newfoundland labrador
hydro
a nalcor energy company

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February 20, 2013

Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL
A1A 5B2

ATTENTION: Ms. Cheryl Blundon
Director of Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: An Application by Newfoundland and Labrador Hydro (Hydro) pursuant to Subsection 41 (3) of the Act for approval of a capital project to refurbish the marine terminal at the Holyrood Thermal Generating Station

Please find enclosed the original and eight copies of the above-noted Application, plus supporting affidavit, project proposal, and draft order.

The project proposed in the Application is the refurbishment to the marine terminal at the Holyrood Thermal Generating Station. This project was included in Hydro's 2012 Capital Budget Application but was denied by the Board in Order No. P.U. 5 (2012) due to the following concerns:

- The evidence did not clearly demonstrate that it was necessary to replace fender 4; and
- The inspections should be conducted prior to doing any of the work.

Hydro has addressed these concerns and amended the project scope accordingly in the attached Application for $5.2 million of 2013 supplemental capital expenditures.

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Geoffrey P. Young
Legal Counsel

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
Thomas Johnson – Consumer Advocate
Dean Porter – Poole Althouse

IN THE MATTER OF the *Electrical Power Control Act,* RSNL 1994, Chapter E-5.1 (the EPCA) and the *Public Utilities Act*, RSNL 1990, Chapter P-47 (the Act), and regulations thereunder;

AND IN THE MATTER OF an Application by Newfoundland and Labrador Hydro pursuant to Subsections 41(3) of the Act, for the approval of refurbishment of the marine terminal at the Holyrood Thermal Generating Station.

TO: The Board of Commissioners of Public Utilities (the Board)

THE APPLICATION OF NEWFOUNDLAND AND LABRADOR HYDRO (Hydro) STATES THAT:

1. Hydro is a corporation continued and existing under the *Hydro Corporation Act, 2007*, is a public utility within the meaning of the Act and is subject to the provisions of the *Electrical Power Control Act, 1994*.

2. Hydro applied for $5.859 million in its 2012 Capital Budget Application for the refurbishment of the marine terminal at the Holyrood Thermal Generating Station.

3. The Board, in Order No. P.U. 5 (2012), denied the proposal noting the following concerns:

   - The evidence did not clearly demonstrate that it was necessary to replace fender 4; and

   - The inspections should be conducted prior to doing any of the work.

4. Hydro has addressed the Board's concerns and amended its scope accordingly in its current Application for $5.198 million of 2013 supplemental capital expenditures. The report entitled "Refurbishment of the Marine Terminal, Holyrood Thermal Generating Station" attached to the Application provides the details of the proposed expenditures.

5. In order to provide a safe docking environment for vessels that use the marine terminal to offload fuel oil, Hydro requires that the marine terminal be in safe and reliable condition.

6. Therefore, Hydro makes Application that the Board make an Order approving, pursuant to Section 41(3) of the *Act*, the capital expenditure of $5.198 million for the refurbishment of the marine terminal at the Holyrood Thermal Generating Station.

DATED AT St. John's in the Province of Newfoundland and Labrador this 20th day of February, 2013.

Geoffrey P. Young
Newfoundland and Labrador Hydro,
500 Columbus Drive, P.O. Box 12400
St. John's, Newfoundland, A1B 4K7
Telephone: (709) 737-1277
Facsimile: (709) 737-1782

IN THE MATTER OF the *Electrical Power Control Act,* RSNL 1994, Chapter E-5.1 (the EPCA) and the *Public Utilities Act*, RSNL 1990, Chapter P-47 (the Act), and regulations thereunder;

AND IN THE MATTER OF an Application by Newfoundland and Labrador Hydro for the approval, pursuant to Section 41 (3) of the Act, of refurbishment of the marine terminal at the Holyrood Thermal Generating Station.

AFFIDAVIT

I, E. Gerard Piercy, Professional Engineer, of St. John's in the Province of Newfoundland and Labrador, make oath and say as follows:

1. I am Manager, Civil Engineering, for Newfoundland and Labrador Hydro, the Applicant named in the attached Application.
2. I have read and understand the foregoing Application.
3. I have personal knowledge of the facts contained therein, except where otherwise indicated, and they are true to the best of my knowledge, information and belief.

SWORN at St. John's in the)
Province of Newfoundland and)
Labrador)
this 20th day of February 2013,)
before me:)

Barrister – Newfoundland and Labrador

E. Gerard Piercy

(DRAFT ORDER)
NEWFOUNDLAND AND LABRADOR
BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

AN ORDER OF THE BOARD

NO. P.U. __ (2013)

IN THE MATTER OF the *Electrical Power Control Act,* RSNL 1994, Chapter E-5.1 (the EPCA) and the *Public Utilities Act*, RSNL 1990, Chapter P-47 (the *"Act"*), and regulations thereunder;

AND

IN THE MATTER OF an application by Newfoundland and Labrador Hydro for approval to proceed with the refurbishment of the marine terminal at the Holyrood Thermal Generating Station pursuant to Section 41(3) of the Act.

