SUMMARY
OF PUBLIC PARTICIPATION

ENVIRONMENTAL IMPACT ASSESSMENT

PROPOSAL BY IRVING OIL LIMITED TO CONSTRUCT A PETROLEUM REFINERY AND MARINE TERMINAL (EIDER ROCK PROJECT)

SAINT JOHN, NB

Prepared by the Department of Environment

October 2010

New Nouveau Brunswick
CANADA

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BACKGROUND

In its Environmental Impact Assessment Report to the Minister, Irving Oil Company Limited has proposed to construct a petroleum refinery and marine terminal (project Eider Rock) in the Red Head area, near east Saint John, NB. The new refinery would process up to 250,000 barrels (40,000 m3/d) per day of crude oil into refined petroleum products for supplying export markets in North America and elsewhere.

The crude oil would be supplied by marine tanker ships using the proposed new marine terminal and the existing single buoy mooring serving the existing Saint John refinery. Other raw materials (including products from the existing Saint John refinery) would be supplied using pipelines, trucks and rail. Finished products would be delivered via marine product tankers, barges, and railcars.

On January 25, 2007, the Irving Oil Eider Rock Project was registered for screening under the provincial Environmental Impact Assessment Regulation of the *Clean Environment Act*. A decision by the Minister of Environment on February 7, 2007 required that the Project undergo a comprehensive Environmental Impact Assessment as per the Regulation

On May 7, 2007, Fisheries and Oceans Canada (DFO), Environment Canada (EC) and Transport Canada (TC) announced that they would conduct a comprehensive study of the Eider Rock Project marine terminal. As Responsible Authorities, they are required to ensure an environmental assessment is completed pursuant to the *Canadian Environmental Assessment Act* (CEAA). A Comprehensive Study Report (CSR) was developed in response to the Environmental Assessment Track Report and a Scoping Document and was issued on November 21, 2007. In addition, Natural Resources Canada (NRCan) and Health Canada (HC) were identified as federal authorities and would provide specialist or expert information and knowledge in support of the environmental assessment process.

Initial public consultation on the Project began on April 5, 2007 with the release of the Draft Guidelines and a 30-day period for public comment. This period allowed members of the public to provide comment on what should or shouldn't be included in the Environmental Impact Assessment Report (EIA). Final Guidelines with the public's input considered were issued to Irving Oil Company Limited on June 4, 2007. Irving Oil prepared Terms of Reference which were reviewed by the Departmentally-appointed Technical Review Committee (TRC) and then proceeded to conduct the study.

A Preliminary Draft EIA Report was received on August 18, 2008 for review by the TRC. As a result of deficiencies noted, clarifications sought and additional work identified by the TRC, the Report was revised, and a Final EIA Report satisfying the Final EIA Guidelines was received from the proponent on April 30, 2009. Thirty copies of the Final EIA Report in both official languages were received on August 4, 2009.

On August 24, 2009, copies of the complete EIA Report, a Summary of the EIA Report and the TRC's General Review Statement were distributed and made available to the public at various locations in the Saint John region, including the Department of Environment office in Saint John. Information was also made available on the Department's Internet site. Concurrently, a news release was issued and paid advertisements were taken out to inform citizens that this information was available, of the upcoming public meeting, and where they could view and/or pick up information. Interested parties were encouraged to contact the Department if they intended to make a formal presentation at the public meeting.

The release of the EIA and General Review Statement and the announcement of the date of the public meeting on August 24, 2009, marked the beginning of the second phase of the formal public consultation process. The Minister of Environment then proceeded with the appointment of an Independent EIA Panel to preside at the provincially mandated public meeting held on November 18th at the Simonds Lions Auditorium, Loch Lomond Villa in Saint John.

The 3-person Panel was chaired by Dr. Pierre-Marcel Desjardins, Economics Professor at l'Université de Moncton. The other members were Ed Aitken, Principal of The Process Group, of Rancho Santa Margarita, California, the Oil Refinery Advisor for the panel, and Dr. George Becking, of Phoenix OHC, Inc. in Kingston, Ontario, the Health/Toxicology Advisor for the panel.

Approximately 40 people attended the public meeting which began at 7:00 p.m. The meeting was tape-recorded to enable the production of a verbatim transcript and simultaneous interpretation services were provided. Following the chair's opening remarks, the meeting began with presentations by individuals or groups who/which had pre-registered to present. The floor was then opened for comments from the audience in attendance. The independent EIA Panel members heard public comments on the EIA.

Prior to the adjournment of the meeting at 9:30 p.m., attendees were reminded that a further 15 days remained for the submission of any written comments on the project to the Minister of Environment. Comment sheets for this purpose were provided at the

meeting. Attendees were also reminded throughout the evening to provide their names and addresses on a provided sign-up form, if they wished to subsequently receive a copy of the Summary of Public Participation and/or the verbatim transcript of the meeting.

Following the closing date for public comments on December 4, 2009, the Panel prepared and submitted a report of public input on the project, reflecting feedback gathered at the public meeting as well as via written comments submitted throughout the public comment period, to the Minister of Environment. This report was received in January 2010. The report is included in its entirety as part of the Minister's Summary of Public Participation, and follows this page.

On June 18, 2010, Irving Oil Limited submitted an Amended Project Description for the Eider Rock Project to the Department of Environment. The amended project resulted in no new information for consideration as part of the Eider Rock Project and subsequent EIA Report which was accepted by the Minister and was subject to public consultation per the EIA Regulation. The Amended Project Description does, however exclude portions of the Project, specifically the construction and operation of a new refinery and associated processes and supporting facilities.

As a result of these amendments, there are significant portions of the EIA Report, the EIA Report Summary, the Technical Review Statement, and the Independent EIA Panel Review which are no longer relevant to the project being considered.

PROJECT UPDATE

On June 18, 2010, Irving Oil Limited submitted an Amended Project Description for the Project Eider Rock to the Department of Environment. This amendment officially withdraws portions of the existing Eider Rock Project, specifically the construction and operation of a new refinery and associated processes and supporting facilities. (Copy of the Amended Project Description is available on page 39)

The amended project being proposed includes a marine terminal, barge landing, heavy haul road, and pipeline between the proposed marine terminal and the existing refinery.

As stated in the Amended Project Description, the purpose is to strengthen the existing operations of Irving Oil, stimulate economic conditions locally and regionally, and help Irving Oil preserve options in the event that market conditions become more favourable in the future.

Amended Project Description:

The amended project description and scope is limited to the following project components as outlined in the EIA Report dated August 4, 2009:

- Linear facilities, including right-of-ways (ROWs) for pipelines.
- A marine terminal and other marine-based infrastructure.
- Facilities for the receipt and transfer of crude oil, consisting of a new crude oil berth to be constructed on a common jetty along with berths for the transfer of finished products and the use of the existing single buoy mooring (SBM)
- A barge landing facility for unloading large modules during construction, constructed on a temporary or permanent basis

As well, the following information was provided regarding the heavy haul road and petroleum product pipelines requirement in light of the amended scope and project description:

- A heavy haul road, to facilitate the movement of marine terminal components from the barge landing facility to the marine terminal location.
- Pipelines between the marine terminal and the existing Saint John refinery, within the preferred linear facilities corridor, to facilitate the movement of crude and/or products between these locations.

Amended Project Purpose, Rationale, and Need:

Since some major components of the original project have been removed, the purpose, rationale and need for the remaining components proposed have also been amended and are as follows:

The amended purpose/rationale/need for the proposed marine terminal is:

- To maintain reliability of crude oil and intermediate product supply and transfer to the existing Saint John refinery.
- Provide redundancy to the existing marine terminal at the Canaport facility serving the existing Saint John refinery.
- Provide alternatives for shipping petroleum products from the existing Saint John refinery, therefore potentially providing redundancy to the East Saint John Marine Terminal.
- Provide alternatives and flexibility for ships of different sizes and configurations which may not be supported by either of the existing marine terminal facilities in Saint John.

The amended purpose/rationale/need for the proposed barge landing facility and heavy haul road is to facilitate the movement, unloading, storage, and assembly of marine terminal components during its construction.

The purpose/rationale/need for the proposed crude oil and petroleum product pipelines is to provide redundancy to the existing crude oil pipelines and product shipping terminal currently serving the existing Saint John refinery.

EIA Process Update:

As a result of these amendments, there are significant portions of the EIA Report, the EIA Report Summary, the Technical Review Statement, and the Independent EIA Panel Review that are no longer relevant to the project as it currently exists.

After consultation with the Technical Review Committee, the Department of Environment determined that the existing EIA Report which was subject to public review and consultation per the EIA Regulation adequately represents the remaining components of the amended project.

FINAL STEPS IN EIA PROCESS

The submission of the Independent EIA Review Panel's report, preparation and release of the Minister's Summary of Public Participation completes the public participation component of the provincial Environmental Impact Assessment process. The Minister of Environment has taken into account the public input received as summarized in the Panel's report and any findings noted, information provided by the Technical Review Committee, including the General Review Statement, as well as the amended scope and project description and made a recommendation to Cabinet for consideration and decision. This recommendation included a series of operational conditions to be considered.

It is anticipated that the Minister of Environment will issue a media release upon Government's decision being made, announcing the Government's determination regarding the project, including any conditions of determination, as applicable.

This information is available by contacting any office of the Department of Environment or via the Department's web site at http://www.gnb.ca/0009/0377/0002/0005-e.asp.

Similarly, the federal Minister of the Environment makes his determination on next steps and will advise the federal Responsible Authorities. Information made available as part of the *Canadian Environmental Assessment Act* (CEAA) process on this project is available on the Environment Canada web site at: http://www.ceaa.gc.ca/050/details-eng.cfm?evaluation=28779

STEPS FOLLOWING THE EIA PROCESS

The EIA process is the first component of a larger environmental management system. Detailed design considerations and operational issues are examined subsequently as part of the Approval and Permitting component of the environmental management system. This would be followed by a Monitoring and Follow-up component to ensure compliance. There would be various construction and operation approvals to be sought and commitments made would have to be tracked in order to ensure compliance.

Independent EIA Panel Review

Irving Oil Limited Eider Rock Project
Petroleum Refinery and Marine Terminal
Saint John, NB

Final Report

January 2010

INTRODUCTION

The present report pertains to the proposal to build a petroleum refinery and marine terminal (Project Eider Rock) by Irving Oil Company, Limited. The proposed Project includes a marine terminal and a petroleum refinery designed at a rate capacity of up to 40,000 m3/d (250,000 bbl/d) of crude oil.

On August 26, 2009, in *The Royal Gazette*, a notice of public consultation for the environmental impact assessment of the project was made by Rick Miles, Minister of Environment. The process included a public meeting which was held on November 18, 2009, beginning at 7:00 p.m. at the Simonds Lions Auditorium. Furthermore, written briefs could be submitted until December 4, 2009.

The present document is the report of the Independent Panel. The three-person panel was chaired by Dr. Pierre-Marcel Desjardins, Economics Professor at l'Université de Moncton. The other members were Ed Aitken, Principal of The Process Group, of Rancho Santa Margarita, California, the Oil Refinery Advisor for the panel, and Dr. George Becking, of Phoenix OHC, Inc. in Kingston, Ontario, the Health/Toxicology Advisor for the panel. The panel's mandate included:

- To facilitate the EIA meeting on November 18, 2009;
- To review public and stakeholder input and determine whether or not issues raised by the public are in fact adequately addressed in the EIA Report, while recognizing that the EIA process is a planning process that typically is completed without all design details having been finalized.
- To provide a report on public input, both as provided at the public meeting as well as via written comments, which is submitted to the Minister of Environment.

The methodology followed by the panel included:

- All information submitted, either at the public meeting or through written documents, was analysed by the panel.
- When required, panel members sought additional information from various sources.

- The report does not refer to every comment received by the panel. Although the panel did analyse every comment and question, in the present report, several issues have been grouped by topic or resource.
- If the panel could not get a satisfactory answer or felt that issues were not adequately covered, paths to achieving the desired objective were recommended.

CONCERNS RAISED

ISSUES RAISED BY PUBLIC REGARDING THE REFINERY IN EIDER ROCK EIA

General Comments on Issues Raised:

In Section 3.2.1.5 the Proponent describes a Selective Hydrogenation Unit (SHU) and Alkylation Unit (ALKY) as part of the proposed project. However, these units are not shown on the Conceptual Process Flow Diagram (Fig. 3.10). I believe the proposed configuration on the process flow diagram should represent this project and the SHU and ALKY units should not be included in this EIA report or potential permit at this time.

There were several questions regarding procedures, codes and interface with local emergency agencies. Since this EIA is based on preliminary engineering estimates, it is premature to judge the adequacy of whether this project satisfies these issues. At this stage the Proponent has indicated in the EIA that all appropriate safety procedures, codes and participation with local agencies will be followed as final details of the project are developed.

