Proponent will develop this sampling plan with NSDEL before doing the study and provide the final study results to NSDEL. Arsenic studies will be carried out on these same samples (see Recommendation 5.12.5.1).

## 6.4 Mining

### 6.4.1 Introduction

Nova Scotia has an extensive history of gold mining and the Goldboro and surrounding area was once known as a significant source of gold extraction. Today the region in the vicinity of the proposed project contains abandoned mines. The project lands are currently owned by the Municipality of the District of Guysborough and the Proponent has entered into an option to purchase. There is an interest in potential future exploration by a few individuals that hold exploration rights that may be impacted by the development of the Project and associated works.

### 6.4.2 Identified Concerns

#### *Panel*

The *Mineral Resources Act*, S.N.S., 1990, c.18 gives authority to enter into mineral exploration licenses and it clearly states that the holder of a mineral exploration license has the right to prospect and search for minerals, and extract minerals for test purposes. The Act specifies that the license holder must obtain the permission of the land owner or access the land through a Ministerial Order in order to conduct any exploration.

Therefore, a mineral exploration license held under the *Mineral Resources Act* gives the holder of the license the ability to search and prospect for minerals, and extract for test purposes, but only after he has acquired permission from the surface rights holder to go on the lands to exercise the license, or has gained access through an order from the Minister. In addition, mining of minerals is prohibited in Nova Scotia under the *Mineral Resources Act* unless a mining lease and mining permit have been first obtained.

#### *Intervenors*

##### McAllister/Lockerby

“It has been presented that development of the site will impair the ability to exercise and enjoy the rights and privileges granted by the exploration licenses which have existed prior to the proposed development of the facilities on a portions of the exploration licenses and that existing mineral claims will be devalued and lost thus causing economic hardship to those that own the rights.”

Dan McDougall, Municipality of the District of Guysborough

“In 2004/2005, during the Municipality’s public consultation process associated with the land use bylaw, a number of issues were raised in relation to the proposed development which includes, but is not limited to ... impact on mining rights ... in the surrounding area.”

Nova Scotia Department of Environment and Labour

“Historic mining activities seem to be well recognized and avoidance generally proposed. Mitigation and monitoring should be thoroughly undertaken where avoidance not possible.”

#### 6.4.3 Panel Findings

The Panel understands that the exploration license under the *Minerals Resources Act* gives the ability to search and prospect. It gives no right to the minerals, no ownership of minerals, and no surface rights.

The Panel also understands that the exploration license holder still requires permission from surface rights holders (currently the Municipality of the District of Guysborough) to go on the lands to explore. Exploration rights are not impacted by who owns the property in the future, Keltic versus Municipality.

The mineral exploration license holder is subordinate to the rights of the surface holder, and the license holder assumes the risk of future development of the surface by the surface owners which may be incompatible with exploration or mine development.

The Proponent states that “Keltic did consider the impact and recognized that the “lands taken up by the Project and its components will remove the potential for mineral extraction from those areas.” This is not disputed, but the *potential* for mineral extraction must not be overstated. The *potential* for mineral extraction is still dependant upon the owner’s permission... The value of those claims is entirely contingent on whether Keltic will permit them to be mined, and it is not the intent of Keltic to ever do so.”

#### 6.4.4 Recommendations

6.4.4.1 That NSDEL confirm with NSDNR the status and rights of any mineral licenses and claims on and around the project site. The Panel does not have jurisdiction to deal with any claims for compensation.





## Appendices



**Appendix A: Letter of Referral from the Nova Scotia Minister of Environment and Labour to the Nova Scotia Environmental Assessment Board**





**Department of  
Environment & Labour**

Office of the Minister

PO Box 697  
Halifax, Nova Scotia  
B3J 2T8

*Our File Number*  
10700-40  
40100-31-15

SEP 01 2006

Mr. Tony Blouin  
Chair  
Nova Scotia Environmental Assessment Board  
PO Box 1749  
Halifax, Nova Scotia  
B3J 3A5

Dear Mr. Blouin:

On August 22, 2006, Keltic Petrochemicals Inc. submitted an Environmental Assessment Report for the proposed LNG and Petrochemical Plant Facilities at Goldboro, Nova Scotia.