WHEREAS Newfoundland and Labrador Hydro ("Hydro") is a corporation continued and existing under the *Hydro Corporation Act, 2007*, is a public utility within the meaning of the Act, and is subject to the provisions of the *EPCA;* and

WHEREAS Section 41(3) of the Act requires that a public utility not proceed with the construction, purchase or lease of improvements or additions to its property where:

a) the cost of construction or purchase is in excess of $50,000; or
b) the cost of the lease is in excess of $5,000 in a year of the lease,

without prior approval of the Board; and

WHEREAS on August 3, 2011 Hydro submitted a capital project to refurbish the marine terminal at the Holyrood Thermal Generating Station as part of its 2012 Capital Budget Application in the amount of $5.859 million; and

WHERAS in Order No. P.U. 5(2012) the Board denied this proposal noting the following concerns:

- The evidence did not clearly demonstrate that it was necessary to replace fender 4; and
- The inspections should be conducted prior to doing any of the work; and

WHEREAS Hydro addressed the Board's concerns and has amended its scope of work and budget request accordingly in the Application dated February 20, 2013, for the approval of the 2013 capital expenditure of $5.198 million; and

WHEREAS this project is required to upgrade inadequate and deteriorated marine terminal infrastructure in order to provide a safe docking environment for vessels that use it to offload fuel oil; and

WHEREAS the Board approved supplementary 2013 capital expenditures in Order No. P.U. 1(2013) in the amount of $284,100 for the refurbishment of the stop logs at the Burnt Dam Spillway; and

WHEREAS the Board is satisfied that the 2013 supplemental capital expenditure for refurbishment of the marine terminal at the Holyrood Thermal Generating Station is necessary to allow Hydro to provide service and facilities which are reasonably safe and adequate and just and reasonable.

<u>IT IS THEREFORE ORDERED THAT:</u>

1. The proposed capital expenditure of $5.198 million for the refurbishment of the marine terminal at the Holyrood Thermal Generating Station is approved.

2. Hydro shall pay all expenses of the Board arising from this Application.

DATED at St. John's, Newfoundland and Labrador, this day of , .

A REPORT TO
THE BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

	Electrical
	Mechanical
	Civil
	Protection & Control
	Transmission & Distribution
	Telecontrol
	System Planning

REFURBISHMENT OF THE MARINE TERMINAL

Holyrood Thermal Generating Station

February 2013

newfoundland labrador
hydro
a nalcor energy company

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1 INTRODUCTION

The Holyrood Marine Terminal facility is an integral component of the fuel oil handling system, and is the single point of entry for all of the No.6 (Bunker C) fuel oil utilized by the plant. The Holyrood Marine Terminal is located in Conception Bay, as indicated in Figure 1.

Figure 1 – Holyrood Marine Terminal Location Map

The primary concern with the Holyrood Marine Terminal facility is the inability of the structure to provide a safe docking environment for the vessels which utilize it to offload fuel oil. Figures 2 and 3 show vessels docking at the facility.

Figure 2: Docking Vessel with Ice Present

Figure 3: Large Docking Vessel

Throughout the years, the structure has aged and the condition of the gravity fender system (see Figure 4 below) has deteriorated. This has resulted in missing, worn, and inoperable gravity fenders. The fenders serve to protect the hull of the vessels from damage during docking and fuel oil offloading operations and are a critical component in the safe docking and fuel oil offloading processes.

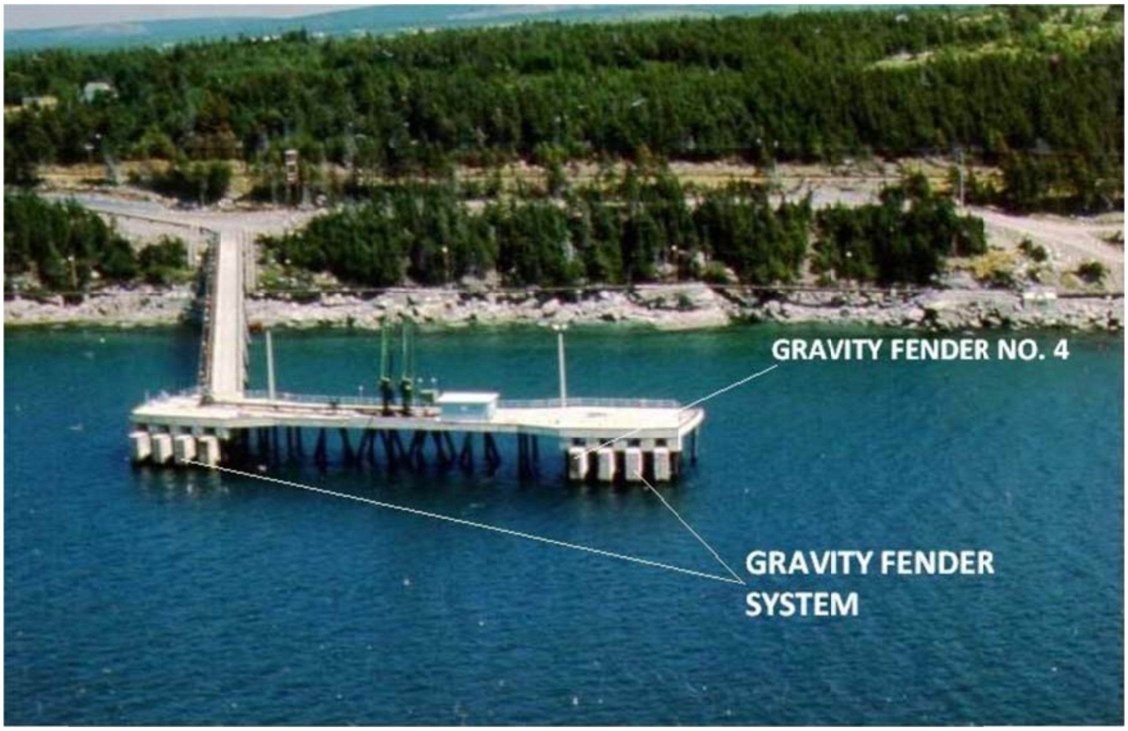

Figure 4: Gravity Fender System (prior to 2008 fender failure)

A severe example of the fender deterioration occurred in 2008 when one of the 70 ton concrete gravity fenders detached from the structure and fell to the sea bottom. To mitigate the loss of this fender, Hydro engaged Hatch (engineering consultants) to investigate the cause of the failure and spearhead the completion of emergency repairs to the three remaining critical fenders to ensure that they were in no imminent danger of falling. The emergency repairs consisted of a major repair to fender 3 which involved the replacement of the secondary support arms on the fender. Temporary refurbishments were also completed on fenders 5 and 6. These repairs were not designed to be used on a permanent basis but were to facilitate fuel shipment through the winter of 2008-2009. Newfoundland and Labrador Hydro (Hydro) confirmed this position with Hatch, as indicated in the Hatch letter of May 16, 2012, attached as Appendix A.