Specific Issues:

Concern about the new refinery project and the environmental impact it will have on the existing refinery. The EIA report is based on preliminary engineering estimates for the new refinery. Therefore, process unit rates and sizes are yet to be finalized.

The Proponent has indicated that there will be some integration between the new refinery and the existing refinery. This will certainly include some feed and product streams being transferred from the existing refinery to the new refinery. What is not clear is whether any existing refinery utility units, such as steam, power or hydrogen, at the existing refinery will help supply the new refinery demand. If that is the case, then there will be an increase in fuel consumption and emissions from these existing units. ***It is recommended that the Proponent define whether any existing refinery process or utility units will result in an increase in rate with this project along with any corresponding emission increase from the existing refinery baseline.***

Concern about the coke storage handling facility. One of the main units in the new refinery project configuration is a coker. These units are typically built for processing the "bottom of the barrel" portion of crude oil. Although coking technology is considered to be very old and simple, these units are continuing to be built due to the increase in heavy crude oil (e.g. tar sands) production. The coke that is produced should be stored in a covered facility in a wet or damp atmosphere to control dust emissions. The coke storage facility as described in the EIA is only conceptual. ***It is recommended that the Proponent provide more details of this facility to ensure adequate emission control.***

Concern about the overall power balance for this project and whether alternative energy processes could be used. This EIA, again, is only based on preliminary engineering estimates. Thus, the overall power supply and consumption has not been finalized. Normally, refineries are designed to be self-sufficient towards power consumption and I would anticipate that would be the case for this project. Since a cogeneration unit has been proposed, these units can be designed to produce excess power that can be exported to the local utility grid. Depending on the contaminants in the fuel gas that would supply the cogeneration unit and the emission control devices installed with this unit, this could be a relatively clean source of power. Other alternative energy processes could be used to help supply power, although these systems would have to be configured properly with the power grid and the refinery. When the detail

design phase is completed, this project should be designed to maximize energy efficiency between the units and the utilities.

Concern about the water usage for this project. The water requirement for this project is substantial. The Proponent has indicated that they looked at various options for water supply including use of sea water. However, they have chosen to use the existing water capacity in the local utility system. The required amount appears to leave no excess capacity for this system. These types of projects should not use utilities from local infrastructure without an associated cost. Otherwise, the next project that needs water will have the full cost burden of building more capacity. ***It is recommended that this project during the next design phase consider maximizing air cooler usage to reduce water consumption and if any local utility water is required, an appropriate capital cost be considered for the utility.***

Concern about the number of storage tanks and location. The Proponent indicates in the EIA that options were considered in the location and layout of the Marine Terminal storage facility. It is recognized that this is a preliminary layout and appears to be feasible for an operations and fire safety standpoint. However, more discussion regarding alternative options and the impact on local residents would be helpful. ***It is recommended that the final layout of the Marine Terminal and storage facility include addressing local resident concerns and impacts.***

Concern and questions regarding the use of cold vents in refineries. This project does not include any cold vents as presented in the EIA. Cold vents emit VOC's in a non-combustible manner. This can result in heavy hydrocarbons being released and potentially finding a source of ignition causing fire or explosion. Cold vents are typically not recommended for new facilities with the potential for hydrocarbon release.

Concern regarding NOx and SOx emissions from the refinery process units. What are the control systems being employed and what type of monitoring will be used. NOx emissions for this project will come primarily from the heater stacks. There

will be a significant number of heaters, each one specific to the process and having to operate independently from the others, so that a combined stack for all heaters is not feasible. NOx is generated by the heat intensity in the firebox causing the oxidation of the nitrogen in the combustion air. NOx emissions can be reduced in fired heaters with "Low NOx" or "Ultra Low NOx" burner technology. "Low NOx" burners and "Ultra Low NOx" burners can achieve significant NOx reduction (40-60%). The choice can depend on the desired NOx emission targets and the type of heater configuration and composition of the fuel gas. The Proponent has indicated that the use of "Low NOx" burners and possibly "Ultra Low NOx" burners will be utilized in this project. Further NOx reduction (60-90%) can be accomplished with Selective Catalytic Reduction (SCR). These systems treat the heater flue gas and convert the NOx compounds to nitrogen using ammonia. The Proponent has mentioned SCR technology but has not indicated a requirement to use it based on the emission estimates documented in the EIA without SCR being installed on the heater stacks. Although, SCR systems are considered to be best available technology, there is no NB regulation that requires the Proponent to use this as long as the project NOx emissions are within the NB standards.

Similarly, SOx emissions are formed primarily in heater stacks from the oxidation of the sulfur compounds in the burner fuel gas. These emissions are controlled by the proper fuel gas amine treating plant for sulfur removal. The Proponent has included a new amine treating plant for the fuel gas, however, the capacity and specifications have not been determined. ***It is recommended that the new amine treating plant be designed for producing a fuel gas with less than 40 wppm total sulfur. This will ensure low SOx emissions from the heater stacks.***

The monitoring for SOx and NOx is typically done with continuous analyzers on the heater stacks. The Proponent has indicated that continuous analyzers will be used but not whether they will be installed on every heater stack. For accurate NOx monitoring, every stack will require a continuous analyzer since the NOx emissions are a function of the heater operation which can vary sometimes significantly between heaters. SOx

emissions are a function of the sulfur content in the fuel gas, therefore; only one or two continuous analyzers are needed, for calibration, with the balance simply calculated from the fuel gas rates and sulfur content to each heater assuming the heaters are using the same fuel gas composition.

Concern for the refinery VOC and odor emissions from this project. VOC emissions come primarily from leaking valves or pumps that are handling light hydrocarbon material. The Proponent has indicated that this project will follow all required regulations and procedures for maintenance and monitoring of potential VOC emitting equipment. There is technology, bellow sealed valves, currently available for reducing VOC emissions from control valves in light hydrocarbon service. Also, pumps can be supplied with dual seals and vent pots to capture any VOC leakage. However, there is no NB regulation requiring this equipment for this project.

The other source of VOC's come from tank vents. The Proponent has indicated that vapor recovery will be installed to handle the offgas from these vents. ***It is recommended that the Proponent consider vapor recovery as part of the flare system to capture offgas vents from process units and limit flare activity.***

Odor issues for refineries typically come from flare stack activity, combustion of gaseous sulfur species, and the handling of contaminated process water streams in the wastewater treatment unit. A vapor recovery system as suggested above will help alleviate odors from the flare. The Proponent discussed various options for the disposition of vapors from the wastewater treatment plant. This project elected to install an "Enclosed Flare" for handling these vapors. This is not a typical choice for dealing with these vapors and could result in incomplete combustion of H2S. ***It is recommended that the Proponent reconsider using either carbon adsorption or thermal oxidizer system to handle wastewater treatment vapors to prevent venting of H2S.***

A further step for odor control would be to cover and seal all process water sewer openings; although the panel recognizes that this is not a requirement for this project.

Concern for the production of significant amounts of Green House Gases (GHG) from this project. There are currently no GHG emission standards for refineries. GHG emission effects are a complicated issue. If one looks at this project from the boundaries of NB, then there will be a significant GHG emission increase. However, if one expands those boundaries, the GHG emission picture is less clear. This project will significantly increase the refining capacity of the North American East Coast. The fact that it is also a new and more efficient refinery will likely result in the shutdown of other smaller and older refineries in the region. Therefore, this project could result in the shutdown and elimination of other refinery GHG emitters.

Carbon capture units are still an available option for refineries. Although, there are currently no carbon capture units installed on any refinery processes, carbon capture technology has been demonstrated on commercial power plants similar to cogeneration type units. The major source of GHG for this project will come from the cogeneration and hydrogen plant units. If GHG reduction is mandated, carbon capture units could be a feasible installation for this project. In addition, the Proponent has indicated that opportunities for CO2 markets would be explored to meet any GHG reduction demand.

Concern for the production of secondary pollutants from this project and the air quality estimated models. The issue PM2.5 and ozone as secondary pollutants was addressed in the EIA. These pollutants are primarily a function NOx and SOx emissions. The new refinery is the primary source for these emissions. Another source for these pollutants is from transportation vehicles. This project will increase the population and certainly add more vehicles. It is not clear whether this was addressed in the estimate and modeling of secondary pollutants. The air quality estimates from the models indicate that this project, based on preliminary estimates, will meet the NB air quality standards. It was suggested that a more comprehensive background conceptual model utilizing natural and existing emission sources be used for the evaluation. The

air quality emissions model could be further refined and the results evaluated once the final design of the project is complete. ***It is recommended that the Proponent address any ancillary effects from this project on secondary pollutants. The air quality models should also be updated with the emissions predictions from the final design of the refinery and offsite facilities and a review of the results should be presented.***

Concern that this Project is not designed to be as efficient in terms of GHG emissions as other similar facilities. The GHG intensity for a refinery is not necessarily a reflection on the efficiency of the overall refinery. The production of GHG for a refinery is a function of the type of crude oil being processed along with the type of fuels being produced. Heavy crude oil refineries, similar to this Project, will have higher GHG production levels due to the amount of energy and processing required. Also producing fuels to meet US federal standards requires more energy, and therefore more GHG production, to reduce the fuel sulphur levels. Thus, the lowest GHG emission refineries will be those processing the lightest crudes and producing fuels with high sulphur content. The GHG emission for this Project is typical for refineries with this crude and product slate. When a GHG emission target becomes a standard for refineries, then this issue can be addressed.

ISSUES RAISED BY PUBLIC REGARDING HUMAN HEALTH, HUMAN HEALTH RISK AND ECOLOGICAL RISK ASSESSMENT IN EIDER ROCK EIA

General Comments on Issues Raised:

Comments received describing anecdotal reports of health effects from the present refinery in Saint John have no relevance for assessing the adequacy of the EIA Report on Eider Rock. It cannot be assumed emissions, and therefore risks, from the proposed refinery will be the same as those perceived to have occurred from the presently operating refinery. The EIA is not a study of the possible health and environmental effects from the present refinery. It is impossible to use the present refinery as a

surrogate for the proposed new facility. Such comments have not been assessed further.

Screening level risk assessments require professional judgements to be made by those conducting the assessments where data are minimal and such judgements may be criticized by other professionals. However, such differences in opinion do not mean the EIA risk assessment is in error unless appropriate scientific data can be produced showing the original assumptions were in error. Unless noted in the section on specific issues, the EIA has adequately described the assumptions made and the degree of conservatism of these assumptions.

Except where noted in the section on specific issues, the screening level risk assessments within the EIA Report were conducted using well established methodologies accepted in most industrialized countries worldwide. One may argue as to the degree of conservatism within the assumptions made but throughout the EIA Report, all assumptions made have a large degree of conservatism within them. One notable exception, which will be highlighted later, is in the choice of exposure pathways for the multi-media risk assessments for the Chemicals of Potential Concern (COPC). Not including drinking water as a source of chemical exposure, particularly for metals, is not a conservative approach.

Several members of the public mentioned the “sea of COPC” listed in Table 3.8 and elsewhere. The EIA Report and TR-014 discuss in some detail the conservative nature of the screening level HHERA carried out for the project. The list of COPC in no way implies any or all of these chemicals will be detected in the environment after the refinery is operational. The operative word is “potential”. The EIA Report does a good job in explaining this issue.

The EIA Report plus the 18 Supporting Studies contain a massive amount of information. Reviewing such a large amount of data is a daunting task even for trained professionals let alone members of the public. This point was raised by many people

and not just those concerned with human health issues. The EIA Report did contain a Cross-Referenced Index as required in the EIA Guidelines (see Annex A – Detailed Table of Concordance). If placed in a more prominent position in the document – perhaps immediately before or after the Executive Summary – there is a good chance more members of the public would have made use of its contents. It certainly would have helped direct them to specific sections where their particular issues were discussed or should have been discussed.

Specific Issues:

The risk assessment methodology does not consider risks from the COPC to vulnerable populations such as the aged, asthmatics and those with other respiratory and cardiovascular diseases. The EIA Report and the Technical support documentation adequately describe how these populations are protected without specifically listing vulnerable populations. It is inherent in the screening level methodology used in the EIA that the conservative assumptions made will protect as close to 100% of the population as possible. The choice of the toddler as the human receptor, the use of maximum concentrations of projected COPC and the assumption that the toddler is exposed to the chemical for 24 hours/day add further protection to vulnerable members of the population. The use of toxicity reference values (TRVs) developed by public health agencies in Canada and the USA add further conservatism to the HHRA. All health agencies, including New Brunswick, Federal Government in Canada and the US-EPA develop their TRVs as protective to sensitive subgroups. If the concentrations of the COPC are lower than such TRVs one can assume vulnerable populations are protected.