I hereby refer the Report to the Environmental Assessment Board for review, in accordance with the *Nova Scotia Environment Act*, the *Environmental Assessment Regulations* and the *Environmental Assessment Board Regulations*. The Board shall submit its report and recommendations to me no later than 110 days from September 1, 2006.

Sincerely,

Mark Parent  
Minister

cc: Jim Gordon, Environmental Assessment Board Administrator  
Julie Towers, Acting Manager, Environmental Assessment



**Appendix B: Membership of the Nova Scotia Environmental Assessment Board and Keltic Petrochemicals Hearing Panel**





**Nova Scotia Environmental Assessment Board (EAB)  
Membership  
(September, 2006)**

Board Chair:

Dr. Anthony C. Blouin

Board Members:

Dr. Ray E. Cranston

Penny J. Henneberry

Bonnie L. Rankin

Dale Smith

**EAB  
Keltic Petrochemicals Hearing Panel  
Membership  
(September, 2006)**

Panel Chair:

Dr. Anthony C. Blouin

Panel Members:

Dr. Ray E. Cranston

Penny J. Henneberry

Dale Smith (Alternate)



## Appendix C: Critical Dates Schedule

Keltic Petrochemicals Undertaking

**Critical Dates Schedule**

(prepared September, 2006  
and amended December, 2006)

<i>Related Activity:</i>	<i>Date:</i>
<i>Undertaking registered</i>	<i>January 12, 2005</i>
<i>Terms of Reference issued</i>	<i>April 8, 2005</i>
<i>NSDEL informed of deletion of highway component</i>	<i>June 16, 2006</i>
<i>Final Draft EIA Report submitted</i>	<i>July 31, 2006</i>
<i>Final EIA Report submitted</i>	<i>August 22, 2006</i>
<i>Ministerial referral to EAB</i>	September 1, 2006 (10 days from receipt of EIA Report)
<b>EAB Activity:</b>	<b>Date(s):</b>
<b>EAB Referral Day 1</b>	<b>September 2, 2006</b>
<b>Public Release of EIA Report</b>	<b>September 13, 2006</b> (12 days from referral)
<b>Actual last date of publishing Notice of Release of Report</b>	<b>September 15, 2006</b>
<b>Prescribe form / sign the Notice of Hearing</b>	<b>September 15, 2006</b> (14 days from referral)
<b>Publication dates for 1st Notice of Hearing</b>	<b>October 30, 2006</b> (no later than 21 days before hearing)
<b>Deadline for comments from public review</b>	<b>October 30, 2006</b> (48 days from last publication date)
<b>Publication dates for 2<sup>nd</sup> Notice of Hearing</b>	<b>November 6, 2006</b> (no later than 14 days before hearing)
<b>Deadline to advise Board for hearing Intervenors</b>	<b>November 6, 2006</b> (14 days before hearing)
<b>Deadline for written submissions from hearing participants</b>	<b>November 10, 2006</b> (10 days before hearing)

<b>Deadline for journals, studies and reports</b>	<b>November 13, 2006 (7 days before hearing)</b>
<b>Public hearings</b>	<b>November 20 - 25, 2006</b>
<b>Deadline for Intervenor / Proponent responses to unanswered hearing questions</b>	<b>December 4, 2006 (7 days after close of hearings)</b>
<b>Deadline for participants' written arguments / submissions</b>	<b>December 11, 2006 (14 days after close of hearings)</b>
<b>Corrections, errors or omissions in transcript reported</b>	<b>December 15, 2006 (within 14 days of transcript becoming available)</b>
<b>Deadline for submission of Report and Recommendations (R&amp;R) to Minister</b>	<b>February 21, 2007 (extended from December 20, 2006, which was 110 days from referral)</b>
<b><i>Subsequent Activity:</i></b>	<b><i>Date:</i></b>
<i>Ministerial Decision</i>	<i>(21 days following receipt of R&amp;R from Board)</i>
<i>Commence work on undertaking</i>	<i>(within 2 years of Ministerial approval)</i>



**Appendix D: Notices of Release of the Environmental  
Assessment Report and Public Hearing**





# NOTICE

(Please note correction to Ecology Action Centre location.)

