APPENDIX F

SNC-Lavalin, Summary of Environmental Legislation, Permitting and Engineering Codes, Standards and Specifications (February 2015)

SNC·LAVALIN

SUMMARY OF ENVIRONMENTAL LEGISLATION, PERMITTING and ENGINEERING CODES, STANDARDS AND SPECIFICATIONS

Bear Head LNG Corporation

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FINAL REPORT

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CRRC

1 INTRODUCTION

This document provides an overview of the legislative context and processes to which Bear Head LNG Corporation (Bear Head Corp.) is subject, in relation to its export facility proposed for development in Nova Scotia, Canada (the "Bear Head Project" or "Project"). Set forth below in Section 2 is a brief overview of Canada's legal system and processes including a summary of the Canadian and Nova Scotian statutes and regulations applicable to liquefied natural gas ("LNG") facilities. Set forth below in Section 3 is a summary of the authorizations and permitting requirements for the Bear Head Project. Section 4 lists laws, regulations, codes, specifications and project design standards that are applicable to the engineering design of the Bear Head Project, with additional codes and standards listed in Appendix A.

2 ENVIRONMENTAL LEGAL CONTEXT

Regulatory permitting in Canada is grounded in well-established processes, legislated through a multitude of statutes (acts) and regulations. Statutes create the framework for regulating a subject area by setting out basic rules and legal requirements, and establish the powers of governments and officials to make regulations in that subject area. Regulations clarify and detail the regulatory framework provided by the statute.

Statutes and regulations are legally binding and enforceable, usually containing a provision making it an offence not to comply with the legislation. Some statutes and regulations detail authorizations/approvals that must be applied for and acquired in order to 'permit' development. Permits contain terms and conditions that the approval holder must follow. In the case of environmental approvals, these include conditions to prevent adverse effects to the environment

Rather than providing for a permitting process, many other statutes stipulate requirements that must be complied with and/or offences that must be avoided, with offences for non-compliance that can result in substantial penalties, including million-dollar fines and/or imprisonment.

2.1 Legal Jurisdictions

The Constitution Act, 1867, as amended [1] (the "Constitution Act"), divides legislative jurisdiction between the federal and provincial governments, and still serves as the basis for this division of power – for example, federal jurisdiction

[1] Originally named the *British North America Act 1867*, it was renamed the *Constitution Act, 1867* as part of patriating the Constitution in 1982. Constitution Act, 1867, 30 &31 Vict., (U.K.), reprinted in R.S.C. 1985, app. II, no. 5 (Can.).

includes criminal law, fisheries, and “peace, order and good government”, while provincial laws focus more on local matters, property and civil rights.

Neither the federal nor provincial government have exclusive jurisdiction over the ‘environment’, as it is not specifically named in the Constitution Act. Many environmental matters therefore fall under ‘concurrent jurisdiction,’ whereby both federal and provincial regulations apply.

Municipal governments also play a role in Canadian environmental law, as defined by each province’s governing statute regarding local government. In addition to government statutes and regulations, environmental obligations and liabilities may be incurred under contract and common law, related to the environment through matters such as nuisance, negligence, strict liability and trespass.

2.2 Federal Environmental Legislation

Environmental matters under federal jurisdiction include fish and fish habitat, migratory birds, navigation, impacts on Aboriginal peoples, and effects that cross provincial or international boundaries. The following provides an overview of the key Canadian environmental legislation that applies to LNG facilities.

2.2.1 Canadian Environmental Protection Act, 1999 – Environment Canada

The Canadian Environmental Protection Act, 1999[2] (“CEPA”) and attendant regulations regulate a broad range of environmental concerns, from toxic substances to environmental emergencies. Any substance listed in Schedule 1 of CEPA is classified as a toxic substance and is subject to specific controls. CEPA also establishes that persons who own or are in control of a spilled toxic substance have a duty to report and take remedial action. Penalty provisions stipulate mandatory fines and penalties where a person is convicted of an offence under CEPA or another environmental act.

Notices issued in respect of the National Pollutant Release Inventory establish reporting thresholds for listed emissions, and make reporting of exceedances mandatory. Facilities that are required to report must submit a detailed accounting of their emissions to Environment Canada.

2.2.2 *Canadian Environmental Assessment Act* – Canadian Environmental Assessment Agency

The Regulations Designating Physical Activities pursuant to the *Canadian Environmental Assessment Act, 2012*[3] (“CEAA”) designate project types and thresholds for which a proponent is required to submit a project description for

[2] Canadian Environmental Protection Act, S.C. 1999, C. 33.

[3] CEAA 2012, S.C. 2012, C. 19, S. 52 (Can.).

screening by the Canadian Environmental Assessment Agency (the "Agency"). Unless a project is specifically designated under the regulation or by the Minister of the Environment, it cannot be required to undergo a federal environmental assessment ("EA"). For designated projects, the Agency has 45 days from the acceptance of a complete project description to determine whether a federal EA is required.

The focus of a federal EA is on assessing potentially adverse environmental effects that are within federal jurisdiction, including impacts on fish and fish habitat, other aquatic species, migratory birds, federal lands, effects that cross provincial or international boundaries, and impacts on Aboriginal peoples.

Some projects are subject to both CEAA and the requirement of a provincial EA, and the two are coordinated or harmonized to the extent possible. Where the federal Minister of the Environment is satisfied that the substantive CEAA requirements can be accomplished through a provincial EA, the Minister may substitute the provincial process for the CEAA process. A project will be permitted to proceed only when the Minister is satisfied that the project is not likely to cause significant adverse environmental effects or, where such effects are likely, the federal Cabinet determines that they are justified in the circumstances. A decision statement is issued that sets out conditions, with which failure to comply is an offence under CEAA, which can result in fines or an injunction.

2.2.3 *Species at Risk Act* – Environment Canada/Fisheries and Oceans Canada

The *Species at Risk Act*[4] prohibits the killing, harming or harassing of species listed as endangered or threatened, the damage and destruction of their residence, and the destruction of critical habitat that has been identified in a recovery strategy and subject to a protection order by the Minister or the Cabinet. While these prohibitions do not automatically apply to all species throughout Canada, they do apply to aquatic species and migratory birds. Project planning must include measures to avoid the prohibited impacts and must take any recovery strategies into account.

2.2.4 Migratory Birds Convention Act – Environment Canada

The *Migratory Birds Convention Act, 1994*[5] ("MBCA") and associated regulations set out the legal requirements for the protection of migratory birds and their nests. Of particular note, "incidental" impacts on migratory birds' nests and their eggs are prohibited, and there is no permitting regime to allow such activity.