Following the completion of the temporary repairs, Hydro implemented a revised docking procedure for all vessels offloading at the facility. This procedure was intended to minimize the forces generated on the fenders during docking and consisted of:

- limiting the size of the vessel at 55,000 dead weight ton[1] (DWT);
- setting vessel length limits between 146 meters to 200 meters;
- setting the maximum vessel draft at 35 feet;
- using tractor tugs to assist the vessels when docking;
- reducing the vessel approach velocity; and
- providing enhanced monitoring of both wind speed and direction to ensure that vessels do not attempt to dock in unfavourable conditions.

Table 1 indicates the vessel size for all dockings from 2009 through the fall of 2012.

Table 1: Holyrood Marine Terminal Facility Vessel Docking Summary

DATE	VESSEL	DWT	LENGTH (m)
January 4, 2009	M/T High Performance	51,303	182.00
February 3, 2009	M/T Kandilousa	46,700	182.76
February 25, 2009	M/T Halki	46,538	183.20
March 9, 2009	M/T Ravnanger	46,338	182.94
March 27, 2009	M/T North Point	53,095	186.41
November 11, 2009	M/T Kandilousa	46,700	182.76
December 15, 2009	M/T Chang Hang Tan Suo	50,900	184.95
January 14, 2010	M/T Minerva Vaso	50,922	183.00
February 8, 2010	M/T Butterfly	47,300	182.50
February 16, 2010	M/T Aris	53,107	186.41
March 2, 2010	M/T Aris	53,107	186.41
November 9, 2010	M/T Minerva Grace	50,989	183.00
December 9, 2010	M/T Acor	40,785	184.32
January 8, 2011	M/T Acor	40,785	184.32
January 29, 2011	M/T Aris	53,107	186.41
February 23, 2011	M/T Aris	53,107	186.41
March 29, 2011	M/T Chang Hang Tan Suo	45,709	184.95
October 3, 2011	MT Iron Point	50,922	182.00

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[1] The displacement at any loaded condition minus the lightship weight. It includes the crew, passengers, cargo, fuel, water, and stores. Like displacement, it is often expressed in long tons or in metric tons.

DATE	VESSEL	DWT	LENGTH (m)
November 25, 2011	MT Iron Point	50,922	182.00
January 1, 2012	MY HC Elida	37,345	186.00
January 9, 2012	MT CPO Norway	37,321	185.00
February 1, 2012	MT Aris Trafigura	38,695	189.00
February 17, 2012	MT Aris Trafigura	38,695	189.00
March 15, 2012	MT Minerva Anna	50,939	183.00
April 19, 2012	MT Minerva Anna	50,939	183.00
November 9, 2012	MT Meriom Glory	50,304	182.00

While there have been no incidents related to berthing since the implementation of the revised docking policy, these procedures were intended to mitigate the risks associated with berthing vessels while considering the condition of the terminal at the time of the assessment. While Hatch's 2011 report did not specify a timeframe for the efficacy of its recommendations, it was implied that an upgrade was required in the near future. Hatch noted that the fenders are in poor condition, and since modern double-hulled vessels tend to have more freeboard[2] than single- hulled vessels, there is a higher risk that wind conditions can exert more force on the fenders and jetty than the older single-hulled vessels. Ballasting operations are sometimes possible to minimize freeboard but the modern double-hulled ships remain higher than single-hulled vessels during docking procedures.

To initiate the completion of permanent repairs, Hydro issued a request for proposal for engineering services to complete a condition assessment of the Marine Terminal and provide recommendations to extend the service life of the structure an additional 40 years. The assessment involved a detailed study of the facilities original design and construction philosophies as well as current operating procedures. The final report was submitted to Hydro on December 20, 2010.

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[2] Freeboard (Nautical) refers to the height of a ship's deck above the water level.

With the announcement of the proposed Labrador interconnection in 2011, Hydro requested that Hatch revisit the report findings and revise the recommendations to include only the least-cost options considered to be critical to ensuring the continued operation of the facility for the next ten years (see Appendix B). The revised report was submitted to Hydro on April 29, 2011 and establishes the scope of work for this proposal.

In addition to the Marine Terminal's docking capacity, there are numerous deficiencies which present life safety concerns during the fuel oil offloading process. Life safety concerns related to the Holyrood Marine Terminal facility are primarily attributed to the presently non-existent man-overboard retrieval/recovery system and limited support vessel access to Marine Terminal facility. Additional concerns with the inadequate deck lighting system also create safety issues. Given the harsh environment, the bulbs in these lighting stands are continuously failing and must be replaced (replacement is necessary every six months). The existing lighting stands measure approximately 35 feet in height. Given the height of the fixtures combined with the high winds and icy conditions which frequent the jetty, replacement of failed bulbs often has to be carried out in less than ideal conditions. High winds and icy conditions can make these replacements hazardous to employees. This creates a significant safety risk to the personnel carrying out the work. New lighting stands installed at a lower height and equipped with two marine rated fixtures would prove beneficial in multiple areas. Not only would they reduce the risk associated with the completion of required maintenance work, they would also provide additional lighting on the jetty deck. This additional lighting would create an opportunity for night time arrival and departure when tidal conditions are often more favourable, thus decreasing the exposure time for berthed vessels.