Concern raised that Proponent not required to comply with international agreements when modelling and carrying out risk assessments. During this stage of the proposed project this is essentially an accurate statement by the Proponent. However, the Proponent has stated emphatically in the EIA Report that all existing regulations in place at the initiation of production will be complied with. This would

include international agreements. ***It is recommended that holding the Proponent to this action should be a condition of approval***

Concern over human health effects from ground level ozone concentrations. The EIA Report does not adequately deal with the issue of possible health effects from 1 hour ozone concentrations above the present 82 ppb. As correctly pointed out by the public, the present I hour Canadian ozone objective is not fully protective of human health and any further increases in ground level concentrations should be considered significant, particularly since the present risk assessment is a screen only. ***It is recommended that a condition of approval of this EIA indicate further design work is required to lower the ground level ozone concentrations.***

Concern that Vanadium (V) emissions will increase incidence of asthma and other respiratory ailments. Concerns were also expressed over the emission of any additional carcinogens, the risk from projected air-borne acrolein concentrations, anecdotal evidence presented that asthma rates have been gradually increasing and the incidence of rare cancers (e.g. Leukemia) are higher than other areas:

1. The concern over V exposure and human health effects is adequately addressed in the EIA, particularly the short toxprofile for V indicating respiratory problems occur only at high occupational exposures. The projected air concentrations of V will be 100 times lower than the present Ontario guideline of 2 ug/m^3.This Ontario guideline has been set to protect human health. The EIA also addresses adequately the issue of health risks from the concentration of air-borne acrolein.

2. No one can argue against efforts to eliminate carcinogenic chemicals from the environment and to eliminate, or at least minimize, the emission of carcinogenic chemicals from new industrial enterprises. However, from a large industrial complex such as the proposed Eider Rock Refinery elimination of emissions of chemicals known to be carcinogenic to humans is not possible. This issue is addressed adequately in the EIA Report Chapter 9 and TR-014. In these Chapters, the concept of incremental life-

time cancer risks is described. Using accepted screening level risk assessment methodology, incremental cancer rates do not exceed a risk of 1/100,000 for any of the COPC. Such risk levels are considered acceptable by Health Canada and New Brunswick Department of Health. Present (baseline) concentrations of the COPC do not pose a risk greater than 1/100,000 and thus are not considered to pose a carcinogenic risk to humans.

3. The issues of increasing asthma rates and the higher than expected incidence of rare tumours such as leukemia are addressed adequately in the Baseline Health Study Report (TR-006) and Chapter 9 of the EIA Final Report. It was found that in 2005, asthma cases were no greater in Health Region 2, of which Saint John and Simonds Parish (SJ/SP) combined census subdivision (CSD) is a part, than in the rest of New Brunswick (RONB). During the period 2000 to 2004 in the combined CSD SJ/SP, the age-standardized incidence of leukemia was the same as for the RONB.

Concern that the project will lead to decreased water quality in Loch Lomond, the source of drinking water for a large proportion of residents in Saint John. This issue is not dealt with adequately in the EIA Report. Although Loch Lomond is not in the LAA it is in the RAA and is the source of drinking water for thousands of Saint John residents. More detail needs to be added to justify the statement that no aerial deposition to surface waters (section 3.4.2) will occur. The Proponent needs to justify a lack of concern over possible pollution of Loch Lomond from the project by supplying wind direction and other meteorological data to justify the lack of concern. The question of whether aerial transport of COPC from the project to Loch Lomond is possible needs to be answered. Also additional information should be provided to justify a lack of concern over the possible loss of groundwater wells arising from the massive amounts of freshwater withdrawn from the Loch Lomond watershed. ***It is recommended that such information be provided as a condition of approval for the EIA. In addition, more details of the contingency plan for mitigation of residential well loss should also be a condition of approval.***

Although not mentioned by the public, the omission of drinking water as a source of exposure to COPC in a multi-media screening level assessment is totally unacceptable risk assessment methodology. No drinking water exposure pathway was listed in Table 3.8.2 or in Chapter 6.0 of TR-014. No matter where the residents of Saint John get their water they will be exposed to low levels of some of the COPC (particularly arsenic (As), manganese (Mn), V and some of the organic chemicals). Such exposures cannot be eliminated from a multi-media assessment carried out using accepted risk assessment methodology. This exposure needs to be considered in the multi-media assessments for the present situation (baseline) as well as the effects from initiation of the refinery operation. Concentrations in drinking water of many COPC will have been monitored by the New Brunswick Government. In a conservative screening level assessment, the maximum concentration found in any year should be used. Where no monitoring data are available the guideline value derived by the Federal/Provincial/Territorial Committee should be used to calculate human exposure. ***As a condition of approval of this EIA, it is strongly recommended that the multi-media risk assessments carried out in the EIA be redone and include drinking water exposures .This recommendation does not depend upon the possibility of contamination of Loch Lomond. No matter where residents of Saint John/Simonds Parish obtain their drinking water there is a possibility that they will be exposed to COPC through this route of exposure.***

Concerns over the adequacy of the Base-Line Health Study (TR-006) [e.g. rationale for choice of study populations, appropriate use of Statistics Canada Canadian Community Health Survey Data, location of receptors in Simonds Parish, lack of discussion of causality and historical air monitoring data):

1. Regarding the receptors in Simonds Parish over water, the EIA Report is very clear that these were not used as health receptors in the HHRA but for the environment assessment in the HHERA process (see Table 3.8.1).

2. Given the spatial boundaries for the LAA (Fig 7.1 – the impact zone for the project), and the boundaries for the Saint John and Simonds Parish CSDs (see Exhibit 1 – TR-006 Annex 1), the choice of study populations was based on the reasonable assumption that those residing closest to the project would be most affected and, consequently, are the populations where health effects are most easily observed. In discussions with the senior Author of TR-006, it was learned that an overlay of Exhibit 1 and the spatial boundaries in Fig 7.1 supported the choice of the combined populations of SJSP CSDs as the study population. Including cross references to these two Figures would have resulted in an increase in transparency regarding the choice of populations. The recommendation that SJ & SP CSDs be analysed separately for health effects indicates a lack of understanding of basic epidemiology and statistics. When age adjusted cancer rates are say 100 cases/100,000 population, it is obvious one would have too few cases available to calculate a statistically meaningful rate in the 3800 residents of SP. To ensure that any change in their health status is detected, it is necessary to combine the analysis of the two CSDs.

3. Criticism of the use of Statistics Canada Canadian Community Health Survey Data also shows some lack of understanding of the methodology used by Statistics Canada in developing the database in NB. The main sample was from 5100 residents of New Brunswick with smaller numbers interviewed in deriving the 3 sub-samples. Based on these numbers, it is problematic that one can obtain meaningful comparisons at lower population groups than the Health Region level. This is adequately discussed in TR-006.

4. In making the criticisms noted in paras 2 & 3 above, it would have been much more helpful in developing an improved base-line health study if those making them would have suggested alternative feasible study designs and statistical procedures for an ecological study of potentially affected populations which would result in scientifically valid health comparisons of the study population and the RONB. In making such suggestions the public must remember the reason for conducting the base-line health study (well described in the TR-006), namely to serve as a comparison point for future

study of the population to ascertain if the health status of the population living close to the proposed refinery changed after operating for a number of years, and whether such changes were similar to those found in the health status of all residents of New Brunswick. As explained clearly in the TR-006 Report, the baseline health study was not intended to be a study of causes of disease nor a discussion of historical air pollution data and its effects on human health. No ecological fallacy was made in TR-006 nor was there a spatial mismatch in the statistical analyses. The report adequately addresses these points.

5. In suggesting that SJ, SP and Rothsay be compared individually to the RONB indicates a misunderstanding of what can be compared in epidemiological studies. In comparing the populations in each of these CSDs to the RONB would necessitate a different denominator (SJ to RONB would have a different denominator than SP to RONB). Such comparisons are not statistically appropriate. ***This is explained in an extended TR-006 Appendix 6A made available to the Panel. This Draft Appendix answers most of the public criticisms regarding comparison populations and it is recommended that it should be included in the final Support Documentation for the EIA.***

6. The Report discusses in detail the strengths and weakness of the various epidemiological methods available to study and compare the health status of various populations. It is worthwhile noting that the ecological methodology chosen for the base-line health study is an accepted methodology by public health agencies (those having the experience and expertise on Staff) throughout Canada, including the New Brunswick Ministry of Health, and in the USA and elsewhere. When reviewed by epidemiologists and statisticians in public health agencies no criticisms of the methodology used similar to those made during the public comment period were obtained.

7. If the methodology used in the baseline health study was flawed (primarily through combining 2 CSDs) as claimed by some public reviewers, the age-standardized cancer

rates for the combined SJ/SP CSD and the RONB reported in the EIA TR-006 should be markedly different from those reported by the Conservation Council of New Brunswick (CCNB) in their Report Cancer in New Brunswick Communities – Part 1 (2009). In fact the results of these two analyses are essentially the same and the small differences noted were statistically non-significant. Based on this comparison one can conclude that the methodology chosen for the baseline health study is acceptable and appropriate for the stated goals.

A second reviewer raised similar issues regarding the baseline health study as those described in paras 1 to 7 above. In addition they claimed the baseline health study underpinned the subsequent HHRA for COPC. This last statement is incorrect. Risk assessments predict the potential risks to individuals in the community exposed to COPC whereas the baseline health study determined the health status of the populations, not individuals within the population. There appears to be a lack of understanding on the part of the reviewer as to the methods used in the epidemiological study and the methods used in carrying out HHRAs, as well as the results one can obtain from these two different scientific activities. Within the EIA Report, TR-014 and TR-006 these two distinct scientific methodologies and the results obtained from each are adequately described. The goals and objectives of each procedure are clearly stated.

ISSUES REGARDING IMPACTS OF THE PROJECT ON ATMOSPHERIC ENVIRONMENT, MARINE ENVIRONMENT AND ECOLOGICAL RISK ASSESSMENT (MERA)

Two detailed reviews were received which raised issues in these areas, one dealing primarily with issues related to air quality and the second with issues related to the MERA.

Overview (MERA comments):

This review is an example of a scientist disagreeing with the methodology chosen based on professional judgement without providing scientific data to justify the concerns

raised. The methodology chosen for the EIA is accepted by most, if not all, international regulatory agencies. The EIA is very clear that the EIA was carried out using screening level risk assessment assumptions and methodologies. To request that the Proponent should have used as guidance the British Columbian publication “Detailed ecological risk assessment in British Columbia” is not appropriate. This was a screening level assessment carried out by methodologies accepted by both the Federal Government and the Government of New Brunswick. The conservatism within this screening level assessment is discussed fully in the EIA.

The concern that there are no risk management goals presented, as such goals will define acceptable risk indicates that the reviewer is not fully informed on the sequence of events that take place during risk assessment and risk management activities. In addition, the definition of acceptable risk (either HHRA or ERA) comes from society (usually via the socio-political system) not risk assessors or risk managers. Furthermore, if there are clear risk management goals for a project (as requested by the reviewer) there would be no need to carry out any form of assessment. The usual progression is: screening level assessments; more quantitative assessments of risk; design of risk management strategies to lower or mitigate such risks to levels deemed acceptable by governments in consultation with the public.

The reviewer continually stresses the need for a larger conceptual plan for the assessment rather than using a screening level approach. All EIAs use a screening level approach, particularly at this preliminary stage of design.

In a written submission reference to receptor selection, the reviewer asks for risk assessment on “individual birds” rather than “” populations of individual species”. In ERAs, one does not determine risk to individual animals but to populations of species of concern except for those covered by the SAR Act. This review has many examples of statements such as “this is not acceptable” (although the issue raised is accepted by the majority of other scientists with expertise in risk assessments). Comments such as this are not helpful in developing any improvements in the EIA process. The reviewer should

instead provide information on what in a screening level assessment would be acceptable. **The major conclusion from this review of the MERA is the fact that the screening level approach for an EIA is not acceptable to the reviewer. These comments are more generally applicable to the EIA process accepted federally and in the Province of New Brunswick than to this particular EIA study under review.**

Specific issues:

Emission control technologies will only be applied if they are economically feasible. The Panel agrees with the reviewer that emission controls will be required to ensure all New Brunswick air quality standards are met and feel economics should be a secondary factor in their choice. However, at this early design phase it is impossible to recommend specific technologies. The Proponent has stated in the EIA that the final design of the project will incorporate the most up to date emission controls. **It is recommended that this be a condition of approval, as should the development of a plan to measure the effectiveness of the emission control technologies chosen.**

Substantial degradation of the air quality in a relatively clean area is anticipated. The reviewer accepts the conclusion in the EIA Report that after initiation of the project all air quality parameters considered will meet New Brunswick standards. However, there was concern over the potential of the project to degrade the air quality in what is now a “relatively clean area”. In assessing the effects of the project on air quality in the Region the reviewer recommends that the Proponent compares the projected contaminant concentration to the present levels rather than to air quality standards. This is not how risk assessments are conducted. The goal of any risk assessment is to determine whether any risk will ensue from exposure to the projected concentration of a contaminant. This is done by comparing the projected (or measured) contaminant concentration to an air quality objective set by regulatory agencies as a concentration posing no risk to human health or the environment. That is, a determination of risk not a determination of air quality degradation. However, if one is interested in the issue raised

by the reviewer, there are adequate data in the many tables within the EIA to determine whether there will be a marked increase in the present levels of contaminants in the assessment area after initiation of the project.