Environment Canada provides technical information and key breeding dates as guidelines to help proponents determine the periods when the risk of destroying a migratory bird nest or egg, or otherwise contravening the MBCA and regulations, is particularly high. Specifics of the timing and extent of the proposed activities, and the migratory

[4] Species at Risk Act, S.C. 2002, c. 29 (Can.).

[5] Migratory Birds Convention Act, 1994, S.C. 1994, c. 22 (Can.).

bird species and their expected use of the project site, need to be taken into account in construction schedules. Appropriate measures need to be decided on a case-by-case basis, and it is the responsibility of those in charge of the project to determine these measures.

2.2.5 *Fisheries Act* – Fisheries and Oceans Canada

The federal government has regulatory authority over water quality and pollution. The *Fisheries Act*[6] prohibits the deposition of deleterious substances into water frequented by fish. This has typically been interpreted by the courts to include virtually any release of any volume or concentration of contaminant. Carrying out work or an activity that results in "serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery,"[7] is also prohibited, except where the work is authorized by a permit or regulation. Serious harm to fish includes any permanent alterations to, or destruction of, fish habitat.

2.2.6 Navigation Protection Act – Transport Canada

The Navigation Protection Act[8] ("NPA") (formerly the Navigable Waters Protection Act) authorizes and regulates interferences with the public right of navigation. The NPA regulates works and obstructions that may interfere with navigation in the navigable waters listed on a schedule to the Act. The NPA also prohibits the dewatering of navigable waters and the depositing or throwing of materials that risk impacting navigation in navigable waters.

The NPA requires owners to provide a Notice to the Minister of Transport of certain works on navigable waters in Canada, upon which a determination is made regarding the likely interferences with shipping and boating activities. If the assessment of impacts to navigation finds that the work is likely to substantially interfere with navigation, an Application for Approval is required. Following the navigation impact assessment, the work may be deemed a permitted work, issued a ministerial approval, or denied if the impacts to navigation are unacceptable.

2.2.7 TERMPOL Review – Transport Canada

Although not a legislated requirement, the completion of a Technical Review Process of Marine Terminal Systems and Transshipment Sites ("TERMPOL") is often required to be undertaken as a condition of approval. The TERMPOL review focuses on shipping routes in Canadian waters as they relate to cargo handling between vessels, or offloading

[6] Fisheries Act, R.S.C. 1985, c. F-14 (Can.).

[7] *Id*. at s. 35(1).

[8] Navigation Protection Act, R.S.C. 1985, c. N-22 (Can.).

from ship to shore or vice versa. The findings of a TERMPOL review may be used by the federal Minister of Transport to inform decisions on shipping routes under the *Canada Shipping Act, 2001.*[9]

2.2.8 Transportation of Dangerous Goods Act – Transport Canada

The Transportation of Dangerous Goods Act[10] ("TDGA") regulates, in coordination with provincial statues, the shipping, handling and transportation of dangerous goods. A schedule to the TDGA defines nine classes of dangerous goods, and regulations address labelling requirements, emergencies and enforcement measures.

2.2.9 National Energy Board Act – National Energy Board

A licence from the National Energy Board ("NEB") is required to authorize export of LNG from Canada. In order to grant an export licence, the NEB must be satisfied that the quantity of gas to be exported does not exceed the surplus remaining after due allowance has been made for the reasonably foreseeable requirements for use in Canada. Similarly, under current regulations, an NEB licence must be obtained in order to import natural gas to Canada. Bear Head Corp. has applied for both an import licence (to import gas from the United States) and an export licence (to export gas from Canada to foreign nations by vessel).

2.3 NOVA SCOTIA ENVIRONMENTAL LEGISLATION

Matters under provincial jurisdiction include air emissions, water and wastewater treatment and discharges, waste management, and issues relating to contaminant release and contaminated lands. Environmental laws and their enforcement vary from province to province – for example, while provincial laws prohibit the discharge of pollutants into the environment, definitions of a pollutant and the environment are not standardized. However, a new emission source or facility that may impact the environment typically requires an environmental approval, from the province where the source or facility is located, for the particular emission, and strict conditions may accompany the approval.

The following provides an overview of the key environmental legislation in Nova Scotia that applies to LNG facilities.

2.3.1 *Environment Act* – Nova Scotia Environment

The *Environment Act*[11] prohibits a party from undertaking certain designated activities unless the applicable approval is granted. Various activities applicable to LNG facilities are identified in attendant regulations, typically specifying associated thresholds. Pertinent regulations include:

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[9] Canada Shipping Act, 2001, S.C. 2001, c. 26.

[10] Transportation of Dangerous Goods Act, 1992, S.C. 1992, c. 34 (Can.).

- Activities Designation Regulations[12]: detail approval requirements for various facilities and activities, including constructing and operating industrial facilities, storing dangerous goods, or altering a wetland.
- Environmental Assessment Regulations[13]: detail environmental assessment registration and approval processes for activities such as constructing or operating storage facilities for liquid or gaseous substances, and constructing or operating a natural gas processing facility.
- Air Quality Regulations[14]: establish maximum permissible ground level contaminant concentrations.
- Petroleum Management Regulations[15]: require storage tank systems to be registered.
- Dangerous Goods Management Regulations[16]: require written approval to handle and/or store hazardous materials.
- Water and Wastewater Facilities and Public Drinking Water Supplies Regulations[17]: create a classification system for wastewater treatment systems and operation certification requirements.

2.3.2 *Energy Resources Conservation Act* – Nova Scotia Utilities and Review Board

The Gas Plant Facility Regulations[18] attendant to the *Energy Resources Conservation Act*[19] require a proponent of a gas plant to acquire a permit to construct and a licence to operate from the Nova Scotia Utility and Review Board. This is an intensive process whereby a third-party certifying authority reviews and certifies engineering plans and drawings throughout the design process, at each stage of facility design. The License to Operate is a continuation of the Permit to Construct authorization from the UARB.

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[11] Environment Act, S.N.S. 1994-95, C. 1 (Can.).

[12] Activities Designation Regulations, N.S. Reg. 47/95 (Can.).

[13] Environmental Assessment Regulations, N.S. Reg. 26/95 (Can.).

[14] Air Quality Regulations, N.S. Reg. 179/2014 (Can.).

[15] Petroleum Management Regulations, N.S. Reg. 44/2002 (Can.).

[16] Dangerous Goods Management Regulations, N.S. Reg. 56/95 (Can.).

[17] Water and Wastewater Facilities and Public Drinking Water Supplies Regulations, N.S. Reg. 181/2009 (Can.).

[18] Gas Plant Facility Regulations, N.S. Reg. 100/2013 (Can.).

[19] Energy Resources Conservation Act, R.S.N.S. 1989, C. 147 (Can.).