The planned development of Muskrat Falls is expected to eliminate, by 2021, the need for the Holyrood Thermal Generating Station (HTGS) to continue as a generating station. The shutdown of the generating units will negate any requirements for fuel oil delivery. For this reason, the scope of work outlined in this proposal has been refined to address only the essential deficiencies from both a safety and environmental perspective and to extend the jetty service life an additional eight years, at which time electrical generation at HTGS will cease. The condition assessment identifies only those items deemed to be necessary to ensure the continued operation of HTGS as a generating station to 2021. To facilitate the safe and efficient fuel handling, required to keep the plant in operation, the work outlined in this proposal is required.

Hydro submitted a capital proposal similar to this with its 2012 Capital Budget Application. The Board, in Order No. P.U.5 (2012), did not approve that proposal. Concerns identified in that order included:

- The evidence did not clearly demonstrate that it was necessary to replace fender 4; and
- The inspections should be conducted prior to doing any of the work.

Hydro has specifically addressed these items in Section 2.1 below.

2 PROJECT DESCRIPTION

This project involves the completion of refurbishments, upgrades, and modifications to the existing Marine Terminal facility at the HTGS for the purpose of extending its useful life, ensuring system reliability, and increasing the level of safety within the facility. The scope of work has been generated from the findings of a condition assessment report, completed by Hatch. A copy of this report can be found in Appendix B. Work will include the following:

1. Restoration of critical fenders 3, 5 and 6 of the swinging gravity fender system;
2. Replacement of detached swinging gravity fender no. 4;
3. Inspection of steel pile foundations, anodes, and attachment brackets; and
4. Improvements to life safety through the installation of devices such as a support vessel access system, a man-overboard recovery system, fall arrest system and improvements to the deck lighting system.

2.1 Inspection and Assessment Requirements

The scope of work outlined in this proposal, was derived through the completion of an independent life extension study. This work is essential to ensure the continued operation of the Holyrood Marine Terminal facility and reflects the minimum upgrade requirements.

It is essential that this work be initiated immediately. Since the implementation of the temporary repairs in 2008, Hydro has engaged Hatch to conduct an inspection of the gravity fenders annually in the late summer or early fall of 2009, 2010 and 2011. The inspections served to identify any issues with temporary repairs and highlight other areas of concern which might require repairs prior to the next shipping season. Based on observations made during the site inspections, all fenders appear to be seizing as a result of corrosion buildup on the hinged connections, wear in the pins and plates, and misalignment resulting from the fenders rubbing and leaning against the support piles. As a consequence, none of the fenders can be considered fully functional and must be repaired and/or replaced.

In response to Board Order No. P.U. 5(2012), the replacement of fender 4 and repairs to the three remaining critical fenders (3, 5, and 6) must be completed to ensure the continued operation of the Holyrood Marine Terminal facility. Correspondence from Hatch reiterating the necessity to complete the fender upgrades is attached as Appendix A. The cost of replacement of the sacrificial anodes[3] has been removed from this proposal. The cost to complete an inspection of the steel piles, anodes and attachment brackets is estimated to be $176,400. Hydro will apply for separate approval to complete any capital work which is identified by the inspection.

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[3] See Page 21 of the Hatch Report

3 EXISTING SYSTEM

The Holyrood Marine Terminal facility jetty is an integral component of the fuel oil handling system and is the single point of entry for all of the No.6 (Bunker C) fuel oil utilized at the plant.

The Marine Terminal consists of a 125 meters shore arm link that bridges the jetty to the adjacent land (see Figure 5 below).

Figure 5: Jetty and Shore Arm Link

The jetty is approximately 74 meters long by 12 meters wide and supports the fuel oil offloading arms and associated pipeline and controls related to the fuel oil offloading process. Both the shore arm link and jetty consist of a concrete superstructure supported on concrete filled circular steel piles (see Figure 6).

Figure 6: Jetty Pile System

The superstructure of the jetty also supports the gravity fender system that absorbs the forces created from the vessels as they approach the Marine Terminal. The vessels are secured to the Holyrood Marine Terminal using four mooring dolphins located on the shore and mooring bollards located on the jetty superstructure.

When a vessel arrives and is secured at the Marine Terminal, fuel oil is offloaded from the vessel into the fuel oil offloading arms located on the jetty and pumped through a pipeline into the fuel oil storage facility which is located approximately one kilometer from the Marine Terminal (see Figure 7 below).

Figure 7 – Holyrood Site Layout

This system for the transfer of fuel oil consists of two fuel oil offloading arms, valves, a network of pipes and associated controls which are located on the Marine Terminal. The pumping force for the transfer of the fuel oil is generated from pumps located on the vessel.

3.1 Age of Equipment or System

The Marine Terminal was completed during the first construction phase of the Holyrood Thermal Generating Station in 1969. The jetty is 43 years of age.

3.2 Major Work and/or Upgrades

There have been no major upgrades to the Holyrood Marine Terminal since initial construction.

3.3 Anticipated Useful Life

The anticipated useful life of a Marine Terminal facility is 35 years. Thus, the current facility has exceeded its design life. The recommended upgrades to the Marine Terminal are expected to extend the life of the facility to meet the future generation requirements of the HTGS.

3.4 Maintenance History

The Holyrood Marine Terminal maintenance history is summarized in Table 2 below. It includes both preventative and corrective maintenance performed on the Holyrood Marine Terminal from 1996 to present.

Table 2: Maintenance History

YEAR	MAINTENANCE ACTIVITY	COST ($000)
2012	Loading Arm upgrades	129.6
2009	Replacement of timber, bolts, and High Density Polyethylene wear strips on gravity fenders (corrective)	15.0
2008	Emergency Repairs to reinforce connection of gravity fenders to Marine Terminal structure (corrective)	777.0
2007	Maintenance of fuel oil offloading arms (preventive)	180.0

3.5 Outage Statistics

There have been no outages related to the Holyrood Marine Terminal.