## Release of Environmental Assessment Report Pursuant to the Nova Scotia ENVIRONMENT ACT

This is to advise that on August 22, 2006, the Minister of Environment and Labour received the Environmental Assessment Report for a petrochemical plant and liquified natural gas facilities proposed by Keltic Petrochemicals Inc., 5151 George Street, Halifax, Nova Scotia. The Minister has referred the Report to the Environmental Assessment Board for review, in accordance with Part IV of the Environment Act and Section 7 (1) of the Environmental Assessment Board Regulations.

The purpose of the proposed Class II undertaking is to construct and operate a petrochemical complex supported by a liquified natural gas importation and vapourization facility and an electric co-generation plant. The proposed site is located within the Goldboro Industrial Park, in Guysborough County.

*Interested persons may examine the Report at the following locations:*

- Municipality of the District of Guysborough, 33 Pleasant Street, Guysborough, Nova Scotia
- Sherbrooke Library, 11 Main Street, Sherbrooke, Nova Scotia
- Isaacs Harbour Medical Centre, 92 Isaacs Harbour Road, Isaacs Harbour, Nova Scotia
- Clean Nova Scotia, 126 Portland Street, Dartmouth, Nova Scotia
- Ecology Action Centre, 2705 Fern Lane, Halifax, Nova Scotia
- Nova Scotia Department of Environment and Labour, Antigonish Office, 219 Main Street, Suite 205, Antigonish, Nova Scotia
- Nova Scotia Department of Environment and Labour, 5th Floor Library, 5151 Terminal Road, Halifax, Nova Scotia
- The Environmental Assessment Website at [www.gov.ns.ca/enla/ess/ea](http://www.gov.ns.ca/enla/ess/ea)

*The public is invited to submit written comments on the Environmental Assessment Report to:*

James S. Gordon, Administrator  
Nova Scotia Environmental Assessment Board  
PO Box 697, Halifax, NS B3J 2T8  
E-mail: [eab@gov.ns.ca](mailto:eab@gov.ns.ca) Fax: 424-0503

*on or before October 30, 2006.*

All comments submitted during this review will also be considered in the Comprehensive Study required under the *Canadian Environmental Assessment Act*. For more information please visit: [http://www.acee.gc.ca/050/viewer\\_e.cfm?CEAR\\_ID=10471](http://www.acee.gc.ca/050/viewer_e.cfm?CEAR_ID=10471) or call (902) 428-1761

Information submitted respecting this environmental assessment, including any personal information, will also be placed in a public file located at:

Department of Environment and Labour Library  
Halifax Office  
5th floor, 5151 Terminal Road

Department of Environment and Labour  
Antigonish District Office  
219 Main Street, Suite 205



Environmental Assessment Board



# NOTICE

## Notice of Hearing Pursuant to the Nova Scotia ENVIRONMENT ACT

Notice is hereby given that the Environmental Assessment Board (EAB) for the Province of Nova Scotia will hold public hearing sessions pursuant to the Environmental Assessment Regulations made under Section 49 of the Environment Act regarding the Environmental Assessment for a petrochemical plant, and liquified natural gas and electrical co-generation facilities, proposed by Keltic Petrochemicals Inc. of Halifax.

*Sessions of the hearing will be held as follows:*

**Guysborough, Municipality of the District of Guysborough**  
**Royal Canadian Legion Hall (Branch 81),**  
Monday, November 20 1:30 pm-4:30 pm and 6:30 pm-8:30 pm

**Sherbrooke, Municipality of the District of St Mary's**  
**Lions Community Centre**  
Tuesday, November 21 1:30-4:30 and 6:30 - 8:30 pm

**Town of Antigonish, Claymore Inn**  
Wednesday, November 22 1:30-4:30 and 6:30-8:30 pm  
Thursday, Nov 23 9 am-12 Noon and 1:30 pm-4:30 pm  
Friday, November 24 9 am-12 Noon and 1:30 pm-4:30 pm  
Saturday, November 25 1 pm-4 pm

Further dates and/or locations may be scheduled following November 6th, the deadline for interested parties to advise the EAB that they wish to make presentations at a hearing. Any additional sessions will be advertised.