2.3.3 Additional Nova Scotian Statutes

The following statutes also apply to LNG facilities in Nova Scotia:

- ***Beaches Act***[20] – requires that a permit (clearance) be obtained prior to undertaking construction activities such as trenching or infilling below the ordinary high water mark.
- ***Endangered Species Act***[21] – prohibits the killing or disturbing of endangered or threatened species, destroying or disturbing residences, and destroying or disturbing core habitat, including nests, nest shelters, hibernaculum or dens.
- ***Special Places Protection Act***[22] – requires that a Heritage Research Permit be obtained prior to conducting archaeological work including reconnaissance, research and/or resource impact assessment. Archaeological assessment was completed in coordination with the administering NS government department, as part of the existing Environmental Assessment for Bear Head, completed by Jacques Whitford Environmental Limited in 2004. No further archaeological assessment is required at this time.
- ***Forests Act***[23] – the Forest Fire Protection Regulations require that fire suppression equipment be on hand when operating within 1,000 feet of the woods.
- ***Public Highways Act***[24] – requires that a permit be obtained prior to conducting any activity or work on a roadway or within a highway right-of-way.

2.4 MUNICIPAL ENVIRONMENTAL LEGISLATION

Municipalities may regulate activities through municipal bylaws, such as through sewer-use bylaws, noise bylaws and property-standards bylaws, and may integrate environmental approvals with planning approvals. Proponents are required to obtain Municipal Development Permits and Building Permits, based on land use bylaw requirements, suitability of proposed developments for the designated zoning, and other such factors. Details of bylaws and municipal requirements vary from municipality to municipality.

[20] Beaches Act, R.S.N.S. 1989, C. 32 (Can.).

[21] Endangered Species Act, S.N.S. 1998, C. 11 (Can.).

[22] Special Places Protection Act, R.S.N.S. 1989, C. 438 (Can.).

[23] Forests Act, R.S.N.S. 1989, C. 179 (Can.).

[24] Public Highways Act, R.S.N.S. 1989, C. 371 (Can.).

3 BEAR HEAD PROJECT PERMITTING

3.1 Existing Authorizations

Bear Head LNG currently holds the following project permits and approvals:

- Transport Canada
    - *Navigable Waters Protection Act* Authorizations (now *Navigation Protection Act*[25])
        - Section 5(1) Authorization – Deepwater Terminal (Permanent Marine Facility), June 28, 2005; extensions issued March 7, 2006, March 14, 2008, March 23, 2009, (undated) 2012, and September 30, 2014[26]
        - Section 10(2) Authorization – Temporary Jetty and Infill (Work Surface), March 7, 2006 (extensions issued March 14, 2008, March 23, 2009, (undated) 2012, and September 30, 2014[27])
    - *Canadian Environmental Assessment Act*[28] – Transport Canada CEAA Screening, LNG Marine Wharf (Permanent Marine Facility), July 12, 2004
        - Canadian Environmental Assessment Agency – In accordance with section 128 of CEAA 2012, the Agency confirmed that the act does not apply to the project updates, February 9, 2015.
- TERMPOL Review Committee, led by Transport Canada
    - Technical Review Process of Marine Terminal Systems and Transshipment Sites, TERMPOL Review Process Report, August 19, 2008

[25] R.S.C. 1985, c. N-22 (Can.).

[26] The September 30, 2014 letter issued by Transport Canada to Bear Head Corp. indicated that the Navigation Protection Act R.S.C. 1985, c. N-22 (Can.) no longer stipulates time limits for completion, commencement or expiry of works, therefore expiry conditions are no longer applicable.

[27] *Id.*

[28] S.C. 2012, C. 19, S. 52 (Can.).

- Fisheries and Oceans Canada
    - *Fisheries Act*[29] Section 35(2) Authorization –Authorization for Works or Undertakings Affecting Fish Habitat (Temporary Wharf and Work Surface), December 4, 2006 (extensions issued (undated) 2009, April 19, 2012[30], February 19, 2015). Extension is valid until December 31, 2019.
    - *Canadian Environmental Assessment Act*[31] –Fisheries and Oceans CEAA Screening, Temporary Wharf and Work Surface, April 26, 2006
        - Canadian Environmental Assessment Agency – In accordance with section 128 of CEAA 2012, the Agency confirmed that the act does not apply to the project updates, February 9, 2015.
- Nova Scotia Environment
    - *Environment Act*[32]
        - Environmental Assessment Approval, August 9, 2004
        - Environment Act Water (Division I) Approval, October 6, 2004
        - Industrial (Division V) Approval, October 6, 2004
        - Industrial (Division V) Approval Amendment, June 29, 2005
- Nova Scotia Transportation and Infrastructure Renewal
    - *Public Highways Act*[33] – Breaking Soil of Highways Permit, September 23, 2004
    - Confirmation that no additional permits are required, December 9, 2014.
- Nova Scotia Department of Natural Resources
    - *Beaches Act*[34] – Clearance, October 19, 2004

[29] R.S.C. 1985, c. F-14, s. 35(2) (Can.).

[30] Bear Head Corp. has requested that Fisheries and Oceans Canada extend the current March 31, 2015 expiry date – this request is anticipated to be issued forthwith.

[31] S.C. 2012, C. 19, S. 52 (Can.).

[32] S.N.S. 1994-95, C. 1 (Can.).

[33] R.S.N.S. 1989, C. 371 (Can.).

- Confirmation that no additional permits are required, December 11, 2014.

- Nova Scotia Utilities and Review Board
  - *Energy Resources Conservation Act*[35]
    - Permit to Construct a Liquefied Natural Gas Plant, Tank Foundations, November 21, 2005
    - Permit to Construct a Liquefied Natural Gas Plant, Tanks, June 6, 2006 (extension issued November 5, 2009, amended permit issued December 13, 2012)
    - Updated Permit to Construct is expected imminently.

- Eastern District Planning Commission
  - Development Permit, January 7, 2005 (renewal issued April 5, 2006)
  - The following new permit was issued for the export facility:
    - Municipal Development Permit, Eastern District Planning Commission, December 1, 2014

Project authorizations have been actively maintained through approved extensions from the regulating authorities

The majority of the authorizations issued for the import facility: are directly applicable to the export facility and require no modification, are no longer needed for the Project, or have been issued anew for the export facility.

Since Bear Head Corp.'s intent is to maintain the existing design of previously-approved marine structures; the following marine-related authorizations remain valid for the export facility:

- *Navigation Protection Act*[36] Authorizations
- *Fisheries Act*[37] Authorization
- *Canadian Environmental Assessment Act*[38] Approval
- *Beaches Act*[39] Clearance

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[34] R.S.N.S. 1989, C. 32 (Can.).