3.6 Industry Experience

The Holyrood Marine Terminal is located in a high energy sea state[4], as a result of its exposure to the Atlantic Ocean and prevailing onshore winds in the area. Typically marine

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[4] Sea state is determined through the measurement of marine conditions including wind speed and wave height.

terminals are located in a sheltered bay. Thus, industry experience is limited for this unique situation.

3.7 Maintenance or Support Arrangements

General maintenance for the Marine Terminal facility has been performed by Hydro personnel. Major maintenance such as epoxy coatings, structural steel repair, concrete repair work, diving inspections, and installation of sacrificial anodes has been carried out by outside contractors.

3.8 Vendor Recommendations

The scope of work included in this proposal is founded on the recommendations derived from a marine terminal condition assessment completed by Hatch (Appendix B). The focal points of the assessment were derived, in large part, from the numerous letters of protest received from the vessel masters docking at the Marine Terminal.

There have been 40 letters of protest submitted from 2006 to 2011 (Appendix C). The letters outline concerns over the condition of various components of the structure and the fuel offloading system. The more noticeable issues include:

- The reduction in size and number of hoses available at the Holyrood Marine Terminal imposes restrictions on the vessels' normal cargo handling capacity, resulting in an increase in turnaround time;
- Delay in berthing after issuing a Notice of Readiness due to the restrictive weather and sea conditions in place at the Holyrood Marine Terminal;
- High back pressure at the manifold caused by considerable length of the shore pipeline and the raised location of shore tanks;
- Shore pipeline has no non-return valve;

- Limiting discharge pressure to 100 psi caused lower flow rate and prolonged discharging time;
- Loading arms gravity drain back to the ships' tanks;
- No booster pumps;
- Ullages and cargo figures taken while vessel is rolling and pitching due to swell; and
- Delays after discharging due to unavailability of tug to assist in leaving berth. The reduction in size and number of hoses available at the Holyrood Marine Terminal imposes restrictions on the vessels' normal cargo handling capacity.

3.9 Availability of Replacement Parts

The availability of replacement parts is not a consideration in this project.

3.10 Safety Performance

While the Holyrood Marine Terminal has never been out of commission due to any safety issues, deficiencies exist. The two major safety concerns highlighted in the Hatch report[5] consist of emergency evacuation from the jetty and man-overboard rescue procedures. The existing Marine Terminal lighting system also raises a number of safety concerns. These issues are further discussed below.

At present, there is no adequate method for emergency evacuation from the south end of the jetty. In an emergency situation, such as a fire at the unloading arms, there is no direct means for an escape to shore. The only method of evacuation requires personnel to utilize chain ladders to climb down the jetty where they could be forced to enter the water, should there be no rescue craft available.

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[5] See Section 7 of Appendix B.

Furthermore, in the event of an emergency such as a man-overboard situation, there are limited means to rescue personnel from the ocean. There are two chain ladders which are located on the shore side of the jetty; an inflatable boat is stored in the control room building; and a life ring is mounted to the railing system. Despite the implementation of these measures, the system is inappropriate as it places the entire effort on the person who has fallen into the water to travel to the nearest ladder before pulling himself out of the water and onto the ladder where he or she is required to climb ten meters to safety with no fall protection available. While there have been no reports of anyone falling into the water to date, given the cold temperatures and high energy of Conception Bay waters a person stands a very small chance of surviving in the event that a fall were to occur.

Adding to the safety deficiencies highlighted above, there is currently no mechanism in place to dock a smaller vessel (such as a tug boat) at the terminal. Such a vessel could serve as a rescue craft in the event of an emergency situation. With this in mind, the current fuel oil offloading procedure utilizes a support vessel to assist during the offloading process. Some of the support vessels' duties include deployment of the oil boom and distribution of the mooring ropes and spring lines to the mooring dolphins.

While the support vessel is available to assist in an emergency during offloading operations, when the probability of an emergency situation is greatest, the interface between the Marine Terminal and the vessel is not ideal. The problem with utilizing the support vessel in a rescue operation lies in the current means of access between the Marine Terminal and the support vessel. At present, the single point of access from vessel to the jetty consists of a chain ladder, which given the nature of the installation cannot be equipped with fall protection. The implementation of a new support vessel access system would provide a safe means of transport from the vessel to the jetty. It is anticipated that a solution for both the man-overboard recovery system and emergency evacuation process can be incorporated with the implementation of such a system.

While the Marine Terminal's lighting system provides adequate lighting levels when all fixtures are operational, the harsh marine environment takes a toll on the fixtures and regular replacement is required. It is during the regular maintenance operations required to keep the fixtures illuminated that the majority of the safety concerns are generated. The existing lighting stands measure approximately 35 feet in height and contain a single fixture mounted at the top. Given the height and location of the fixtures, the process of changing out the bulbs is difficult in all weather conditions. The height of the fixtures requires the use of a bucket truck to complete the work. Accessing the jetty in the truck and setting up to complete the changeover, in itself, poses a risk. Given the high winds and icy conditions which frequent the jetty, maintenance and replacement of fixtures is often carried out in less than ideal conditions, which substantially magnifies the safety risk to the personnel carrying out the work. In the past, repairs to failed fixtures have been delayed for weeks at a time while waiting for conditions to permit the safe completion of required repairs. A reduction in the number of operational light fixtures reduces the deck lighting levels thereby increasing the probability of accidents as a result of poor lighting conditions. New marine rated fixtures installed at a lower elevation would prove beneficial in multiple ways. The marine rated fixtures would provide a longer service life which reduces the maintenance effort and the lower light stands would make the completion of any required maintenance work much easier to carry out. Improvements to the lighting system could also create the opportunity for night time arrival and departure, where tidal conditions are often more favourable. This would help to decrease the exposure time in which vessels are berthed at the facility and risks to personal safety are greatest.