Supplementary monitoring is not representative of the regional air quality. The reviewer considered the incorporation of five supplementary air quality monitoring sites a "useful activity". However, the time-frame chosen (6 – 8 months) did not allow one to determine the air quality during the summer months. The summer is when winds are predominantly from the south, thus bringing more contaminants from the project area. The reviewer feels at least a full years monitoring would be required in order to develop any meaningful conclusions about changes to air quality in the region. **The Panel agrees with this recommendation. As a condition of approval, it is recommended that the Proponent conduct additional monitoring during the summer months at the five supplementary sites and determine whether the data obtained require changes to the conclusions made in the EIA Report.**

The Base Case is inappropriately defined. This is an important issue. As the reviewer has pointed out, without an appropriate determination of the Base Case it is not possible to determine accurately the cumulative effects of the project on air quality. The Panel notes that one criticism will be answered if the supplementary monitoring was carried out over a one year period and those data are used in the determination of the Base Case. However, there remains a major difference of opinion between the reviewer and the Proponent over the use of a single value to represent the Base Case. The reviewer does not feel one number can represent the air quality for a given chemical over all time and in all situations (meteorological conditions for example). The reviewer states further: "*It is accepted practice to include the regional emissions (including point sources, area sources and natural sources) in a modelling exercise so that meteorological constraints and variability on each source are treated consistently and would be represented by the "Application Case" requested in the final Terms of Reference (P.53).*" It is claimed by the reviewer that the analysis of existing data (TR-10, appendix A Table 5.3) and the model validation exercise (TR-10 Table 6.1a and Appendix C) shows the background

concentration varies dramatically with the weather. It is further claimed that this fact implies that the Proponent has not fulfilled the requirement in the Terms of Reference regarding the completion of air dispersion analyses to assess impacts on air quality under varying weather conditions. **The Panel recommends that as a condition of approval the Proponent provide additional justification for the use of single numbers to represent the existing emission sources in the region rather than modelling the regional emissions as a whole in order to meet fully the Terms of Reference. Since models were used in discussions around PAI and SPM, the Proponent should provide justification for not using similar methodology for other chemicals, in particular CACs.**

The MERA did not consider "whole effluent" as a "COPC". It would be impossible to define what one might consider "whole effluent" at this stage of design. It is premature to attempt to define this issue further. However, from a toxicology point of view this is an important concept. ***It is recommended that toxicity testing of a representative "whole effluent" be required later in the design phase. This would provide assurances that the modelling of individual COPC had indeed identified a lack of risk (lack of additive or synergistic risks).***

The MERA should have included accidents, malfunctions and unplanned events. It is difficult to understand how one can assess the risks from such events except in a general way. This has been done adequately in the EIA Sections 2.9, 5.8 and Chapter 23.

Receptor selection not well documented and did not include entire groups of organisms that may be sensitive (e.g. ichthyoplankton). This subject is adequately covered in Chapter 3 (section3.5.4.3.3), Chapter 13 and TR-015 (Marine & Ecological Risk Assessment Technical Study).

Risks to habitats were not adequately assessed in a similar manner to chemically-related risks. This is an important issue. However, the panel feels there is

adequate discussion of this issue in the EIA Report (Chapter 13) given the extremely early design phase of the project. **However, given the importance of this issue, it is recommended that the Proponent re-assess the risk to fish habitat as the emissions and effluents from the project become better defined.**

CRITIQUE OF EIA MARINE ENVIRONMENT REPORTS RELATED TO ATLANTIC SALMON

Overview:

A reviewer with postgraduate training and work experience related to salmonid fish biology and population management reviewed material in the Comprehensive Study Report and the EIA (including TR-001, TR-005 and Chapter 10) related to potential effects of the Eider Rock project on Atlantic salmon. The same material was reviewed by the Technical Review Committee (TRC). The TRC was satisfied with the information presented in the freshwater aquatic environment and marine environment sections of the final EIA report and generally agreed with the findings.

Given the importance of the VEC – Atlantic salmon, and the nature of the criticisms raised related to methodologies used and the quality of data presented, ***The EIA Panel recommends that the Proponent be asked to present further justification for their conclusions and in some cases conduct further studies in support of their conclusions (see specific issues below).***

Specific Issues:

Whether Atlantic salmon in Mispec River are iBoF salmon – a protected species under SAR Act. As noted by the reviewer no data on the genetic analysis conducted by DFO (or others) were presented in the reports. This lack of reviewable scientific data on such an important point is not acceptable. Given the level of protection afforded the iBoF Atlantic salmon by the SAR Act, this differentiation is extremely important. ***The***

Panel recommends that the Proponent make available the data on genetic analysis of the Atlantic salmon found in the Mispec River and if necessary re-evaluate their conclusions regarding the source of Atlantic salmon in the Mispec River.

Presence, or absence, of Atlantic salmon in the marine PDA and LAA for refinery. Neither the reviewer nor Proponent apparently has data to support their positions – the Proponent says no Atlantic salmon were found (but no field investigations carried out) and the reviewer's contention that they will be there. This latter conclusion is really one of those "faith based conclusions" the reviewer accuses the Proponent of making. ***Since no field investigations were carried out to support either position, the Panel recommends that that the Proponent be asked do a thorough review of all fish surveys carried out over the last few years in the area of concern to determine whether any data exists to support either position.***

Effects of refinery on Atlantic salmon (EIA Report, Chapter 10). The Proponent and reviewer agree that the effect of the refinery on Atlantic salmon may be limited to the effects of changes in the drainage area. However, the reviewer feels this effect is not adequately documented nor are there sufficient data presented to be sure such effects can be mitigated by directing water to the river from elsewhere. In the review of Chapter 10 of the EIA (pgs 52 – 56 of CCNB submission) many examples of what the reviewer considers '*mistakes, false statements and erroneous conclusions"* are presented. If the reviewer is correct these issues need to be addressed and corrected as required. Afterwards the Proponent needs to indicate whether corrections made alter the conclusions reached in Chapter 10, particularly as they relate to possible cumulative effects from the marine development and significance of possible effects to the freshwater drainage area. ***The Panel feels this can best be accomplished by the Proponent meeting with reviewer to discuss the many assertions made on the pages listed above. Furthermore, the Panel agrees with the reviewer that the "Follow-up and Monitoring" described in Chapter 10.7 of the EIA Report be made a condition of approval. The Panel realizes the Proponent has stated this will be***

done prior to construction but the Panel would like it made a condition of approval and changes to the facility design and or the mitigation procedures suggested by these studies be made a mandatory requirement to ensure negligible effects on the Atlantic salmon populations.

Reassessment of "Significant adverse residual environmental effect" for species with special status – abiding with the SAR Act. The reviewer has taken issue with the interpretation of the SAR Act by the Proponent in Chapter 10.1.8 of the EIA Report. ***The Panel recommends the Proponent discuss this interpretation of the SAR Act with DFO to ensure it is correct as stated in the EIA. This issue provides further support for the Panel's recommendation that the Proponent provide the data on genetic analysis of the Mispec River salmon to confirm with some degree of confidence that these salmon are not iBoF stock.***

Possible aggregation of salmon in thermal plume of cooling water outflow – possibility for impingement or entrainment of post-smolts. The reviewer does not agree with the conclusion reached by the Proponent. However, at this stage of the design work for the facility it is difficult to see how this issue can be resolved. ***Given the importance of this issue, the Panel recommends that any approval be made conditional until the Proponent can give more details on the facility design. Once these details are known this issue must be re-evaluated prior to initiation of construction.***

AN OVERARCHING PANEL RECOMMENDATION: The reviewer has raised many methodological issues and disagrees with many conclusions reached with regards to the project effects on Atlantic salmon populations. Given the efforts ongoing to strengthen the Atlantic salmon populations in the PDA, and the importance given by society to these efforts, the Panel recommends that any approval of the EIA contains a condition that the issues raised by the reviewer be carefully reviewed by the Proponent to ensure their conclusions regarding possible effects on Atlantic salmon are valid. No permits for construction should

be issued until the issues related to Atlantic salmon populations have been resolved to the satisfaction of experts on the Technical Review Committee and other fishery experts within the Atlantic Region

CRITIQUE OF THE IMPACT ON COMMERICAL FISHERIES

General Comments on Issues Raised:

Criticism was raised regarding the process and the result of the EIA as it pertains to commercial fisheries of the area. The criticism focuses on deficiencies mainly with respect to the measurement of commercial fisheries activities in the area. More specifically, the review points to “inadequacies in the consultation process, the spatial and temporal factors regarding the commercial fisheries, and the assessment of shipping impacts”.

For the consultation process in the context of the EIA, pertinent information was considered difficult to access. Furthermore, it was suggested that some conclusions may under value actual commercial fishing activity. An example is the gaspereau fishery, where landings are used as lobster bait. The value of this fishery is therefore not measured in sales revenues, but in decreased operational costs as alternative bait would have to be purchased if the gaspereau fishery would not be available to lobster fishermen.

Temporal factors allude to the fact that the analysis was done based on existing fishing seasons, but that those seasons have been modified in the past and may well be modified in the future. They also allude to the estimated revenue per trap, which the reviewer argues varies significantly in terms of season and location, as the lobster fishery is very cyclical. Spatial factors allude to estimates of commercial fisheries activities in the areas, which it is argued is under-estimated. Criticism points specifically to what is perceived as methodological flaws, particularly related to the counting of buoys in order to estimate the number of lobster trap in the area. Part of the criticism

refers to the fact that in periods of strong tidal currents, many buoys would not be visible as they would be under water. The criticism also refers to the fact that the study did not take into account the practice of using two buoys for several traps (up to 30) as fishermen often use lobster trawls, with one buoy at the beginning and one at the end. The review states that additional information was submitted for inclusion in the EIA, but is not reflected in final documents.

The EIA Panel feels the Proponent needs to take all information into account and modify conclusions where the data suggest initial conclusions were erroneous.

A further component of the spatial criticism relates to what is described as “the spatial boundaries of the areas of assessment for the commercial fisheries are incomplete and the EIA reports do not properly assess the number of commercial fishermen likely to be impacted by the project.”

Finally, it has been suggested that there is significant gear losses in the area and the increased traffic will exacerbate this problem. It is argued that mechanisms proposed in the EIA to develop mitigation solutions will not generate desired results.

Specific Issues:

The Review asks for alternative mitigation strategies that include:

- **The establishment of voluntary ship traffic lanes with incentives for compliance or financial compensation for all fishermen who utilize the fishing grounds of Saint John Harbour based on a fair scale and set of criteria.**
- **The participation in the TERMPOL process.**
- **The establishment of a gear loss compensation fund to compensate fishermen who lose gear due to accidents involving ship traffic.**

Traffic lanes and gear loss are discussed in Chapter 14 of the EIA Report. With respect to traffic lanes, the report does make reference to them, but makes no specific suggestions other than to state that the "Proponent will continue to support the work of the Port of Saint John Traffic Committee, and will encourage the use of established approaches by Project-related vessels". It further points out that the establishment and location of shipping lanes is the responsibility of the government agencies responsible for marine shipping and safety.

Gear loss is referred to as an accidental event in Chapter 23. In Chapter 14, the report suggest that "a majority of the Project activities shall occur within the Proponent's water lot and vessel traffic will occur within the Harbour as controlled by the Saint John Port Authority and established shipping lanes, where fishing gear should not be deployed."

There seems to be an agreement that shipping lanes should be used, but the difficulty seems to lie in the process to establish them. The Panel recommends that relevant government agencies responsible for marine shipping and safety should work with all stakeholders to establish shipping lanes, as well as a mechanism to make the process efficient. This should in turn reduce considerably gear loss due to ship traffic.

Furthermore, the Panel recommends that participation in the TERMPOL process be a condition for approval.

CRITIQUE BY A FAMILY OF LOCAL LANDOWNERS

The family owns collectively 179 acres of land located at the centre of the Eider Rock project, between the proposed refinery site and the terminal. Negotiations between the Proponent and the Family have taken place, but no agreement has been arrived at. The family's goal is the sell their property.

The Panel has concluded that the family of landowners would be significantly affected by the Eider Rock project. Consequently, as a condition of approval, the Panel recommends that the Proponent agrees to purchase the property at fair market value.

PERIOD OF APPROVAL

It has been argued that the EIA approval should have a relatively short period before it is no longer valid. A period of three years was suggested during presentations at the public meeting. In a jurisdiction like California, the limit is one year.

The Panel considers that economic conditions as well as technological knowledge changes rapidly and that giving an approval for a long period would not be in the public interest. The Panel thus recommends that approval be given for a limited period, consistent with provincial regulations and that the number of years should be as limited as possible.