[35] R.S.N.S. 1989, C. 147 (Can.).

[36] R.S.C. 1985, c. N-22 (Can.).

[37] R.S.C. 1985, c. F-14 (Can.).

[38] S.C. 2012, C. 19, S. 52 (Can.).

[39] R.S.N.S. 1989, C. 32 (Can.).

The civil works associated with the following authorizations have been completed, therefore the authorizations are no longer needed:

- *Environment Act*[40] Water (Division I) Approval
- *Public Highways Act* Permit

The following new permit was issued for the export facility:

- Municipal Development Permit, Eastern District Planning Commission, December 1, 2014

3.2 Pending Authorizations

An application has been submitted to the NEB for the following licences:

- A 25-year import licence to import up to 503 Billion cubic feet (Bcf) per annum of natural gas to Canada from the United States (up to 12,574 Bcf over the requested licence term)
- A 25-year export licence to export up to 12 mtpa of LNG from Canada (up to 322 million tonnes over the requested licence term)

Modifications are underway for the remainder of the permits, as follows:

- *Environment Act*[41]
    - Environmental Assessment Approval – an updated Registration Document is being prepared and approval is anticipated in mid-2015. The approval will include terms and conditions detailing required documents and processes such as:
        - Environmental Protection Plan;
        - Greenhouse Gas Management Plan;
        - Environment Act requirements under Division IV and V;
        - TERMPOL review; and
        - Monitoring and contingency plans (e.g., air quality and noise).

[40] S.N.S. 1994-95, C. 1 (Can.).

[41] S.N.S. 1994-95, C. 1 (Can.).

- *Energy Resources Conservation Act*[42]
    - The Nova Scotia Utility and Review Board has indicated that issuance of the Permit to Construct is expected imminently.

Set forth in the table below is a summary of existing Bear Head Project authorizations, modifications required, and anticipated dates for the corresponding permitting processes.

[42] R.S.N.S. 1989, C. 147 (Can.).

Table 1: Bear Head Project Authorizations

Authorization	Jurisdiction and Issuing Authority	Date of Authorization / Extension	Authorization / Modification Required (Y/N)	Date or *Anticipated Date* of Request for Modification / Authorization	Date Issued / Anticipated Date of Approval	Regulatory Significance of Modification / Authorization
National Energy Board Act • NEB decision to issue a Licence to Export Liquefied Natural Gas	Federal - National Energy Board	New licence	Y	November 6, 2014	*June 30, 2015*	The Licence becomes effective upon approval of the Governor in Council, normally granted without further public process.
National Energy Board Act • NEB decision to issue a Licence to Import Natural Gas	Federal -National Energy Board	New licence	Y	November 6, 2014	*June 30, 2015*	The Licence becomes effective upon approval of the Governor in Council, normally granted without further public process.

Authorization	Jurisdiction and Issuing Authority	Date of Authorization / Extension	Authorization / Modification Required (Y/N)	Date or *Anticipated Date* of Request for Modification / Authorization	Date Issued / Anticipated Date of Approval	Regulatory Significance of Modification / Authorization
Navigable Waters Protection Act • Section 5(1) Deep Water Terminal (Permanent Jetty) Authorization	Federal - Transport Canada	June 28, 2005 Extensions issued: • March 7, 2006 • March 14, 2008 • March 23, 2009 • Undated 2012 • September 30, 2014	N	n/a	n/a	n/a
Navigable Waters Protection Act • Section 10(2) Wharf and Infill (Temporary Wharf and Work Surface) Authorization	Federal - Transport Canada	March 7, 2006 Extensions issued: • March 14, 2008 • March 23, 2009 • Undated 2012 • September 30, 2014	N	n/a	n/a	n/a

Authorization	Jurisdiction and Issuing Authority	Date of Authorization / Extension	Authorization / Modification Required (Y/N)	Date or *Anticipated Date* of Request for Modification / Authorization	Date Issued / Anticipated Date of Approval	Regulatory Significance of Modification / Authorization
Canadian Environmental Assessment Act • Federal Environmental Assessment, LNG Marine Wharf (Permanent Marine Facility)	Federal - Transport Canada	July 12, 2004	N (Confirmed February 9, 2015)	n/a	n/a	n/a
Fisheries Act • Section 35(2) Authorization - Harmful Alteration, Destruction or Disruption of Fish Habitat (Temporary Wharf and Work Surface)	Federal - Fisheries and Oceans Canada	December 4, 2006 Extensions issued: • Undated 2009 • April 19, 2012 • February 19, 2015	N	n/a	n/a	n/a
Canadian Environmental Assessment Act • Federal Environmental Assessment, Temporary Wharf and Work Surface	Federal - Fisheries and Oceans Canada	April 26, 2006	N (Confirmed February 9, 2015)	n/a	n/a	n/a

Authorization	Jurisdiction and Issuing Authority	Date of Authorization / Extension	Authorization / Modification Required (Y/N)	Date or *Anticipated Date* of Request for Modification / Authorization	Date Issued / Anticipated Date of Approval	Regulatory Significance of Modification / Authorization
Environment Act • Environmental Assessment Approval	Provincial - Nova Scotia Environment (NSE)	August 9, 2004	Y	Request to issue modified approval: October 31, 2014 Registration document to be filed: *March 18, 2015*	*June 2015*[1]	Construction cannot begin prior to issuance of the EA approval
Environment Act • Wetland (Division I) Approval	Provincial - Nova Scotia Environment	October 6, 2004	N (Confirmed November 28, 2014)	n/a	n/a	n/a
Public Highways Act • Breaking Soil of Highways Permit	Provincial - Nova Scotia Transportation and Infrastructure Renewal (NSTIR)	September 23, 2004	N (Confirmed December 9, 2014)	n/a	n/a	n/a
Beaches Act • *Beaches Act* Clearance	Provincial - Nova Scotia Department of Natural Resources (DNR)	October 19, 2004	N (Confirmed December 11, 2014)	n/a	n/a	n/a

[1] Legislated timeframe of 57 days from submission of the Registration Document to the Minister's decision, as per section 13.1 of the Environmental Assessment Regulations N.S. Reg. 26/95 (Can.).