The noted safety issues have always existed at the facility, as it was built to the safety standards in place at the time of construction. The strong emphasis placed on safety in recent years has exposed the issues. While operational procedures for the completion of specific tasks have been implemented to manage these emergencies, there have been no major projects initiated to correct these deficiencies. Past preventative and corrective maintenance were generally aimed at operational assets. Emergency equipment was inspected, but no formal records were retained. The recent Hatch assessment was the first Marine Terminal survey completed by a third party to consider safety in comparison with current standards. Modern marine terminal design gives substantial consideration to the implementation of life safety features. This is a design philosophy which can be attributed, in large part, to the evolving safety culture within the modern day workforce where much more emphasis is placed on worker safety. Designs including non-obstructive safety railing, routes for emergency evacuation and infrastructure for man-overboard rescue are standard.

3.11 Environmental Performance

The Holyrood Marine Terminal has never been out of commission as the result of an environmental issue, however, potential for a serious environmental impact does exist while docking and offloading fuel oil from modern vessels. While Hydro does have a contingency plan (see Appendix D) in place, if a spill were to occur, the plan relies primarily on the pre-booming of the tanker, prior to offloading, to contain any spilled fuel oil. There have been a number of instances in which poor weather and arctic ice have inhibited Hydro's ability to pre-boom the tankers prior to offloading at the facility. Table 3 outlines the instances in which pre-booming were not possible. Spill prevention is clearly the preferred option.

Table 3: Summary by Date of Inability to Pre-Boom the Tankers (2002-2012)

Date	Tanker (If Recorded)	Comment
9-Oct-02	Lanner	The oil spill containment boom was sent to the Holyrood marina but not deployed due to high wind conditions.
25-Oct-02	Alfios 1	The oil spill containment boom was sent to the Holyrood marina but not deployed due to high winds.
11-Feb-03	M/T Saetta	The oil spill containment boom was sent to the Holyrood marina but not deployed due to ice conditions at the dock and on the eastern shore of Holyrood Bay. Ice around the dock and Holyrood Bay moved off overnight and the oil spill containment boom was deployed at 0930 hrs on 2003-02-10.

Date	Tanker (If Recorded)	Comment
23-Feb-03	M/T Elbe Heidmar	The oil spill containment boom was sent to the Holyrood marina but not deployed due to high wind and sea conditions. Winds reduced overnight but because ice was forming around dock and Holyrood Harbour, the boom was left ashore at the marina.
21-Mar-03	M/T Aramis	The oil spill containment boom was not sent to Holyrood for deployment as Holyrood Harbour and Conception Bay was completely ice covered.
19-Feb-04	M/T Pobeda	The oil spill containment boom was sent to Holyrood but not deployed due to ice conditions at the dock, along the eastern shore of the harbour and at the Holyrood marina.
9-Sep-04	M/T Milagro	The oil spill containment boom was delivered to the Holyrood marina but not deployed due to high winds and wave action at the Marine Terminal. The order to deploy the boom was given at 1915 hours when winds abated.
20-Nov-04	M/T Asphalt Star	The containment boom was delivered to the Holyrood marina but not deployed due to high wave and tide activity in the area of the HTGS Marine Terminal.
18-Dec-04	M/T Evros	The oil spill containment boom was delivered to the Holyrood marina on December 16, 2004, but not deployed due to high winds and wave action. The boom was deployed on December 17, 2004 at approximately 1030 hours and remained in place for the duration of cargo discharge.
6-Jan-05	M/T Alfios 1	The oil spill containment boom was sent to Holyrood and deployed. However, the boom was removed on January 5, 2005 at 12:30 hrs due to heavy ice conditions at the dock area.
9-Feb-05	M/T Seapromise	The oil spill containment boom was delivered to the Holyrood Marine at 1500 hours February 8, 2005 but not deployed due to the presence of slob ice in the Holyrood Harbour. The boom remained at the Holyrood marina for the duration of tanker discharge operation but was not deployed due to high wave action at the HTGS terminal on February 9, 2005.
1-Mar-05	M/T Falcon Carrier	The oil spill containment boom was sent to Holyrood marina and deployed. The boom was removed on March 1, 2005 at 1400 hrs due to drifting ice at the dock area and along the Eastern Shore of Holyrood Bay.
31-Mar-05	M/T Iokasti	The oil spill containment boom was sent to Holyrood but was not deployed until 1015 hrs on March 30, 2005 due to tanker arrival schedule misunderstanding.
10-Nov-05	M/T East Siberian Sea	The oil spill containment boom was delivered to the Holyrood marina at 1630 hours on November 9, 2005 but was not deployed due to high winds and wave/tide action at the off loading terminal. The boom was deployed at

Date	Tanker (If Recorded)	Comment
		1000 hours on November 10, 2005 and remained in place for the full duration of the cargo discharge.
16-Feb-07	M/T Falcon Carrier	Oil boom not deployed due to ice/weather conditions.
19-Jan-08	M/T Stena Compassion	Oil boom not deployed due to ice, then high winds.
12-Mar-08	M/T Chauler Bay	Oil boom not deployed due to ice.
4-Jan-09	M/T High Performance	Oil boom not deployed due to restricted visibility and sea state.
9-Mar-09	M/T Ravnanger	Oil boom not deployed due to high winds and sea state.
27-Mar-09	M/T North Point	Oil boom not deployed due to high winds and sea state.
15-Dec-09	M/T Chang Hang Tan Suo	Oil boom not deployed due to ice.
14-Jan-10	M/T Minerva Vaso	Oil boom not deployed due to ice then high winds.
8-Feb-10	M/T Butterfly	Oil boom not deployed due to ice and high winds.
30-Mar-10		Oil boom was deployed previous to discharging cargo but damaged during retrieval due to high winds and seas.
31-Jan-11	M/T Aris	Oil boom not deployed due to safety concerns from winds and ice.
01-Feb-12	MT Aris Trafigura	Oil boom was not deployed due to safety concerns from winds and ice.
17-Feb-12	MT Minerva Anna	Oil boom was not deployed due to safety concerns from ice.
15-Mar-12	MT Minerva Anna	Oil Boom was not deployed due to safety concerns from ice.