Appendix 1: Presentations at public meeting and/or submissions of written documents:

- Conservation Council of New Brunswick and Fundy Baykeeper (Written submission)
- Curry, Tim – Atlantica Centre for Energy (Written submission)
- Dalzell, Gordon (Presentation at public meeting and written submission)
- Debly, Theresa (Presentation at public meeting)
- Griffin, David (Written submission)
- Harding, Allan R. (Written submission)
- Harris, David on behalf of the Harris Family (Presentation at public meeting and written submission)
- Kidd, Scott – Conservation Council of New Brunswick (Presentation at public meeting)
- Milewski, Inka (Presentation at public meeting)
- Prosser, Gary (Presentation at public meeting)
- Recchia, Maria – Fundy North Fishermen's Association (Presentation at public meeting)
- Recchia, Maria, Melanie Wiber and Darcy J. Dignam – Fundy North Fishermen's Association (Written submission)
- Thompson, David (Presentation at public meeting)
- Tippett, Paula (Presentation at public meeting and written submission)

Appendix 2: UNITS ACRONYMS AND ABBREVIATIONS

ug/m^3	micrograms per cubic metre
ALKYL	alkylation unit
CAC	criteria air contaminant
CCNB	Conservation Council of New Brunswick/Fundy Baywatch
CEMS	continuous emission monitoring system
COPC	chemicals of potential concern
CSD	Statistics Canada census subdivision
DFO	Department of Fisheries and Oceans Canada
EIA	environmental impact assessment
ERA	ecological risk assessment
GHG	greenhouse gases
H_2S	hydrogen sulphide
HHRA	human health risk assessment
HHERA	human health and environmental risk assessment
iBoF	inner Bay of Fundy
ILCR	incremental life-time cancer risk
LAA	local assessment area
NB	Province of New Brunswick
NBENV	New Brunswick Department of the Environment
NOx	nitrogen oxides
OMOE	Ontario Ministry of the Environment
PDA	project development area
RAA	regional assessment area
SAR	species at risk
SCR	selected catalytic reduction
SHU	selected hydrogenation unit
SJ	City of Saint John New Brunswick
SP	Simonds Parish New Brunswick
SOx	sulphur oxides
TRV	toxicity reference value
VEC	valued environmental component
VOC	volatile organic compound(s)

Amended
Project Description:
Project Eider Rock

Irving Oil Company, Limited
Saint John, New Brunswick

Project No. 1013263.06

Table of Contents

List of Figures

2.0 PROJECT DESCRIPTION

A description of the Project is provided in this chapter. The chapter is organized as follows.

- First, the Marine Terminal and Other Marine-Based Infrastructure of the Project, including but not limited to the marine terminal itself, jetty, berths, and barge landing facility, are described.
- Project alternatives, including alternatives to the Project and alternative means of carrying out the Project, are described.
- A brief description of how the Project facilities and infrastructure will be constructed, operated, and ultimately decommissioned and abandoned at the end of their service life is also provided.
- Finally, a brief discussion of the emissions and wastes associated with the Project is provided.

2.1 Project Infrastructure

2.1.1 Overview

The marine terminal consists of integrated berths on a common trestle for the transfer of crude oil, for the existing Saint John refinery, and in the future for refined products to and from vessels berthed at the terminal. A barge landing facility for unloading large equipment modules during Construction of the jetty is also required. The existing single buoy mooring (SBM, also known as the monobuoy) at Canaport will continue to be used for crude oil tanker unloading, as currently. The marine terminal would provide flexibility and reliability for the unloading operations currently conducted at Canaport.

The Marine Terminal and Other Marine-Based Infrastructure to be constructed and operated includes:

- Facilities for the receiving and unloading of crude oil and intermediate feedstocks from other refineries, consisting of new crude oil berths fitted with infrastructure for the transfer of crude oil, to be constructed on a common jetty with other berths;
- Facilities for the future transfer of finished petroleum products (consisting of product transfer berths fitted with infrastructure for the transfer of products); and
- A barge landing facility for unloading large modules during Construction, constructed on a temporary or permanent basis.

Additionally, though not subject to *CEAA*, future pipelines connecting the marine terminal to the existing Saint John refinery would be constructed to provide redundancy to and improve reliability of the existing pipelines currently used for this purpose. The pipelines would be constructed to avoid the need for authorizations that are *CEAA* triggers (*i.e.,* would be conducted using directional drilling or spanning bank to bank for watercourse crossings).

The marine terminal will serve to transfer the crude, intermediate feedstocks, and finished products, for the existing Saint John refinery as well as for the possible trans-shipment of petroleum products and other products in the future, should these commercial opportunities arise. Further details on the marine terminal facilities and infrastructure are provided in the following sections.

2.1.2 Geographic Location

The marine terminal will be located within the Port of Saint John, proximal to the existing marine terminal currently operated by Canaport Limited, an affiliate of the Proponent. The marine terminal facilities will be constructed mostly within the submerged water lot owned by the Proponent, which is associated with its existing Canaport operations, surrounded by submerged Crown land. The general location of the various infrastructure associated with the Project is shown in Figure 2.1. The location and preliminary layout of the marine terminal is provided in Figure 2.2. It is noted that the configuration, location, layout, and/or alignment of marine terminal structures and other marine-based infrastructure (*e.g.,* jetty and barge landing facility) is preliminary and may vary slightly from that presented herein. The marine terminal that is ultimately built could be of a smaller size than envisioned herein, but would be constructed at the same location and in a manner similar to that shown herein and its footprint and environmental effects would be within the envelope of that described herein and to be assessed in the EA of the Project. Any changes to these structures that might arise as a result of engineering are not expected to increase the overall footprints or substantially change the environmental effects resulting from their construction and/or operation.

Connections to shore will be located along the coastline between Deep Cove and Mispec Point. A trestle/jetty structure up to approximately 1,300 m long will contain several berths accessed by a common trestle, to be used for petroleum product and crude transfer. The jetty will be connected to shore via a trestle, approximately 450 m in length. A smaller berth for smaller vessels and barges may be built approximately 300 m offshore, on a separate jetty that is mounted on the same trestle as the other jetty.

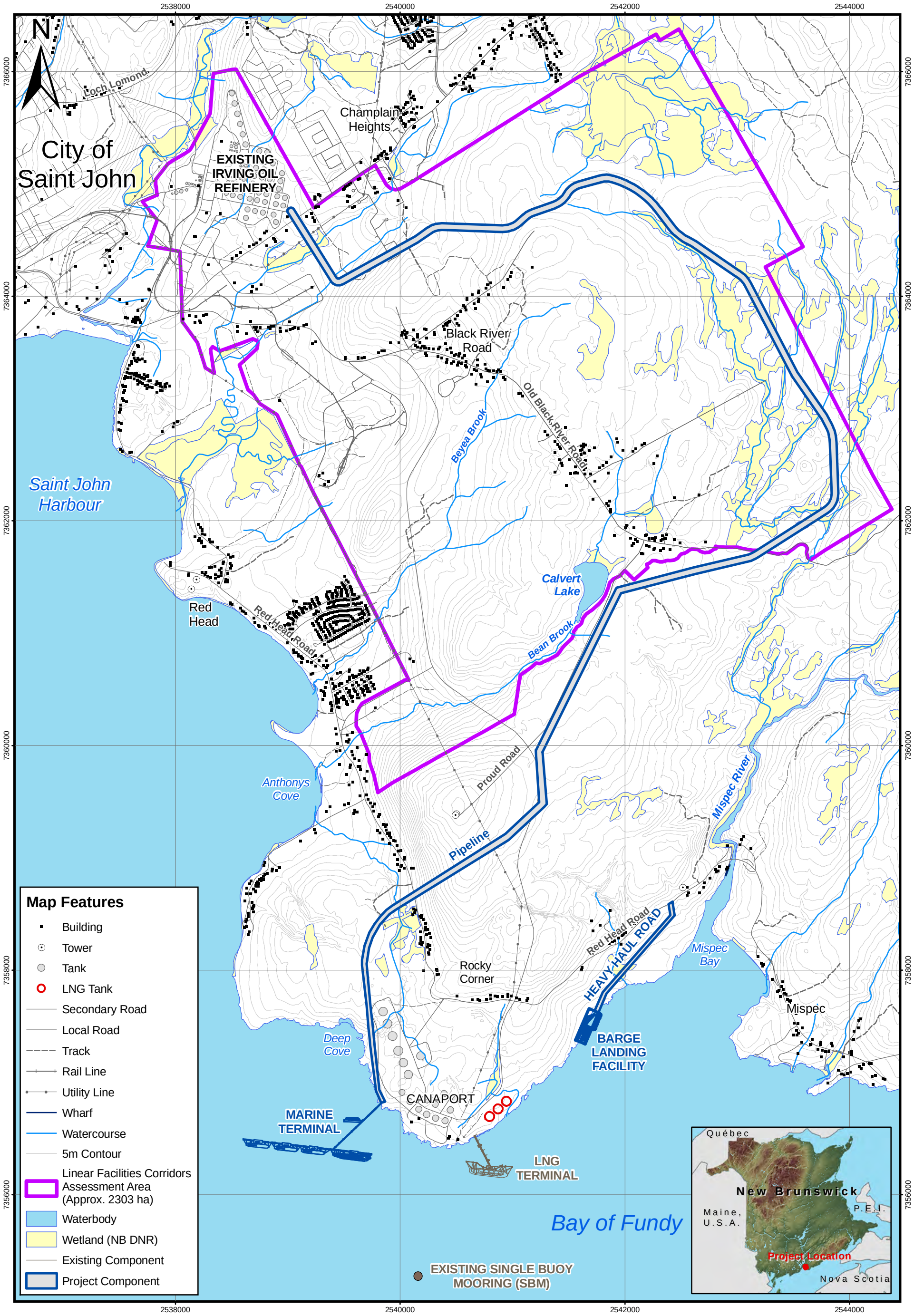
The marine terminal will be located offshore where sufficient draft for the anticipated vessels is available, thereby eliminating the need for substantial dredging of the sea floor to facilitate navigation. Some limited dredging, cleaning and/or levelling of the sea floor may ultimately be required where piles, caisson, or jacket structures would be installed for the jetty and trestle construction.

While the siting of these marine facilities is generally well understood according to the details provided in Figure 2.2, their precise location and configuration may be adjusted as necessary to allow for their technically and economically feasible constructability and to minimize environmental effects. The precise location, configuration, and construction of the jetty and trestle structure will thus be determined as part of a detailed engineering design and will be provided in the application for a permit under the *Navigable Waters Protection Act* (*NWPA*).

2.1.3 Description of the Marine Terminal Facilities

The Project would be constructed to facilitate the transfer of crude oil required as a raw material for the existing Saint John refinery, to improve the reliability of and provide redundancy for the existing SBM and possibly facilitate the future transfer of products onto ships for transportation to intended markets. The marine terminal will consist of the following elements:

- Berths for the transfer of crude oil, intermediate feedstocks, and finished petroleum products between ships and the terminal; and
- A barge landing facility, constructed on either a temporary or permanent basis, for unloading large equipment during Construction or as required thereafter.



Map Parameters
Projection: NB Stereographic
Scale: 1:32,000
Date: April 13, 2010
Project No.: 1013263.

Data Source: Service New Brunswick, NB DNR, Fluor, Sandwell Engineering Inc.