Authorization	Jurisdiction and Issuing Authority	Date of Authorization / Extension	Authorization / Modification Required (Y/N)	Date or *Anticipated Date* of Request for Modification / Authorization	Date Issued / Anticipated Date of Approval	Regulatory Significance of Modification / Authorization
Energy Resources Conservation Act • Permit to Construct a Liquefied Natural Gas Plant (Tank Foundations)	Provincial - Nova Scotia Utilities and Review Board	November 21, 2005	N	n/a	n/a	n/a
Energy Resources Conservation Act • Permit to Construct a Liquefied Natural Gas Plant	Provincial - Nova Scotia Utilities and Review Board	June 6, 2006 Extension issued: • November 5, 2009 Amended permit issued: • December 13, 2012	Y	October 31, 2014	*Imminent*	Bear Head Corp. is working with the Certifying Authority as detailed design proceeds
Municipal Development Permit	Municipal - Eastern District Planning Commission	January 7, 2005 Renewal issued: • April 5, 2006	N[2]	November 18, 2014	Issued December 1, 2014	n/a

[2] Updated general development permit was received December 1, 2014. Additional building permits may be required prior to construction.

4 ENGINEERING CODES AND STANDARDS

This section outlines the general laws, regulations, codes, specifications and project design standards that are applicable to the design of the Bear Head Project.

The order of precedence for the use of applicable codes and standards will be as follows:

Applicable Laws and regulations including CSA Z276-15 Liquefied natural gas (LNG) - Production, storage, and handling and LNG Code of practice (July 2005),and any conditions of regulatory permits relating to the project.

1. The codes and standards and specifications referred to in CSA Z276-15 Liquefied natural gas (LNG) - Production, storage, and handling and the Nova Scotia LNG code of Practice
2. Canadian codes and standards
3. U.S. codes and standards that have been adopted as Canadian engineering standards
4. Everything else contained, or referenced in, the contract documents.
5. Nova Scotia Occupational Health and Safety Act

Bear Head Corp. operates in accordance with its corporate environment, health and safety policies and is committed to managing and operating its worldwide assets in a manner consistent with its core values to protect the health and safety of people and the environment.

Nova Scotia and Labour Advanced Education, through the application of the *Occupational Safety General Regulations* is responsible for worker safety during construction and operation of an LNG facility. The principles underlying the legislation are founded on the Internal Responsibility System for which all those associated with the workplace share responsibility for health and safety.

For public safety, the responsibility for approving an LNG facility also resides with the Minister of Environment and Labour, with the pertinent legislation including the *Nova Scotia Energy Resources Conservation Act (NS ERCA),* the *Pipeline Act (NS PA)* and the *Gas Plant Facility Regulations* (the latter incorporate by reference CSA Z276-15). The intent of the Code of Practice is to supplement and clarify the requirements of the *Gas Plant Facility Regulations* and CSA Z276-15 and, through its application, to protect the public by the appropriate design, construction, operation and abandonment of LNG facilities in the Province of Nova Scotia.

CSA Z276-15 encompasses all parts of a land-based LNG facility including the storage containers, systems that condition, liquefy or vaporize natural gas, and structures integral to the transfer of fluids between storage containers and points of receipt or shipment by pipeline, tank car, tank vehicle or marine vessel. This excludes marine

terminals, which are regulated by Transport Canada, but includes the transfer piping beginning with the first terminal-side flange or coupling. Support facilities covered by CSA Z276-15 are also encompassed by the Code of Practice, including emergency systems.

In addition to the above-referenced legislation, regulations and the Code of Practice, the proposed works will be designed, constructed and operated in compliance with specific industry standards and Codes of Practice. These are listed in Appendix A.

APPENDIX A

OTHER RELEVANT ENGINEERING STANDARDS

1.1 Canadian Standards

1.1.2 Reference Publications

This Standard refers to the following publications and where such reference is made it shall be to the latest edition or amendment.

CGSB-Canadian General Standards Board

CAN/CGSB-24.3-92, Identification of Piping Systems

CAN/CGSB-48.9712-2006, Qualification and Certification of Non-Destructive Test Canadian Standards Association

1.1.3 CSA Standards

A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete;

A23.3-14, Design of Concrete Structures;

A23.4-09(R2014)/A251-00, Precast Concrete - Materials and Construction/Qualification Code for Architectural and Structural Precast Concrete Products;

S16-09 - Design of steel structures

CISC Handbook of Steel Construction 10th Edition

S6-14 - Canadian highway bridge design code

B51-09, Boiler, Pressure Vessel, and Pressure Piping Code

3149.1 -10, Natural Gas and Propane Installation Code

B149.2-10, Propane Storage and Handling

C22.1-12, Canadian Electrical Code, Part I (22nd, Edition) Safety Standards for Electrical Installations

CAN/CSA-G30.18-09 (R2014), Carbon-Steel Bars for Concrete Reinforcement

G279-M1982 (R1998), Steel for Pre-stressed Concrete Tendons

W 117.2-06 (R2011), Safety in Welding, Cutting, and Allied Processes

Z245.15-13, Steel Valves

1.1.3.1 CSA Z299 Series

CAN3-Z299.0-86 (R2007), Guide for Selecting and Implementing the CAN3-Z299-85 Quality Assurance Program Standards;

CAN3-Z299.1-85 (R1997), Quality Assurance Program - Category 1

CAN3-Z299.2-85 (R1997), Quality Assurance Program - Category 2

CAN3-Z299.3-85 (R1997), Quality Assurance Program - Category 3

CAN3-Z299.4-85 (R1997), Quality Assurance Program - Category 4

1.1.4 Canadian Department of Transport Civilian Air Regulations and Standards

TP 382 Obstruction Marking and Lighting Standards

1.1.5 Electrical and Electronic Manufacturers Association of Canada (EEMAC)

NBC 2010 Canadian Commission on Building and Fire Codes

User's Guide- NBC 2010 Structural Commentaries (Part 4)

1.1.6 Canadian Geotechnical Society

Canadian Foundation Engineering Manual, 4th edition (2008).

1.1.7 Government of Canada

Canada Labour Code, Part II, 2015

1.1.8 National Research Council Canada

National Building Code of Canada, 2010

1.1.9 Transport Canada Publication

TP 743-2001, TERMPOL Review Process.

1.1.10 ULC-Underwriters Laboratories of Canada Standard

CAN4-5102-88, Standard Method of Test for Surface Burning Characteristics of Building Materials

1.1.11 ULC Underwriters' Laboratories of Canada

All equipment installed shall bear the approval label of the Canadian Standards Association (CSA) or the approval of the appropriate Provincial authority where CSA approval is not available.