The Marine Terminal facility was originally designed to accommodate 35,000 DWT, single-hulled vessels. Throughout the years, economics and logistics have dictated that modern fuel storage vessels be much larger, thereby enabling them to carry more fuel. To maintain a competitive edge within the industry and meet the growing demand for fuel supply, agencies have transitioned to larger vessels thereby making the smaller vessels obsolete. Furthermore, single-hulled tankers have been slowly replaced with double-hulled vessels since the early 1990s. This replacement was in response to major oil spill incidents such as the Exxon Valdez spill of 1989. While the double-hulled vessels offer a secondary containment, thereby reducing the risk of an oil spill, the double hull raises the vessels' center of gravity. This raised center of gravity results in increased vessel freeboard leaving the vessel more vulnerable to the effects of wind. In periods of high wind, the vessel can exert more force on the Marine Terminal fender system. The vessels currently available for offloading fuel at the Holyrood Marine Terminal facility range in size from 46,700 DWT (Motor Tanker (M/T) Kandilousa) to 71,345 DWT (M/T Chauler Bay). This creates significant risk and a potential for damage to the Marine Terminal and the vessel itself during offloading operations as the aged fender system is no longer able to adequately withstand the forces it is subject to by the larger vessels. Available records indicate that vessels larger than 35,000 DWT have berthed at the Holyrood Marine Terminal since 1972. Vessels prior to 1990 were mainly of single hull construction; however, there is no available information to confirm as to exactly when double-hulled vessels began delivering fuel to HTGS.

The continued docking of these larger, double-hulled vessels will continue to deteriorate the terminal's fender system, thus, increasing the likelihood of another failure. The engineering assessment to determine the mode of failure for the 70 tonne concrete gravity fender in 2008 found that, given the location of the center of gravity for each concrete fender, the mechanism of failure was likely a plunge and roll. This mode of failure would almost certainly create a situation whereby the rear portion of the concrete fender could penetrate the hull of a vessel docked at the Holyrood Marine Terminal. While there was no third party loss or damage in this instance, had a vessel been docked at the Marine Terminal during the fender failure, the result of such an event could have amounted to a significant hydrocarbon spill into Conception Bay.

3.12 Operating Regime

The Holyrood Marine Terminal is typically utilized between September and April to receive fuel oil, although tankers have arrived year round from time to time. An average year includes eight fuel deliveries with as many as twelve being required during years in which heavy loads are encountered.

4 JUSTIFICATION

This project is justified on the requirement to upgrade inadequate and deteriorated Marine Terminal infrastructure. These upgrades are required to provide the HTGS with the ability to provide safe, environmentally responsible, least-cost, reliable electrical service.

The existing Marine Terminal has deteriorated to the state where it no longer meets the requirements of the vessels utilizing the facility. Vessels offloading fuel oil have required the facility to function outside of its original design limitations which has elevated the risk of damage to both the Marine Terminal and the vessel. The availability of non-modern vessels that would match the design criteria for the Holyrood Marine Terminal in a modern era is limited. Many of the vessels that would be suitable for delivery at the Holyrood Marine Terminal have been retired and replaced with more modern vessels. Finding suitable vessels and ensuring they are available at the time required for a delivery to HTGS places time constraints on the deliveries and risks the possibility of a vessel not being available to deliver to HTGS.

The Holyrood Marine Terminal facility is an integral component of the fuel oil handling system, and is the single point of entry for all of the No.6 (Bunker C) fuel oil utilized by the plant. The failure of any component of the Holyrood Marine Terminal facility will result in a complete cutoff of fuel oil supply.

4.1 Net Present Value

A net present value calculation was not performed for this project as there are no viable alternatives.

4.2 Levelized Cost of Energy

This project does not involve analyzing a new energy generation source or enhancing the existing generation capacity.

4.3 Cost Benefit Analysis

A cost benefit analysis is not applicable for this project as there are no quantifiable benefits. This project is justified on the merit of ensuring the continued safe, reliable operation of the Holyrood Marine Terminal facility.

4.4 Legislative or Regulatory Requirements

Hydro has not received a directive from any government department or agency indicating that the proposed work is required to meet the requirements of any listed legislation.

While legislative or regulatory requirements did not play a role in the development of the scope of work, there are a number of acts and regulations that define the requirements for constructing components similar to those at the Holyrood Marine Terminal. These include:

- Navigation Waters Protection Act – Transport Canada;
- Canadian Environmental Assessment Act;
- The Fisheries Act;
- Species at Risk Act;
- Transportation of Dangerous Goods Act; and
- Canadian Shipping Act.

These acts and regulations pertain to the actual construction and implementation of the proposed upgrades and modifications. They are not applicable to the selection of the work scope.

4.5 Historical Information

The refurbishment of the Holyrood Marine Terminal is not a recurring project, thus no historical information is available.

4.6 Forecast Customer Growth

There are no anticipated customer growth implications that can be attributed to this project. The projected HTGS production requirements for 2013-2017 can be seen in Table 4 below.