Figure 2.1
Location of Major Project Components

0 0.5 1 2
Kilometres

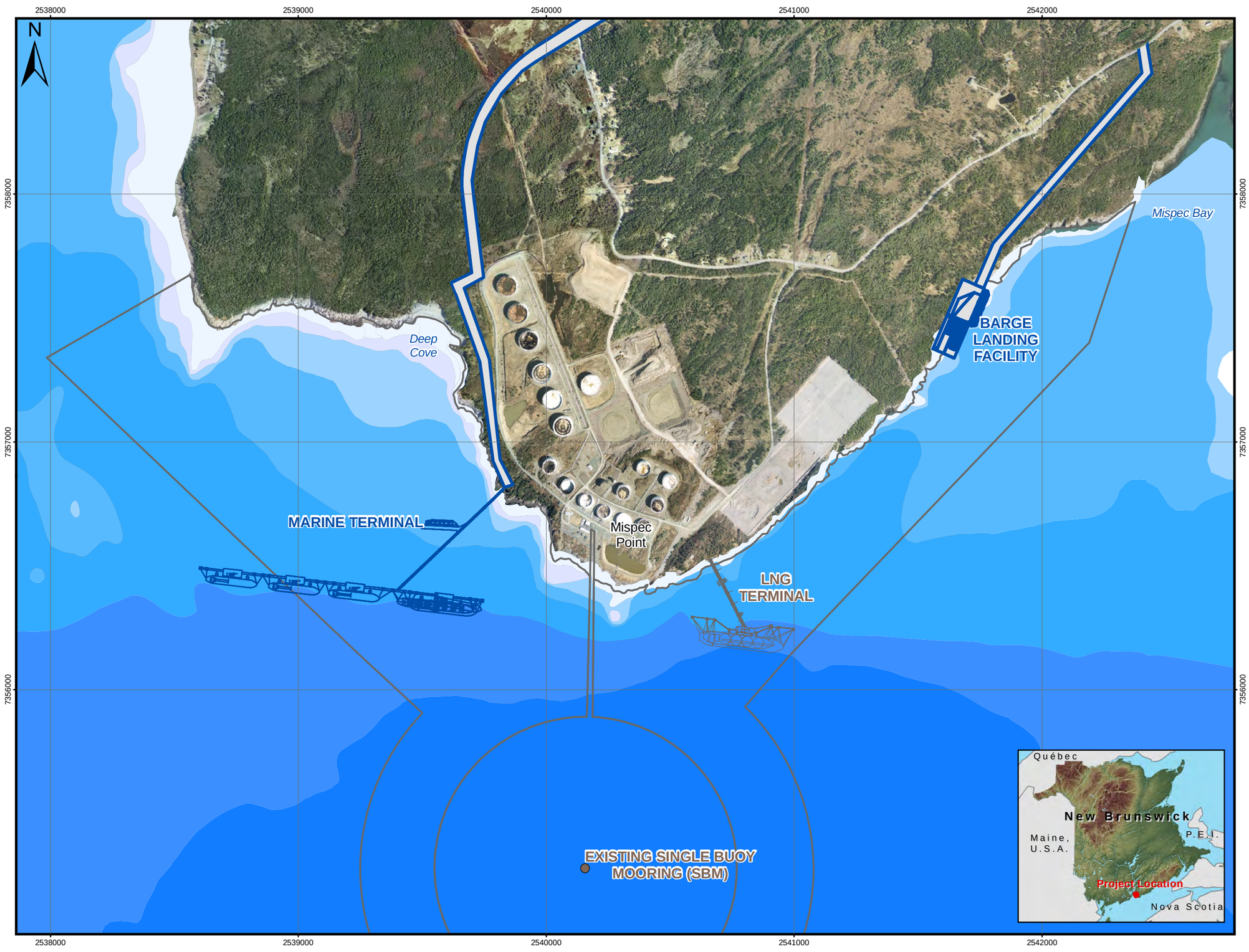
Project Eider Rock

Jacques Whitford

Figure 2.2

Location and Conceptual Layout of Marine Terminal

Project Eider Rock



Map Features

- Marine Terminal
- Existing Component
- Project Component
- Canaport Water Lot Boundary

Bathymetry

- 0-2m
- 2-5m
- 5-10m
- 10-20m
- 20-30m
- 30-40m
- 40-50m

0 100 200 400 600 800
Metres

Map Parameters
Projection: NB Stereographic
Scale: 1:15,000
Date: April 14, 2010
Project No.: 1013263.
Data Sources: City of Saint John, GIS Division, Service New Brunswick, Fluor, Sandwell Engineering Inc., Canadian Hydrographic Service

Jacques Whitford

The marine terminal will also include piping and loading arms for crude oil and finished products, fire detection and fighting equipment, a gas detection system, lighting and electrical distribution systems, and navigational aids (including docking radar and fog horns).

Further details on the facilities to be constructed and operated as part of the Project are provided in the following sub-sections.

2.1.3.1 Jetty

A jetty for the transfer of crude oil intermediate feedstocks will be constructed approximately 650 m to the northwest of Mispec Point. Finished products may also be transferred to and from the ships using the jetty in the future. The jetty will be sited offshore where sufficient draft for the anticipated ships is available, eliminating the need for dredging of the sea floor to accomplish navigation. A single trestle, approximately 450 m in length would be constructed to connect the jetty to shore. A conceptual rendering of the jetty and trestle structure is provided in Figure 2.3.

Figure 2.3 Conceptual Rendering of Marine Terminal (Jetty and Trestle Structure)

The jetty will consist of up to five berths for ships to dock to the marine terminal, and could be configured as follows.

- One crude oil berth, approximately 350 m in length, will be located at an approximate 20 m depth. This berth will facilitate the docking of a one crude tanker sized between 70,000 and 165,000 dead-weight tonnes (dwt).

- Smaller berths, approximately 630 m in total length, will be located at an approximate 20 m depth for unloading smaller ships, as well as for loading finished products onto ships in the future. These berths will facilitate the simultaneous handling of cargo with product tankers sized between 37,000 and 165,000 dwt.
- One berth/platform will be constructed on a separate jetty from the other berths (though on the same trestle), located approximately 300 m offshore to facilitate loading of smaller coastal barges or ships. This berth will be connected to the single trestle common to all berths.

Piping supported by the trestle will convey crude and potentially finished products between the jetty and the existing tankage at Canaport. Initially, the existing pipeline linking Canaport to the existing Saint John refinery will be used to transfer the crude unloaded at the marine terminal to the existing refinery.

2.1.3.1.1 Jetty and Trestle Structure

The marine terminal will consist of a jetty and trestle connected to the sea floor by supporting structures. Depending on the supporting structure selected, some dredging or side casting of sea floor material will be required. Two options are being considered for the supporting structures of the trestle and jetties in the marine environment:

- A jacket structure; or
- A caisson structure.

Additionally, regardless of the option selected for the supporting structures of the jetty, the trestle in the near-shore area will be supported by pile structures on the sea floor.

Each supporting structure and method of construction is discussed briefly below.

Option 1: Jacket Structure

The jacket is a three-dimensional, steel space frame that rests on the sea floor and extends approximately 11.6 m above the mean water level (MWL) and approximately 7.8 m below MWL. Steel piles are inserted into the tubular jacket legs and driven into bedrock. The construction of a typical jacket structure is shown schematically in Figure 2.4.

Under current design alternatives being considered, approximately 67 jacket structures would be required. This design would require the preparation of the sea floor over an area of approximately 19,815 m^2. Based on the alternatives being considered, the total volume of material to be dredged is approximately 59,409 m^3. Regardless of method of construction chosen, the dredging and disposal activities associated with the construction of the jetty/trestle structure will be conducted under a Disposal at Sea Permit to be obtained from Environment Canada.

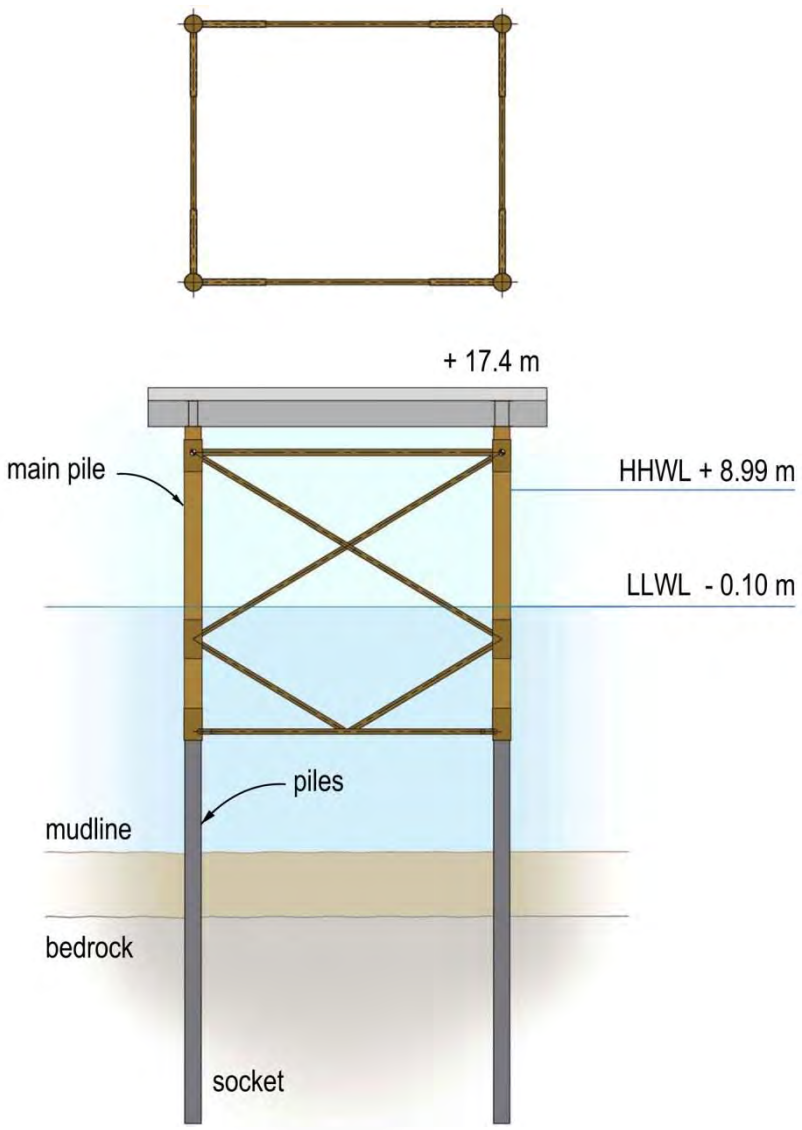


Figure 2.4 Schematic of Typical Jacket Structure

Option 2: Caisson Structure

A caisson is a hollow concrete or steel cylinder that would be fabricated onshore and floated to the marine terminal site by tugboats. Once in the proper location, each cylinder would be sunk into position and filled with rock until it is stabilized. Each caisson would be 25-28 m in diameter, and sit on a mattress of rock fill, with either a permanent rock-placed ring surrounding it or the use of a temporary steel caisson to prepare the surface for placement of the permanent caisson. The rock fill placed around the full circumference of the caisson will provide scour protection. The construction of a typical caisson structure is shown schematically in Figure 2.5.

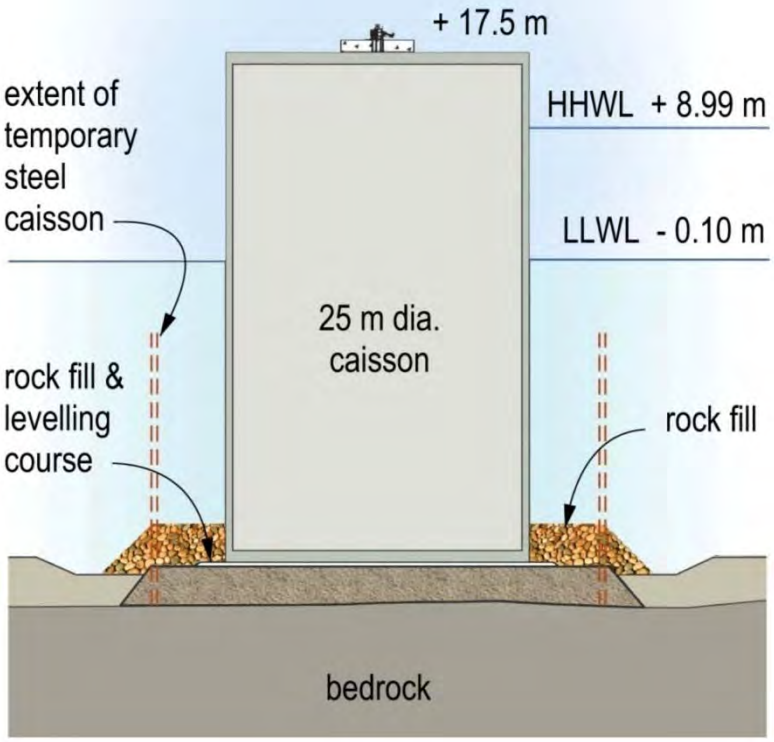


Figure 2.5 Schematic of Typical Caisson Construction (Temporary Steel Caisson Method)

Under current design alternatives being considered, up to 39 caisson structures would be required. Based on the alternatives being considered, this design would require the preparation/dredging of the sea floor over an area of up to 118,457 m^2. The total volume of material to be dredged is up to 250,541 m^3.

It is important to note that the area of sea floor and volumes of material to be dredged, as listed under Options 1 and 2 above, are limited to the areas of physical disturbance only, and currently do not include the entire area influenced by potential dredging, side-casting, and/or the disposal of spoils. However, once the construction method and disposal method for the spoils have been confirmed following engineering design, the volumes and affected areas will be updated accordingly, and appropriate habitat compensation will be developed.

Piled Access Trestle

Regardless of whether jackets or caissons are ultimately selected for the construction of the jetty, the common trestle from shore leading to the jetty will be constructed by piling due to shallow water depth at the shore end of the trestle. A pile structure would consist of hollow steel piles about 1 m diameter. Sockets would be drilled into bedrock. The socket and the bottom portion of the steel pile would be filled with concrete. Under current design, approximately 48 piles would be required. The area of the sea floor covered by the piled access structure and the volume of material to be dredged are

incorporated in the above areas and volumes for the jacket structure or the caisson structure. A schematic of the pile construction method is shown in Figure 2.6.