1.2 US Standards

ACI, American Concrete Institute

AGA, American Gas Association

ANSI, American National Standards Institute

ASCE, American Society of Civil engineers

ASTM, American Society for Testing and Materials

AWWA, American Water & Waste -Water

CGA, Compressed Gas Association

CCPS, Center for Chemical Process Safety

GTI, Gas technology Institute

IEEE, Institute of Electrical and Electronics Engineers

ISA, Instrument Systems and Automation Society of America

NACE, National Association of Corrosion Engineers

NEC, National Electric Code

NEMA, National Electric Manufacturers Association

NFPA, National Fire Protection Association

OSHA, Occupational Safety and Health Administration

TEMA, Tubular Exchanger Manufacturers Association

UBC, Uniform Building Code

UL, Underwriters Laboratories

1.2.1 ACI-American Concrete Institute Standards

301-10, Specifications for Structural Concrete

304R-00, Guide for Measuring, Mixing, Transportation and Placing of Concrete

311.4R-05, Guide for Concrete Inspection

372R-13, Guide to Design and Construction of Circular Wire Strand Wrapped Prestress Concrete Structures

373R-97 (2010), Construction of Circular Concrete Structures Prestressed with Circumferential Tendons

506-66-05, Recommended Practice for Shotcreting

1.2.2 AGA-American Gas Association Publication

Purging, Principles and Practice (Cat. no. xk0775, 1975)

1.2.3 ANSI–American National Standards Institute Standards

ANSI/HI 9.1-9.5 Centrifugal/Vertical Pump General Guidelines

ANSI/HI 9.8 Centrifugal/Vertical Pump Intake Design

1.2.4 API-American Petroleum Institute Standards

5L-2012 Specification for Line Pipe – 45th Edition

RP 500-2014 Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Division 1 and Division 2, Third Edition

520, Part 1-2014 Sizing, Selection and Installation of Pressure-relieving Devices in Refineries – Ninth Edition

521-2014 Guide for Pressure-relieving and Depressuring Systems – Sixth Edition

560-2007 Fired Heaters for General Refinery Services – Fourth Edition

610-2011 Centrifugal Pumps for Petroleum, Heavy Duty Chemical and Gas Industry Services, Eleventh Edition

613-2003 Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services Fifth Edition

614-2008 Lubrication, Shaft Sealing, and Control-oil Systems and Auxiliaries for Petroleum, Chemical and Gas Industry Services Fifth Edition

617-2014 Centrifugal Compressors for Petroleum, Chemical and Gas Industry Services Eight Edition

618-2007 Reciprocating Compressors Fifth Edition 2007

620-2013, Recommended Rules for Design and Construction of Large, Welded, Low-Pressure Storage Tanks – Twelfth Edition

650-2013 Welded Steel Tanks for Oil Storage – Twelfth Edition

661-2013 Air-cooled Heat Exchangers for General Refinery Service – Seventh Edition

RP-752-2009 Management of Hazards Associated with Location of Process Plant Permanent Buildings, Third Edition

1104-2013 Standard for welding pipelines and related facilities –Twenty First Edition

2510 (R2011), Design and Construction of Liquefied Petroleum Gas (LPG) Installations.

2510A (R2010) Fire protection considerations for the design and operation of liquefied petroleum gas (LPG) storage facilities.2nd Edition.

API Recommended Practice 2003-1998, Protection Against Ignitions Arising Out of Static, Lightning and Stray Currents Sixth Edition

NPRA-2004 Security Vulnerability Assessment Methodology for the Petroleum and Petrochemical Industries- Second Edition

1.2.5 ASCE–American Society of Civil Engineers

ASCE 7 Minimum Design Loads for Buildings and Other Structures

1.2.6 ASME-American Society of Mechanical Engineers Codes

BPVC Boiler and Pressure Vessel Code – 2015 Edition

Section I — Power Boilers

Section VII — Care of Power Boilers

Referenced ASME Standards

- *B1.20.1 — Pipe Threads, General Purpose, Inch*
- *12 Standards from the B16 Series on pipe flanges and fittings*
- *B31.1 — Power Piping*
- *B36.10M — Welded and Seamless Wrought Steel Pipe*
- *PTC 25 — Pressure Relief Devices*
- *QAI-1 — Qualifications for Authorized Inspection*

Referenced BPVC Sections

- *BPVC-II-A, B, C, D — Section II, Materials, Parts A through D*
- *BPVC-V — Section V, Nondestructive Examination*
- *BPVC-VIII-1 — Section VIII, Rules for Construction of Pressure Vessels, Division 1*
- *BPVC-IX — Section IX, Welding and Brazing*

ASME Section VIII — Pressure Vessels

Referenced BPVC Sections

- *BPVC-II-A, B, C, D — Section II, Materials, Parts A through D*
- *BPVC-V — Section V, Nondestructive Examination*
- *BPVC-IX — Section IX, Welding and Brazing Qualifications*

Referenced ASME Standards

Division 1:

- 5 Standards from the B1 Series on screw threads
- 13 Standards from the B16 Series on pipe flanges and fittings
- 9 Standards from the B18 Series on hex bolts
- *B36.10M — Welded and Seamless Wrought Steel Pipe*
- *B36.19M — Stainless Steel Pipe*
- *NQA-1 — Quality Assurance Program Requirements for Nuclear Facilities*
- *PCC-1 — Guidelines for Pressure Boundary Bolted Flange Joint Assembly*
- *PCC-2 — Repair of Pressure Equipment and Piping*
- *PTC 25 — Pressure Relief Devices*
- *QAI-1 — Qualifications for Authorized Inspection*

Division 2:

- API 579-1/ASME FFS-1 — Fitness-For-Service
- 3 Standards from the B1 Series on screw threads
- 9 Standards from the B16 Series on pipe flanges and fittings
- 4 Standards from the B18 Series on hex bolts
- *B36.10M — Welded and Seamless Wrought Steel Pipe*
- *B36.19M — Stainless Steel Pipe*
- *NQA-1 — Quality Assurance Program Requirements for Nuclear Facilities*
- *PCC-1 — Guidelines for Pressure Boundary Bolted Flange Joint Assembly*
- *PTC 25 — Pressure Relief Devices*
- *QAI-1 — Qualifications for Authorized Inspection*

Division 3:

- API 579-1/ASME FFS-1 — Fitness-For-Service

- 3 Standards from the B1 Series on screw threads
- 4 Standards from the B16 Series on pipe flanges and fittings
- 7 Standards from the B18 Series on hex bolts
- *B36.10M — Welded and Seamless Wrought Steel Pipe*
- *B46.1 — Surface Texture (Surface Roughness, Waviness and Lay)*
- *PTC 25 — Pressure Relief Devices*
- *QAI-1 — Qualifications for Authorized Inspection*

AI 3.1-2007, Scheme for the Identification of Piping Systems

B16.5-1996 Steel Pipe Flanges and Flanged Fittings

B16.11-2001 Forged Steel Fittings, Socket Welding and Threaded

B31.3-2012 Process Piping;

B31.5-2010 Refrigeration Piping;

B31.8-2014, Gas Transmission and Distribution Piping Systems;