*The purpose of the hearing, under Section 8 of the Environmental Assessment Regulations, shall be:*

- (a) to receive submissions and comments from any interested party;
- (b) to ask questions and to seek answers respecting the environmental effects of the undertaking; and
- (c) to provide information which will assist the hearing panel in the preparation of its report and recommendations to the Minister.

Any interested parties may attend and make presentations after having notified the undersigned on or before November 6, 2006. Written submissions for presentation at the hearing must be received by November 10, 2006, and journals, studies and reports used as reference materials shall be submitted no later than November 13, 2006.

*The EAB Administrator may be contacted as follows:*

James S. Gordon  
Nova Scotia Environmental Assessment Board  
5151 Terminal Road  
PO Box 697, Halifax, NS B3J 2T8  
or e-mail at [eab@gov.ns.ca](mailto:eab@gov.ns.ca)  
or Fax at (902) 424-0503  
or Phone (902) 424-2484

*Information respecting this environmental assessment and public hearings is available in a public file at the following addresses. All submissions and comments received during the hearing, including any personal information, will also be placed in that public file located at:*

Department of Environment and Labour Library  
Halifax Office  
5th floor, 5151 Terminal Road

Department of Environment and Labour  
Antigonish District Office  
219 Main Street, Suite 205

All comments submitted during this review will also be considered in the Comprehensive Study required under the *Canadian Environmental Assessment Act*. For more information please visit: [http://www.acee.gc.ca/050/viewer\\_e.cfm?CEAR\\_ID=10471](http://www.acee.gc.ca/050/viewer_e.cfm?CEAR_ID=10471) or call (902) 426-1761

*Dated at Halifax, Nova Scotia, this 20th of  
October, 2006.*

*James S. Gordon, Administrator*

  
**NOVA SCOTIA**

**Environmental Assessment Board**



**Appendix E: Analysis of Public Comments Related to  
the Keltic Petrochemicals Undertaking**

163



## Analysis of Public Comments Related to the Keltic Petrochemicals Undertaking

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This report analyses more than 1770 documents received as part of the public consultation for the proposed Keltic Petrochemicals Undertaking.

Excluded from the analysis were:

- copies of previously recorded submissions,
- requests to appear at public hearings,
- several copies of the same letter or email,
- cover letters from union representatives to members asking for signatures on form letters (The responses themselves were included except for those which had no address included),
- inter government communications

Many of those who wrote letters in support of the Undertaking also signed form letters. Attempts were made to find these and count them as one submission. As well, some writers opposed to the Undertaking sent in follow-up material. These submissions were also counted as one.

### *Form letters*

More than 1500 form letters in support of the proposed Keltic Petrochemicals Undertaking were analyzed.

Included in the material were copies of cover letters from union representatives requesting members to sign the enclosed form letter and to use the (also) enclosed stamped, addressed envelopes to mail them in to support the Keltic Undertaking. This might suggest that union representatives actively gathered and submitted form letters.

The largest proportion of letters from outside Antigonish and Guysborough came from the more industrialized areas of the province. In some cases, those signing indicated that while they were writing from Halifax, Dartmouth or Alberta, they were working away from home.

Several form letters had unreadable signatures and either no addresses or addresses that were unreadable. These were not counted in the analysis. Unreadable signatures with readable addresses were included.

Of the form letters analyzed, approximately 1500 had Nova Scotia addresses. There were 13 form letters from outside the province; three from Alberta, four from NFLD, three from PEI, two from New Brunswick and one from the USA.

Of the 128 form letters from Guysborough County, there were 28 from Boylston and 17 from Mulgrave. There were fewer than 30 from Goldboro, Country Harbour, Isaacs Harbour and New Harbour combined. The addresses on the remainder were either other locations in the County, RR#s or just "Guysborough."