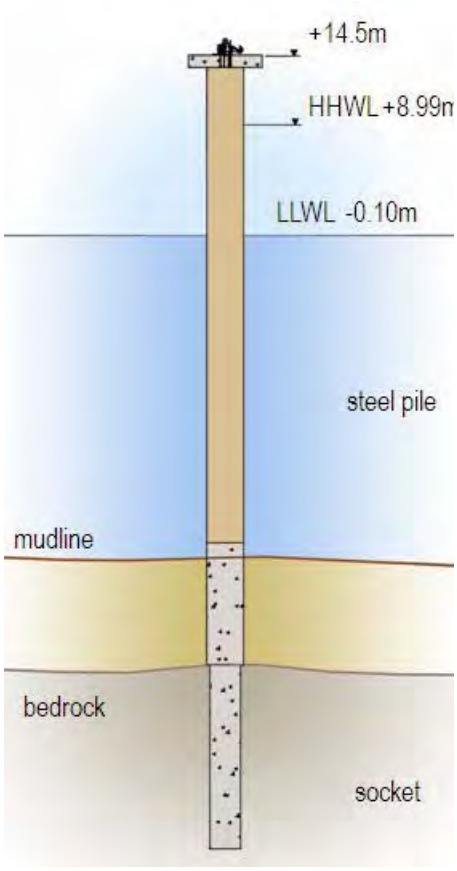


Figure 2.6 Schematic of Pile Construction

The preferred structure will be determined following an analysis for each competing design. For the purpose of the EA to be conducted under *CEAA*, both construction and support structure options (jacket/pile or caisson/pile) for the jetty and trestle have been carried and assessed.

2.1.3.2 Oil Handling and Transfer Facilities

The marine oil handling and transfer facilities will consist of the infrastructure required for the transfer of crude oil and intermediate feedstocks from tankers, as well as the transfer of finished products onto tankers in the future. The infrastructure will include loading arms that facilitate the transfer of crude oil with crude tankers and finished products, and piping that facilitates the transfer the feedstocks or products between the ships and shore.

2.1.3.2.1 Loading Arms

Loading arms are used for both the loading of, and discharging of liquid cargoes between ships and the jetty. Each loading arm will consist of a pair of counter-balanced pipe sections connected by a swivel joint. The base of the arm will be connected to the jetty, while the end of the arm will be coupled to ship's valves. Moveable joints at each end of the arm will allow for freedom of movement to accommodate wave and tide action induced on the ship. The loading arms will be equipped with hydraulic positioning controls, automatic shut-off valves, an emergency release coupling, and a manual

quick connect/disconnect coupler. Secondary containment for pipe and associated fittings will be provided.

The loading arms will be designed to operate within a pre-determined range of motion and their position will be continuously monitored by sensors. If the ship drifts too far from the dock, the sensors will engage the automatic shut-off valve built into each arm system and the transfer of oil stops. Because oil flow is automatically interrupted in such emergency situations with this design, thereby minimizing the potential for spills, it is not necessary to boom vessels during transfer of crude or finished products.

Each loading arm will have an emergency release system, whereby two valves on the end of the arm will close and split apart should the vessel be drawn from the berth unexpectedly. There will be an area around each arm that will capture any potential spills. This area will rely on curbs and a sump with a sufficient capacity to hold the entire contents of one arm. If there is contaminated water in the sump, the contents will be pumped into a truck on the shore.

2.1.3.2.2 Piping

Piping is required to facilitate the movement of crude oil and products on the jetty and trestle, and to transfer crude oil and finished products between tankers and the existing storage tanks located on shore.

2.1.3.3 Barge Landing Facility

A barge landing facility for the unloading of jetty components during Construction is required. The barge landing facility will be generally located along the shoreline in an area known as Russell's Beach, located between Deep Cove and Mispec Bay, with the precise location to be determined. The barge landing facility may be decommissioned following Construction, or may remain in place permanently following construction for other uses. A conceptual rendering of the barge landing facility is provided in Figure 2.7.

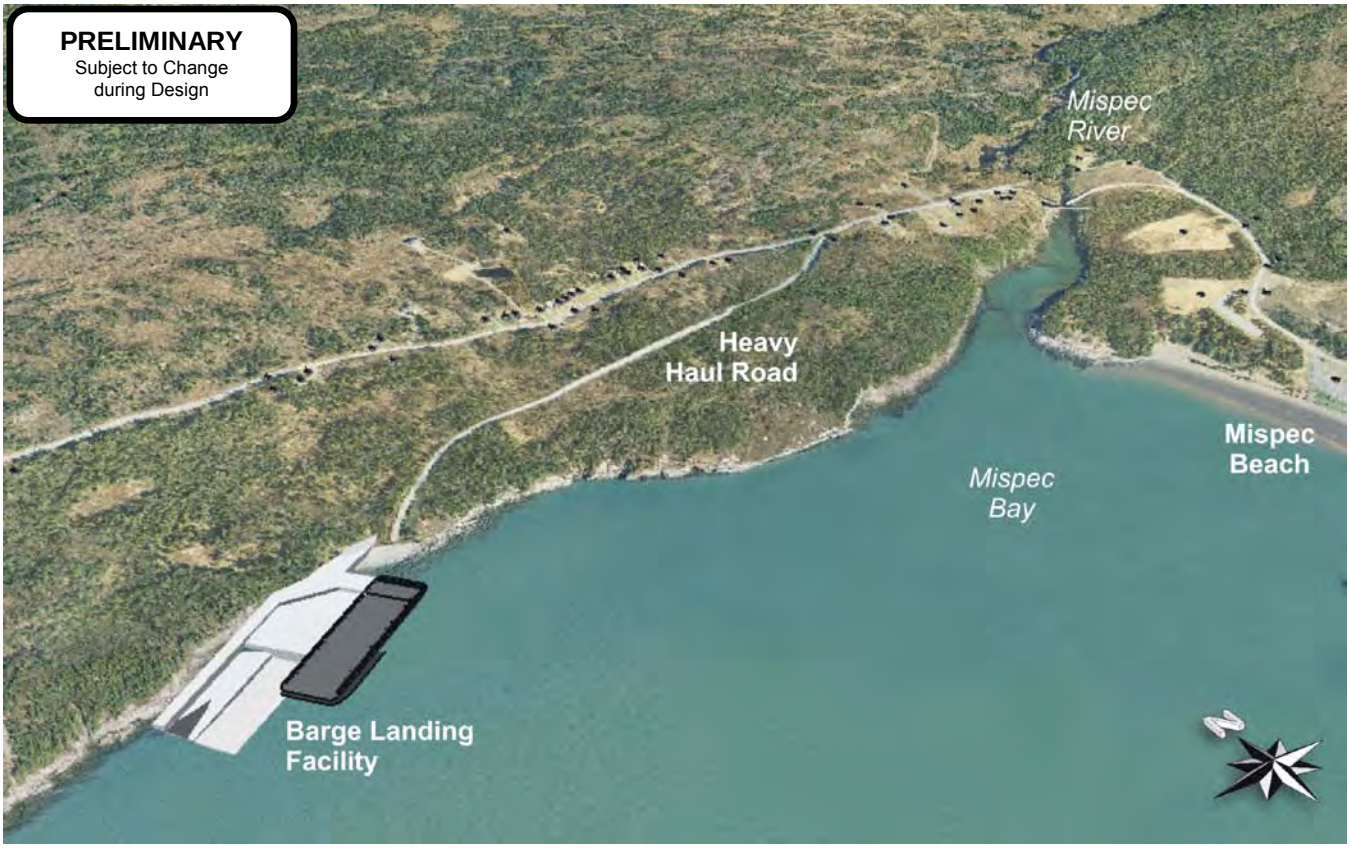


Figure 2.7 Conceptual Rendering of Barge Landing Facility

The barge landing facility, covering an area of approximately 3.5 ha, will consist of a dock and mooring points. As the coast at the proposed location is relatively steep and rocky, a substantive amount of rock and earth will be required to be added or removed, depending on if the dock is cut into the shore or built out into the sea, for the construction of the barge landing facility, particularly to build up the approach to the dock. The majority of the construction for the barge landing facility will be accomplished by blasting on land. There is no planned dredging of the marine environment to accomplish construction, although side-casting is possible. At this early stage of engineering design, it is estimated that an area of approximately 24,000 m^2 in the near shore will require blasting in order to accomplish construction of the barge landing facility. If any infilling of the marine waters or blasting are required below the ordinary high water mark (to be determined as part of detailed engineering design), the precise areas to be in-filled or blasted and the quantities of lost fish habitat will be clarified during permitting of the Project and provided as part of the HADD authorization application. DFO blasting guidelines will be followed.

2.1.4 Linear Facilities

2.1.4.1 Pipelines

Initially, the existing crude pipeline between the existing Canaport marine terminal and the existing Saint John refinery will continue to be used for the transfer of feedstocks for the existing refinery. In the future, new pipelines may be constructed to connect the marine terminal to the existing Saint John

refinery, to provide redundancy to the existing crude pipeline and to facilitate the future transfer of products to and from the new marine terminal.

The precise number of pipelines to be built has not been determined, but they would be constructed in a corridor shown on Figure 2.1 between the marine terminal and the existing Saint John refinery. All watercourse crossings for pipelines will span the width of the watercourse from bank to bank or be directionally drilled under the watercourse, such that no disturbance of the stream bed or its banks (up to the ordinary high water mark) is required. The construction activities conducted within 30 m of a watercourse or wetland will require a provincial watercourse and wetland alteration permit. Construction of the pipelines while avoiding any disturbance of the stream bed or its banks will be carried out in such a manner that, authorizations for harmful alteration, disruption or destruction (HADD) of fish habitat under the federal *Fisheries Act* or permits under the federal *Navigable Waters Protection Act* (*NWPA*) are not required for these structures.

A Linear Facilities Corridors Route Selection Technical Study (Jacques Whitford 2009) was conducted in support of the EIA of the Project under the New Brunswick *Environmental Impact Assessment Regulation*, and Section 3.5.6 of the provincial EIA Report documents the route selection process, constraints, alternatives considered, and outcomes (preferred and alternative alignments), to support permitting of the Project. The preferred facilities corridor shown in Figure 2.1 was identified, within which the pipelines will ultimately be sited, constructed and operated. Note that the preferred linear facilities corridor assessed in the provincial EIA Report considered the use of the corridor for routing various linear facilities; however, the construction of a rail line, water mains, a service road, and electrical transmission facilities within this corridor is no longer envisioned.

2.1.4.2 Marine Terminal Area Access

Access to the marine terminal will be provided via existing roadways and entrances. The main truck and passenger vehicle access to the storage tank area and marine terminal will be via Bayside Drive and the Canaport entrance.

2.1.4.3 Heavy Haul Road

A heavy haul road will be constructed for transporting very large modules and equipment to and from the barge landing facility during Construction. The specific alignment and construction of the heavy haul road has not been confirmed at this time, although its general location is shown in Figure 2.1.

The heavy haul road is expected to be approximately 36 m wide and limited to less than a 6% grade, to allow the movement of large pieces of equipment required during construction of the marine terminal.

2.2 Construction

2.2.1 Construction and Installation of Jetty and Other Marine-Based Infrastructure

The construction of the Project includes:

- Land-based site preparation of the barge and trestle landings;
- Preparation of the sea bed, including dredging or side-casting, and installing the support structures (piles and jackets or caissons) on the sea floor;

- Installation of the trestle and jetty support structures and deck; and
- Fitting the marine terminal with equipment to facilitate the transfer of feedstocks and/or products.

The majority of the marine terminal will be constructed using barges equipped with on-board, heavy-lifting cranes. Major jetty components (*e.g.,* jackets) would be fabricated off-site and barged to the site for installation at the appropriate location on the sea floor. Once the structure is completed, large equipment (loading arms and piping) will be installed on the jetty using barges where necessary or land-based vehicles. Smaller equipment would be delivered to the marine terminal by truck for installation.

The major pieces of equipment will be delivered to the marine terminal as packaged units (*e.g.,* the piles and jacket structures or caissons) and installed as required. Equipment to be installed on the jetty and trestle include loading arms, mooring points, pipelines, fire suppression equipment, and ancillary equipment. The equipment installation is expected to be relatively straightforward and result in minimal environmental effects, with careful design and execution of the installation tasks.

2.2.1.1 Site Preparation and Installation

Land-based site preparation for the marine terminal would likely include blasting for the heavy haul road down to the barge landing facility, and for the terminal trestle landing. No blasting is expected to be required below the water line or within the inter-tidal zone for the marine jetty/trestle structure, but some blasting is expected to be required for the construction of the barge landing facility. The amount of blasting would depend on the final elevation and required slopes determined during engineering design.