1.2.7 ASTM-American Society for Testing and Materials Standards

ASTM E84 - 14 Standard Method of Test for Surface Burning Characteristics

ASTM A106 / A106M – 14 Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service

A312/A312M-14b Standard Specification for Seamless, Welded and Heavily Cold Worked Austenitic Stainless Steel Pipes

ASTM A320 / A320M - 14 Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service

ASTM A312 / A312M - 14b Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

ASTM A333 / A333M - 13 Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service and Other Applications with Required Notch Toughness

ASTM A350 / A350M - 14 Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components

ASTM A352 / A352M - 06(2012) Standard Specification for Steel Castings, Ferritic and Martensitic, for Pressure-Containing Parts, Suitable for Low-Temperature Service

ASTM A416 / A416M - 12a Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

ASTM A420 / A420M - 14 Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service

ASTM A421 / A421M - 10 Standard Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete

ASTM A537 / A537M - 13 Standard Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel

ASTM A553 / A553M - 14 Standard Specification for Pressure Vessel Plates, Alloy Steel, Quenched and Tempered 7, 8, and 9 % Nickel

ASTM A722/A722M - 12 Standard Specification for Uncoated High-Strength Steel Bars for Prestressing Concrete

ASTM A772/A772M - 00(2011) e1 Standard Test Method for AC Magnetic Permeability of Materials Using Sinusoidal Current

ASTM A821/A821-10, Standard Specification for Steel Wire, Hard-Drawn for Prestressed Concrete Tanks

ASTM WK48147 Revision of A821 / A821M - 10 Standard Specification for Steel Wire, Hard-Drawn for Prestressed Concrete Tanks

ASTM A966 / A966M - 08(2012) Standard Practice for Magnetic Particle Examination of Steel Forgings Using Alternating Current

ASTM WK44018 Revision of A966 / A966M - 08(2012) Standard Practice for Magnetic Particle Examination of Steel Forgings Using Alternating Current

ASTM A1008 / A1008M - 13 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

ASTM C33 / C33M - 13, Standard Specification for Concrete Aggregates; and

E 380-1993 Standard Practice for Use of the International System of Units [SI] (the Modernized Metric System).

1.2.8 AWWA-American Water & Waste -Water Standards

C205 -12 Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 in. (100 mm) and Larger - Shop Applied

C300-11 Reinforced Concrete Pressure Pipe, Steel-Cylinder Type

C502-05 Dry-Barrel Fire Hydrants

C950-95 Fiberglass Pressure Pipe

D100-11 Welded Steel Tanks for Water Storage

D130-11 Flexible-Membrane-Lining and Floating-Cover Materials for Potable Water Storage

1.2.9 CGA-Compressed Gas Association Standard

341-1987, Standard for Insulated Cargo Tank Specification for Cryogenic Liquids. Sixth Edition

S-1.3 Pressure Relief Device Standards — Part 3 Stationary Storage Containers for Compressed Gases - Eight Edition

1.2.10 CCPS - Center for Chemical Process Safety

Guidelines for Facility Siting and Layout 2003

Guidelines for evaluating process plant buildings for explosions and fires and toxic releases 2nd Edition 2012

Inherently safer Chemical processes 2nd Edition 2008

Guidelines for hazard evaluation procedures, 3rd edition 2008.

1.2.11 Government of United States

29 CFR 1910.146 – PERMIT-REQUIRED CONFINED SPACES 2003 EDITION.

FEMA-P750-2009 National Earthquake Hazards Reduction Program (NEHRP) Recommended Provisions for Seismic Regulation for New Buildings and Other Structures

1.2.12 GTI-Gas Technology Institute Publications

GRI Report 0176-89, LNGFIRE: A Thermal Radiation Model for LNG Fires;

GRI Report 0242-89, LNG Vapor Dispersion Prediction with the DEGADIS Dense Gas Dispersion Model.

1.2.13 NACE-National Association of Corrosion Engineers Standard

SP 0169-2013(Formerly RP0169), Control of External Corrosion on Underground or Submerged Metallic Piping Systems.

1.2.14 ISA Instrument Society of America Standards

5.1 Instrumentation Symbols and Identification

5.2-1976 (R1992) Binary Logic Diagrams for Process Operations

84.01-1996 Application of Safety Instrumented Systems for the Process Industry

12.13.01-2003 Performance Requirements for Combustible Gas Detectors

ANSI/ISA-60079-29-1 (12.13.02-2013) Explosive Atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases

84.01-1996 Application of Safety Instrumented Systems for the Process Industry;

ANSI/ISA-60079-29-1 (12.13.01)-2013 Explosive Atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases

ANSI/ISA-TR12.13.02-1999 (R2013) Investigation of Fire and Explosion Accidents in the Chemical, Mining, and Fuel-Related Industries

1.2.15 NEC- National Electrical Code

Article 725-15 Power and Grounding

1.2.16 NEMA–National Electrical Manufacturers Association Guidelines

ICS 4 Terminal Blocks for Industrial Use

ICS 6 Enclosures for Industrial Control Systems

1.2.17 NFPA-National Fire Protection Association Standards

10-2013, Portable Fire Extinguishers

11-2010, Low Expansion Foam and Combined Agent Systems

11 A-1999, Medium and High Expansion Foam Systems

12-2015, Carbon Dioxide Extinguishing Systems

12A-2015 Standard on Halon 1301 Fire Extinguishing Systems

13-2013, Installation of Sprinkler Systems

14-2013, Installation of Standpipe, Private Hydrants, and Hose Systems

15-2012, Water Spray Fixed Systems for Fire Protection

16-2015, Installation of Foam-Water Sprinkler Systems and Foam-Water Spray Systems

17-2013, Dry Chemical Extinguishing Systems

20-2013, Installation of Stationary Fire Pumps for Fire Protection

22-2013, Water Tanks for Private Fire Protection

24-2013, Installation of Private Fire Service Mains and Their Appurtenances

25-2013, Inspection, Testing and Maintenance of Water Based Fire Protection Systems

30-2015, Flammable and Combustible Liquids Code

37-2015, Installation and Use of Stationary Combustion Engines and Gas Turbines

54-2015, National Fuel Code

57-2002, Liquefied Natural Gas Fuel Systems Code

58-2014, Storage and Handling of Liquefied Petroleum Gases

59-2015, Utility LP-Gas Plant Code

59A-2013, Production, Storage, and Handling of Liquefied Natural Gas (LNG)

68-2013, Guide for Venting of Deflagrations

69-2014, Standard on Explosion Prevention Systems

70-2014 National Electrical Code

72-2013, National Fire Alarm and Signaling Code

75-2013 Fire Protection of Information Technology Equipment

77-2014, Static Electricity

90A-2015 Standard for the Installation of Air-Conditioning and Ventilating Systems