Sources of origin of form letters in favour of the Keltic Petrochemicals Undertaking from outside the County of Guysborough were:

Antigonish	504
Pictou	195
Inverness	44
Richmond	35
Victoria	14
Cape Breton	117
Colchester	79

Cumberland	21
Hants	55
Halifax	275
King's /Annapolis	15
Lunenburg /Queens	26
Digby/Yarmouth	13

It may be useful to note that each of the five form letters circulated had the same concluding paragraph: "I also support the use of the Existing Antigonish-Guysborough highway through Erinville as an option to the route proposed by Keltic." All but two respondents agreed with this comment.

### ***Individual responses***

The proposed Keltic Petrochemicals Undertaking attracted approximately 25 letters of support from individual businesses, union representatives and business organizations, some of whom are partners of Keltic Petrochemicals. These came mainly from the counties of Antigonish, Guysborough, Pictou and Halifax. There were letters of support from federal and provincial government agencies in the area as well as municipal governments.

In addition there were three letters of support for the Undertaking from Goldboro and three from Isaacs Harbour. Another five came from the elsewhere in Guysborough County (including a council member and a member of the community liaison committee) and two from Antigonish County.

The remaining individual letters or emails in support of the Undertaking came from:

Alberta	1
Cheticamp	1
Dartmouth	1
Halifax	4
New Glasgow	1
Port Hastings	1
New Brunswick	1
Unknown email address	5

Those who wrote letters or emails opposed to the proposed Keltic Petrochemicals Undertaking include five from Goldboro, two from Fisherman's Harbour, two from Country Harbour, one from Isaacs Harbour, two from New Harbour, one from Seal Harbour and BC, and one from Drum Head. Seven were from elsewhere in Guysborough County, some of whom are part time residents. Letters or emails opposing the undertaking were also received from:

Mulgrave	3
Merigomish	1
Sheet Harbour	1
Port Dufferin	1
Stellarton	1
New Glasgow	1
Rose Bay	1
New Brunswick	1
Unknown email addresses	3



## **Appendix F: Public Hearing Agenda**



**Environmental Assessment Board (EAB)  
Keltic Petrochemicals Undertaking**

**Hearing Agenda**

*Note: Numbers listed as the right hand column represent planned times only, by agenda item.*

**Monday, November 20, 2006:** Guysborough, Municipality of the District of  
Guysborough, Royal Canadian Legion Hall (Branch 81), 10628 Highway # 16

1:30 pm - 5:00 pm:	
1) Opening Address by EAB Hearing Panel Chair, Tony Blouin	15
2) Opening Presentation by Proponent, Keltic Petrochemicals Inc.	30
3) Questions and Answers (Q&A) of Proponent	30
4) Intervenor Presentation by	
<b>Municipality of the District of Guysborough (Hines / MacLeod / Pelly/ Torrey/ Cleary / McDougall)</b>	45
Q&A of Intervenor	45
5) Open Forum	45
6:30 pm - 9:30 pm:	
1) Synopsis Presentation by Proponent	10
2) Questions and Answers (Q&A) of Proponent	15
3) Intervenor Presentations by	
<b>Ecology Action Centre - Ms. Chantal Gagnon Mr. Frank Fougere Mr. Stewart MacIntosh Mr. Ernie Kelly</b>	80
Q&A of Intervenors, after each Intervenor	40
4) Open Forum	35

**Environmental Assessment Board (EAB)  
Keltic Petrochemicals Undertaking**

**Hearing Agenda**

*Note: Numbers listed as the right hand column represent planned times only, by agenda item.*

**Tuesday, November 21, 2006:** Sherbrooke, Municipality of the District of St Mary's, Lions Community Centre, 7996 Highway # 7