Site preparation is also required for the sea floor. In order to install the structures on the sea floor, unconsolidated sea bed material will likely be swept/side-cast. Some limited dredging may be required. The quantity of dredged material varies depending on the supporting structure selected for the marine terminal, as discussed previously. Following sweeping/side-casting, bedding material may be required, based on the stability of the sea bed. Following preparation of the sea floor, barges and cranes would lower the structures into place.

2.2.1.1.1 Blasting

Blasting times and locations will be controlled to minimize risk to non-blasting construction workers and noise nuisance to the surrounding area. Blasting activity will only be carried out during daylight hours, Monday to Saturday, in order to minimize noise nuisance to surrounding neighbours. Pre-blast surveys and sampling of potable water wells will be conducted at all owner-occupied residences within 500 m of the proposed blasting activity. As required, vibration monitoring during the blast will also be conducted in accordance with the *Blasting Code* under the New Brunswick *Municipalities Act*. Any blasting on land and in close proximity to freshwater or marine fish habitat will be carried out to the extent feasible in accordance with DFO's *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters.*

2.2.1.1.2 Pile Driving

The design philosophy is to use mass concrete foundations anchored where necessary. Extensive piling is not expected. However, in areas where soils are not geotechnically stable enough for construction of the units, pile driving will be necessary. Where this is required, piles will be driven by conventional impact pile drivers. The number of piles required will be confirmed in the design phase.

Where piling is required, piling times and locations will be controlled to minimize risk to construction workers and noise. Piling activity will be carried out during daylight hours, Monday to Saturday, wherever feasible. Periodic vibration monitoring will also be conducted.

2.2.1.2 Dredging and Disposal

As mentioned above, some side-casting is required for site preparation. Some limited dredging may also be required to facilitate the installation of the jackets and piles. If selected, caisson structures may require more extensive dredging. However, navigational dredging and disposal is not expected to be required.

The transfer berths will be located off-shore where sufficient draft is available for the anticipated vessel type, thus avoiding dredging to the extent possible. Side-casting is not expected to require transportation of material away from the structures. Dredged material removed during dredging activities (if required) will be disposed at an approved disposal at sea site, likely at the nearby Black Point ocean disposal site. Although a Disposal at Sea permit is not required for these activities considered to be normal operation of a vessel, environmental quality associated with the disposal of drill cuttings will be assessed and any potential concerns addressed by Environment Canada under Section 36(3) of the *Fisheries Act*. Overall, ocean disposal of dredge spoils will be conducted in accordance with a Disposal at Sea permit obtained under the *CEPA.*

Water and suspended sediments from the drill cuttings return mixture will be allowed to settle and will be monitored to meet regulated discharge criteria prior to being released over the side of the drill barge. Cuttings will be stored and returned to shore for disposal in an approved landfill or at sea under the authority of a Disposal at Sea permit.

2.2.2 Marine Vessel Berthing and Deberthing

2.2.2.1 Marine Vessel Transportation and Unloading

The established shipping lanes in the Bay of Fundy will be used by construction vessels for equipment deliveries associated with the construction of the Project. The final details of the route and site-specific guidelines/procedures for marine vessel transportation will be established once the final design of the marine facilities has been completed.

The majority of the marine terminal will be constructed using barges equipped with on-board, heavy-lifting cranes. Once the structure is completed, large equipment (loading arms and pipelines) will be installed on the jetty using barges where necessary or land-based vehicles. Smaller equipment would be delivered to the marine terminal by truck for installation.

2.2.3 Marine Terminal Operation

The marine terminal will develop safety procedures and contingency plans to minimize the risks of an accident or unplanned event throughout the life of the facility. The Proponent has committed to completing a TERMPOL review process (2001 edition) at the appropriate time following the completion of the EA for the Project and when sufficient design information is available. TERMPOL is a voluntary process directed by Transport Canada to evaluate operational ship safety, route safety, and management and environmental concerns associated with the location, construction and operation of a marine terminal handling bulk petroleum products and related concerns. The scope of the TERMPOL review process would likely be focused on the new marine terminal, and not incorporate the ongoing existing operations at the Canaport Limited SBM and marine terminal.

The berthing and deberthing of ships at the marine terminal will require tugboats and the development of dedicated navigation procedures. These activities will be included in the TERMPOL review process.

2.2.3.1 Anchorage of Marine Vessels

Temporary anchorage may be required for construction vessels or equipment barges due to weather or enforced exclusion zones. Currently, there are four anchorages in the Saint John Harbour area (designated as Anchorages A, B, C, and D).

2.2.3.2 Berthing and Deberthing of Vessels at Barge Landing Facility

Heavy, oversized components will be delivered to the Project site via the barge landing facility. The barges will then barge the pre-fabricated components to the Project site where they will be unloaded into place with on-ship cranes. In general, barges would depart at the end of the shipping lanes and approach the barge landing facility from the southwest and proceed north to the facility. During unloading, barges will be held in place using on-board thrusters or tug boats.

2.2.4 Construction Schedule

Construction of the Project, subject to approval under *CEAA* and the New Brunswick *EIA Regulation*, is anticipated to be carried out over an appropriate two to three year construction period. Construction would be initiated when the Proponent determines it to be technically and economically feasible to construct the Project, and following regulatory approvals.

Prior to the commencement of Construction, the Proponent will notify the appropriate regulatory agencies and stakeholders.

2.3 Operation

2.3.1 Marine Vessel Berthing and Deberthing

2.3.1.1 Shipping Activities

The Project is not expected to significantly affect volumes of material shipped in the Bay of Fundy during Operation, as the Project is intended to supplement and provide redundancy to infrastructure currently used for unloading or loading ships currently serving the existing Saint John refinery.

Shipping is not included as part of the scope of the EA under *CEAA*, although is discussed briefly herein for context.

All tanker traffic in the Bay of Fundy is monitored by the Canadian Coast Guard's Marine Communications and Traffic Services (MCTS) centre. Tanker traffic within Saint John Harbour is assisted by the Atlantic Pilotage Authority (APA) and the Saint John Port Authority. All tanker traffic is via two established shipping lanes (one for entry and one for departure from the Bay of Fundy). The existing shipping lanes were established for navigational safety of vessels within the Bay of Fundy transiting between Saint John and the Atlantic Ocean. There are no shipping lanes within Saint John Harbour, but there are four anchorages in the Saint John Harbour area.

Vessels associated with the new jetty will use the established shipping lanes and existing anchorages in the Bay of Fundy. All Irving Oil owned and operated ships are double-hulled.

2.3.1.2 Marine Vessel Transportation and Crude Oil Transfer

Ships of various sizes will be used to supply crude oil and intermediate feedstocks to the existing Saint John refinery and to possibly transport intermediate products and products to markets in the future. Typical ship classes include:

- VLCC (Very Large Crude Carrier), with a capacity of approximately 2,100,000 barrels (bbl) of crude;
- Suezmax – approximately 1,000,000 bbl capacity of crude;
- Aframax – approximately 650,000 bbl capacity of crude or product;
- Smaller product tankers will transport feedstocks and products (*e.g.,* gasoline, Eurodiesel, ULSD, VGO, naphtha, and vacuum residual) to and from Saint John.

The established shipping lanes in the Bay of Fundy and other existing established routes will continue to be used. Temporary anchorage will continue to be used for tankers due to traffic, weather or enforced exclusion zones.

2.3.1.3 Berthing and Deberthing of Vessels at the Existing SBM and Transfer Berths

Berthing and deberthing procedures for tankers that use the existing SBM are already well established. The VLCC ships would be expected to follow these procedures.

For other vessels, the berthing and deberthing procedures will be established following the completion of the TERMPOL review process, in consultation with stakeholders. However, in general, crude and product tankers would depart at the end of the shipping lanes and approach the Project from the southwest towards the terminal, then northward towards the proposed berth. Final manoeuvring in the vicinity of the new berths will be east to west or west to east.

Exclusion zones or navigational restriction on the movement of tankers and support vessels may be permanently or periodically established in the interests of safe navigation. These exclusion zones or navigational restrictions would be established and posted in the "Practices and Procedures" by the Saint John Port Authority as per Section 56(1)(b) of the *Canada Marine Act*. Advance notice would continue to be made to fishers of tanker arrivals and departures as currently occurs.

2.3.2 Crude Oil and Product Transfer

The transfer of crude oil from tankers at the existing SBM is already well established. The use of the new marine terminal will not alter these procedures.

At the berth, loading arms would be connected to the vessel to facilitate the transfer of crude oil or products. The arms are designed to operate within a pre-determined range of motion and their position is continuously monitored by sensors. If the ship drifts too far from the dock, the sensors would engage the automatic shut-off valve built into the arm system and the transfer of crude or product stops.

2.4 Decommissioning and Abandonment

The Project will be designed, built, and maintained to operate efficiently for at least its anticipated life span (minimum 30 years, but likely extended by refurbishment or maintenance). Eventually, the marine terminal will be decommissioned and abandoned. A Decommissioning and Abandonment Plan will be developed. The Plan will have a contingency to allow for shutdown at any time during the anticipated project life and will contain measures to achieve targeted environmental goals. At that time, all structures will be dismantled and removed from the site. Any hazardous materials will be collected and disposed of at a government approved hazardous material disposal site. Disturbed areas (shore landings) will be landscaped and re-vegetated. In the event of decommissioning, a more detailed plan will be developed in accordance with applicable regulations.

2.5 Emissions and Wastes

Emissions and wastes resulting from the Project as currently conceived at this early stage of conceptual engineering design of the Project are discussed in this Section.

Emissions and wastes discussed here are those originating from the Marine Terminal.

2.5.1 Air Contaminant Emissions

Emissions to the atmosphere of air contaminants and sound will be released during Project activities. The EA Report will detail the Project-related emissions predicted to occur during Construction and Operation.

Generally, emissions during Construction of the Project will consist of dust from earth moving activities, combustion gas emissions from equipment deliveries, and noise. These will be generally limited to the Canaport property and not likely be distinguishable beyond the property line.

During Operation, emissions will consist of combustion gas emissions from marine vessels that facilitate the movement of oil, and noise. The emissions and noise from these ships currently result from the operation of the existing SBM, and as ships would simply be displaced from the existing SBM to the marine terminal (*i.e.,* no significant change in shipping or crude transfer is envisioned), these emissions do not represent a change from those associated with current operations at Canaport

2.5.2 Solid Waste

Solid waste generated by Construction activities is expected to consist of general construction wastes (*e.g.,* steel, wood, off-spec concrete), office waste, and overburden and aggregate. These materials

will be reused for construction wherever possible, or recycled or disposed (as appropriate) at approved facilities.

Scrap material will be sorted by category. Metallic scrap will be sorted by metallurgy (*e.g.,* carbon steel, alloy steel, and stainless steel) so that it is saleable for recycling.

Packing material (*e.g.,* wood, plastic, and cardboard) will be segregated. These materials that can be disposed of at a Construction and Demolition (C&D) debris disposal facility will be disposed in this manner, and those that cannot be will be sent to an appropriate recycling or disposal facility. Any materials that can be re-used during Construction, including wood, will be saved.

Contaminated containers (*e.g.,* paint drums, adhesive tubs, and like items) will be segregated according to their contents in designated containers for controlled disposal at licensed disposal facilities.

Recyclable material that cannot be sent to a C&D site will be destined to facilities that are approved to receive each type of material for recycling or disposal as feasible or appropriate. All applicable guidelines and regulations will be followed, and best practices will be implemented, as will be detailed in the Environmental Protection Plan for Construction.

2.5.3 Office Waste

Office waste consists primarily of paper, cardboard, and spent copier and printer cartridges. These will be segregated into designated recycle bins for storage until collected by recycling companies for delivery to recycling facilities.

2.5.4 Maintenance Waste

Routine maintenance will be carried out in designated areas of the site. Only emergency maintenance will be allowed at machine work locations or operational areas of the site. All waste oils, mechanical fluids, and oily rags will be disposed of in properly labelled storage containers and drums on-site until picked up by licensed contractors for disposal.

2.5.5 Hazardous Waste

A variety of other fuels and potentially hazardous materials could be used during the Project. Gasoline, diesel fuel, propane, grease, motor oil, and hydraulic fluids are needed for heavy equipment.

Other potentially hazardous materials that could be used routinely include acetylene, oxygen and other compressed gases, paints, epoxies, cleaners and solvents, and glycol/methanol. All hazardous materials would be inventoried and monitored and the inventory would be developed and updated as the Project proceeds. Site inspections, good housekeeping, and maintenance of equipment and systems would be an integral part of environmental protection. Further, such practices are important in reducing the potential for leaks or spills of dangerous goods. All waste materials generated would be tracked through a waste management program.

3.0 REFERENCES

Jacques Whitford Limited. 2009. Linear Facilities Corridor Route Selection Technical Study: Project Eider Rock – Proposed Petroleum Refinery and Marine Terminal in Saint John New Brunswick. Report 1013263.03-016 prepared for Irving Oil Company, Limited by Jacques Whitford Limited, Saint John, New Brunswick. June 5, 2009.

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