90B-2015 Standard for the Installation of Warm Air Heating and Air-Conditioning Systems

101-2015, Life Safety Code

255-2006, Standard Method of Test of Surface Burning Characteristics of Building Materials

385-2012 Standard for Tank Vehicles for Flammable and Combustible Liquids

600-2015, Industrial Fire Brigades

750-2015, Water Mist Fire Protection Systems

780-2014, Installation of Lightning Protection Systems

1221-2013, Installation, Maintenance and Use of Emergency Services Communications

1901-2009, Automotive Fire Apparatus

1961-2013, Fire Hose

1962-2013, Care, Use, and Service Testing of Fire Hose Including Couplings and Nozzles

1963-2014, Fire Hose Connections

2001-2015, Clean Agent Fire Extinguishing Systems

1.2.18 NACE-National Association of Corrosion Engineers

RP 0169 Control of External Corrosion on Underground or Submerged Metallic Piping Systems

6A192 Dehumidification and Temperature Control During Surface Preparation, Application, and Curing for Coatings/Linings of Steel Tanks, Vessels, and Other Enclosed Areas SSPC TR-3:12

RP 0288 Inspection of Linings on Steel and Concrete

1.2.19 USEPA 816-F-01-007 Primary Drinking Water Standards

1.2.20 TEMA-Tubular Exchanger Manufacturers Association Publication

Standards of Tubular Exchanger Manufacturers Association, Eighth Edition

1.2.21 UBC-Uniform Building Code

1.3 Other (European)

EN 1473 Installations and equipment for liquefied natural gas – Design of onshore facilities.

1.4 Facility Specific Codes and Standards

1.4.1 Single Containment LNG Storage Tanks

API 2000 Venting Atmospheric and Low-pressure Storage Tanks Sixth Edition (Identical Adoption of ISO 28300:2008)

API MPMS 2.2B Manual of Petroleum Standard Chapter 2 “Calibration of upright cylindrical tanks by optical reference line method”, (2013)

API 620 and Appendix Q Design and Construction of Large, Welded, Low-pressure Storage Tanks Twelfth Edition

BS 7777- Parts 1, 2 & 3:1993: Flat bottom, vertical cylindrical storage tanks for low temperature service

PI –201 Compacted Density (Perlite Institute)

ASTM C549-06 (2012) Perlite Loose Fill Insulation

1.4.2 Marine Design Codes and Guidelines

Structures Design and Construction

Society of International Gas Tankers and Terminal Operators, Ltd (SIGTTO): Site Selection and Design for LNG Ports and Jetties, Information Paper No. 14

Oil Companies International Marine Forum (OCIMF): Mooring Equipment Guidelines

Oil Companies International Marine Forum (OCIMF) and SIGTTO: Prediction of Wind Loads on Large Liquefied Gas Carriers

Oil Companies International Marine Forum (OCIMF): Prediction of Wind and Current Loads on VLCC's (current forces only)

American Petroleum Institute (API): RP2A –WSD Recommended Practice for Planning, Design and Constructing Fixed Offshore Platforms Twenty Second Edition

American Petroleum Institute (API): Spec 2B (R2012); Specification for the Fabrication of Structural Steel Pipe

Precast / Pre-stressed Concrete Institute (PCI): PCI Design Handbook

The American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges

American Petroleum Institute (API): RP1124, Ship, Barge and Terminal Hydrocarbon Vapor Collection Manifolds

BS8007: Minimum reinforcement and crack width control in thick concrete elements [dolphin decks]

ASTM Designations D1143 and D3689 [pile load tests]

SIGTTO (Society of International Gas Tankers and Terminal Operators), Standards & Publications for LNG Facilities

Site Selection and Design of LNG Ports and Jetties

Liquefied Gas Handling Principles on Ships and Terminals

Guidelines for Hazard Analysis as an Aid to Management of Safe Operations

Ship Information Questionnaire for Gas Carriers

Guidelines for Ship/ Shore Access for Gas Carriers

Recommendations for the Installation of Cargo Strainers on LNG Carriers

Recommendations for Manifolds for Refrigerated Liquefied Natural Gas Carriers

Accident Prevention – The Use of Hoses and Hard-Arms at Marine Terminals handling Liquefied Gas

Guidelines for the Alleviation of Excessive Surge Pressures on ESD

Recommendations and Guidelines for Linked Ship/ Shore Emergency Shut-down of Liquefied Gas Cargo Transfer

Vapor and Fire Detection Study

A Guide to Contingency Planning for the Gas Carrier Alongside and within Port Limits

OCIMF (Oil Companies International Marine Forum) Standards & Publications

Design and Construction specification for Marine Loading Arms

Guide on Marine Terminal Fire Protection and Emergency Evacuation

The Sandia study, Guidance on risk analysis and safety implications of a large liquefied natural gas (LNG) spill over water

International Port Planning Guidelines

International Association of Ports and Harbours (IAPH)

“Guidelines for Port Planning and Design” Port Planning & Construction Committee (2001)

1.4.2.1.1 International Maritime Organization (IMO) Conventions and Protocols and Design

IMO Convention on Load Lines 1966

IMO Protocol of 1988 relating to the International Convention on Load Lines, 1966

IMO International Convention for the Safety of Life at Sea, 1974 (SOLAS) as amended

IMO Protocol of 1978 relating to the International Convention for the Safety of Life at Sea, 1974

IMO Protocol of 1988 relating to the International Convention for the Safety of Life at Sea, 1974

IMO International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto

IMO International Convention on Standards for Training, Certification and Watchkeeping for Seafarers, 1978, as amended

IMO Convention on the International Regulations for Preventing Collisions at Sea, 1972

IMO International Convention on Tonnage Measurement of Ships, 1969

IMO Merchant Shipping (Minimum Standards) Convention, 1976 (ILO Convention No. 147)

IMO International Maritime Dangerous Goods (IMDG) Code

IMO International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)

1.5 HES REGULATIONS AND STANDARDS

Applicable regulations and standards related to Health, Environment and Safety for the project facilities are provided below.

NS Occupational Health and Safety Act

Canadian Occupational Health and Safety Regulations

US Safety and Health Regulations and Standards

US Occupational Safety & Health Administration

29 CFR Part 1910.119 Process Safety Management of Highly Hazardous Chemicals

US Department of Transportation

33 CFR Part 127 Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas and

49 CFR Part 193 Liquefied Natural Gas Facilities

National Fire Protection Association (NFPA)

NFPA 59A-2013 Standard for the Production, Storage, and handling of Liquefied Natural Gas (LNG)

Financial Institution Safety Guidelines

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