1:30 pm - 5:00 pm:	
1) Opening Address by EAB Hearing Panel Chair, Tony Blouin	15
2) Opening Presentation by Proponent, Keltic Petrochemicals Inc.	30
3) Questions and Answers (Q&A) of Proponent	30
4) Intervenor Presentation by	
<b>Mr. Kevin McAllister</b>	20
Q&A of Intervenors, after each Intervenor	10
5) Open Forum	105
6:30 pm - 9:30 pm:	
1) Synopsis Presentation by Proponent	10
2) Questions and Answers (Q&A) of Proponent	15
3) Intervenor Presentations by	
<b>Municipality of the District of St. Mary's - Warden David Clark         Ms. Katherine Reed</b>	40
Q&A of Intervenors, after each Intervenor	20
4) Open Forum	95

**Environmental Assessment Board (EAB)  
Keltic Petrochemicals Undertaking**

**Hearing Agenda**

*Note: Numbers listed as the right hand column represent planned times only, by agenda item.*

**Wednesday, November 22, 2006:** Town of Antigonish, Claymore Inn, 136 Church Street

1:30 pm - 5:00 pm:

- |                                                                  |    |
|------------------------------------------------------------------|----|
| 1) Opening Address by EAB Hearing Panel Chair, Tony Blouin       | 15 |
| 2) Opening Presentation by Proponent, Keltic Petrochemicals Inc. | 30 |
| 3) Questions and Answers of Proponent                            | 30 |
| 4) Intervenor Presentations by                                   |    |

**Assembly of Nova Scotia Mi'kmaq Chiefs- Mr. Douglas Brown  
Mr. Michael Cox  
NS Department of Environment and Labour - Mr. Kim MacNeil**

- |                                           |    |
|-------------------------------------------|----|
| Q&A of Intervenors, after each Intervenor | 20 |
| 5) Open Forum                             | 75 |

6:30 pm - 9:30 pm:

- |                                             |    |
|---------------------------------------------|----|
| 1) Synopsis Presentation by Proponent       | 10 |
| 2) Questions and Answers (Q&A) of Proponent | 15 |
| 3) Intervenor Presentation by               |    |

**The Concerned Citizens of Lincolnville - Mr. James Desmond**

- |                   |     |
|-------------------|-----|
| Q&A of Intervenor | 10  |
| 4) Open Forum     | 125 |



**Environmental Assessment Board (EAB)  
Keltic Petrochemicals Undertaking**

**Hearing Agenda**

*Note: Numbers listed as the right hand column represent planned times only, by agenda item.*

**Friday, November 24, 2006:** Town of Antigonish, Claymore Inn

9 am - 12 Noon:

- |                                                                       |    |
|-----------------------------------------------------------------------|----|
| 1) Synopsis Presentation by Proponent                                 | 10 |
| 2) Questions and Answers (Q&A) of Proponent                           | 15 |
| 3) Intervenor Presentations by                                        |    |
| <b>Ecology Action Centre - Ms. Jennifer Graham<br/>Mr. Jerry Webb</b> | 40 |
| Q&A of Intervenors, after each Intervenor                             | 20 |
| 4) Open Forum                                                         | 95 |

1:30 pm - 5:00 pm:

- |                                                                                                                                                                   |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1) Synopsis Presentation by Proponent                                                                                                                             | 10 |
| 2) Questions and Answers (Q&A) of Proponent                                                                                                                       | 15 |
| 3) Intervenor Presentations by                                                                                                                                    |    |
| <b>Guysborough Regional District Development Authority<br/>- Mr. Gordon MacDonald<br/>Dr. Marike Finlay-de Monchy<br/>Dr. Karin Cope<br/>Dr. Elisabeth Bigras</b> | 90 |
| Q&A of Intervenors, after each Intervenor                                                                                                                         | 40 |
| 4) Open Forum                                                                                                                                                     | 55 |

**Environmental Assessment Board (EAB)  
Keltic Petrochemicals Undertaking**

**Hearing Agenda**

*Note: Numbers listed as the right hand column represent planned times only, by agenda item.*

**Saturday, November 25, 2006:**      Town of Antigonish, Claymore Inn

1:00 pm - 4:00 pm:

1) Synopsis Presentation by Proponent	10
2) Questions and Answers (Q&A) of Proponent	15
3) Intervenor Presentations by	
<b>Ecology Action Centre - Ms. Chantal Gagnon</b>	
<b>Environment Canada - Mr. Steve Zwicker</b>	40
Q&A of Intervenors, after each Intervenor	20
4) Open Forum	50
5) Final Response by Proponent	30
6) Closing comments by Hearing Panel Chair	15



**Appendix G: List of Proponent and Intervenor Witnesses  
Sworn in at the Public Hearing**



**List of Proponent and Intervenor Witnesses  
Sworn in at the  
N.S. Environmental Assessment Board Public Hearing  
Re: Keltic Petrochemicals Inc.  
November 20-25, 2006**

<b>Intervenors</b>	<b>Witnesses</b>
Keltic Petrochemicals Inc. (Proponent)	Shawn Duncan, Derrick Owen, Rob Schonk, Janet Blackadar, Dave Purvis, Kevin Dunn and Glen Longert
Municipality of the District of Guysborough	Warden Lloyd Hines, Bradley MacLeod, Sheila Pelly, Debbie Torrey, Gary Cleary and Dan McDougall
Ecology Action Centre	Chantal Gagnon, Jennifer Graham, and Mark Butler
Frank Fougere	
Stewart MacIntosh	
Antigonish Guysborough Road Committee	Ernie Kelly
Kevin McAllister	
Municipality of the District of St. Mary's	Warden David Clark
Katherine Reed	
Assembly of Nova Scotia Mi'kmaq Chiefs	Douglas Brown and Michael Cox
Nova Scotia Department of Environment and Labour	Kim MacNeil, David Shea, Andrew Murphy, Solveig Madsen, John Drage and John Theakston
The Concerned Citizens of Lincolnville	James Desmond and Lyndon Hibbert
Aquaculture Association of Nova Scotia	Brian Muise and Bruce Hancock
Antigonish Eastern Shore Tourism Association	Ernest Curry
Delia Burge	
Greyhawke Ridge Minerals Inc.	Wayne Lockerby
Nova Scotia Department of Transportation and Public Works	Mike Croft and Phil Corkum
Construction Association of Nova Scotia	Ernie Porter
Kathi Ryan	
Jerry Webb	

<b>Intervenors</b>	<b>Witnesses</b>
Guysborough Regional District Development Authority	Gordon MacDonald
Dr. Marike Finlay-de Monchy	
Dr. Elisabeth Bigras	
Dr. Karin Cope	
Environment Canada	Steven Zwicker, Sinclair Dewis and Michael Hingston

## Appendix H: List of Acronyms



### List of Acronyms

BOD	Biological Oxygen Demand
BOG	Boil Off Gas
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Act
CLC	Community Liaison Committee
CMHC	Canada Mortgage and Housing Corporation
CSR	Comprehensive Study Report
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EAC	Ecology Action Centre
EC	Environment Canada
EIA	Environmental Impact Assessment (the EA Report)
EMO	Emergency Measures Organisation
EPP	Environmental Protection Plan
FEED	Front End Engineering Design
GCRDA	Guysborough County Regional Development Agency
HADD	Harmful Alteration, Disruption or Destruction (of fish habitat)
HAZOP	Hazard and Operability Analysis
HC	Health Canada
LNG	Liquefied Natural Gas
MEK(S)	Mi'kmaq Ecological Knowledge (Study)
NSDE	Nova Scotia Department of Energy
NSDEL/NSEL	Nova Scotia Department of Environment and Labour
NSDNR	Nova Scotia Department of Natural Resources
NSEAB	Nova Scotia Environmental Assessment Board
NSHPP	Nova Scotia Department of Health Promotion and Protection
NSTPW/ DOT&PW	Nova Scotia Department of Transportation and Public Works
PM <sub>10</sub>	Particulate matter less than 10 micrometres diameter
PM <sub>2.5</sub>	Particulate matter less than 2.5 micrometres in diameter
REET	Regional Environmental Emergencies Team
SARA	Species At Risk Act

SOEI	Sable Offshore Energy Inc.
SOEP	Sable Offshore Energy Project
ToR	Terms of Reference
TSP	Total suspended particulate matter
VEC	Valued Environmental/Ecosystem Component
VOCs	Volatile Organic Compounds