Table 4: HTGS Production Requirements (September 2013 - December2017)

	2013		**2014**		**2015**		**2016**		**2017**	
	No. Ship-ments	**Quantity (bbls x 1,000)**	**No. Ship-ments**	**Quantity (bbls x 1,000)**	**No. Ship-ments**	**Quantity (bbls x 1,000)**	**No. Ship-ments**	**Quantity (bbls x 1,000)**	**No. Ship-ments**	**Quantity (bbls x 1,000)**
Jan	2	450	2	450	2	450	2	450	2	450
Feb	2	450	2	450	2	450	2	450	2	450
Mar	1	225	2	450	2	450	2	450	2	450
Apr	1	225	1	225	1	225	1	225	1	225
May	-	-	-	-	-	-	-	-	-	-
Jun	-	-	-	-	-	-	-	-	-	-
Jul	-	-	-	-	1	225	-	-	-	-
Aug	-	-	1	225	-	-	1	225	-	-
Sep	-	-	-	-	1	225	-	-	-	-
Oct	1	225	1	225	1	225	1	225	-	-
Nov	1	225	1	225	1	225	1	225	-	-
Dec	1	225	2	450	2	450	2	450	-	-
Total	**9**	**2,025**	**12**	**2,700**	**13**	**2,925**	**12**	**2,700**	**7**	**1,575**

Note: Fuel deliveries are based on forecast production from the HTGS. Deliveries are subject to change based on inflows in the hydro reservoirs which impact on the amount of hydroelectric generation available as well as customer demand and energy requirements.

Under Hydro's current assumptions, there would be two full tanks of fuel remaining at the HTGS facility at the in-service date of the Labrador infeed. The conceptual base case plan for HTGS is to operate as a primary generation source until the Labrador infeed is brought online in mid-2017. It will continue to serve as a backup generation source through the end of 2021 and must remain functional until this time.

4.7 Energy Efficiency Benefits

There are no energy efficiency benefits associated with this project.

4.8 Losses during Construction

There will be no losses during construction as this project will not require the HTGS to be out of service.

4.9 Status Quo

The Holyrood Marine Terminal is nearing the end of its service life and currently offers a substandard ability to properly dock and offload fuel oil from modern vessels. Despite the implementation of controlled docking procedures, which enable the terminal facilities fender system to better withstand the impact loads of the vessels, the facility is being utilized outside of its original design parameters. The structure is too old, deteriorated, and undersized to properly handle the vessel loads and the risk of failure of the structure or damage to a tanker is elevated. The corrosive marine environment to which the structure is subject will undoubtedly lead to the continued deterioration of the structure and the upgrades must be considered to extend the service life.

Failure to complete the recommended upgrades could yield severe consequences. The HTGS is a major source of electrical energy to the province, generating on average between 15% and 25% of the island's electricity annually. In a single year, the plant could be required to produce up to three TWh of energy, which is equivalent to approximately 45% of Hydro's Island Interconnected supply requirement in 2012. While its primary role is to meet the power demands of the Avalon Peninsula, the HTGS is also used to supplement power supply to other areas of the island during years in which water levels are low and the full hydroelectric generation output cannot be received. At peak production, the plant burns approximately 18,000 barrels of oil per day.

While the probability of an incident occurring is difficult to quantify, the potential for a dock failure is real. This is verified by the gravity fender failure of 2008. If another fender were to fail, the potential for damage to the Marine Terminal structure and/or a docked vessel would be high. The consequences of either event could potentially lead to the inability to supply fuel oil to the generating station, personal death or injury, and/or a major environmental catastrophe. Any single one of these possibilities would be unacceptable to Hydro, yet all three have the possibility of occurring simultaneously if the dock were to experience major failure.

Should the extent of the damage inflicted on the structure, be sufficient enough to prevent further berthing of tankers for the offloading of fuel oil, Holyrood's onsite fuel supply would only be sufficient to provide up to 20 days of power generation at full load - assuming that the three onsite storage tanks are full. Requirements to run the facility at full load typically occur during the winter months when the demand for power is greatest. Consequently, the risk for marine terminal failure is also greatest during the winter months when more frequent deliveries are required to maintain the required fuel oil supply. The inability to offload fuel oil in Holyrood would remove 465 MW of power generation from the Island Interconnected System, leaving a significant shortfall in the available power supply. Newfoundland Power could be called on to maximize their available generation in conjunction with the use of portable generation units, however, the reality is that it would be impossible to make up the shortfall that would result from an inoperable Holyrood generating plant. Rotating blackouts would be required to effectively deal with the power supply shortfall, until such time that the Marine Terminal could be reinstated to accommodate fuel oil offloading procedures. Depending on the nature of the damage, the timeframe required to mobilize and complete repairs of this nature would take months to facilitate.

Aside from the potential issues surrounding power generation, the probability of a massive environmental catastrophe is also quite high. As was noted in the investigation completed following the 2008 fender detachment, had a ship been berthed at the facility at the time, the plunge and roll failure mechanism would have, in all likelihood, damaged the vessel's hull. In 2008, the failure occurred when no vessel was docked, which prevented any damage. The tankers which offload fuel oil in Holyrood hold 250,000 barrels of fuel oil. The magnitude of any spill could result in an environmental disaster of international proportion, resulting in disastrous environmental impacts in Conception Bay for years to follow.

Furthermore, the safety of the personnel responsible for conducting the offloading operations is presently jeopardized each time a ship is berthed at the facility. It is fortunate that failures, such as those in 2008, have occurred at times in which the facility has been unoccupied. Had there been people present during this failure the outcome could have been much worse – with serious injury or fatalities possible.

The consequence of not completing this project is the continued reliance on an outdated and deteriorated fuel oil offloading facility which is nearing the end of its useful service life. This creates significant and unacceptable risks to Hydro's responsibility to provide reliable power, the safety of personnel, and the environment.

4.10 Alternatives

Given its age and the current docking and offloading issues with the Marine Terminal facility, the risk to both life safety and the environment is significant. Three alternatives were considered to address these concerns.

Alternative 1 – Upgrades to Extend Service Life for 35 Years

Alternative 1 would require the completion of significant upgrades, to extend the Marine Terminal's service life an additional 35 years. Work under this alternative consists of: the removal of the seven existing gravity fenders; supply and installation of four new gravity fenders; supply and installation of two six meter by six meter concrete capped mooring dolphins; supply and installation of two new shore bollards; perform pull tests on six existing bollards; supply and installation of life safety upgrades; supply and installation of pile anodes; replacement of the existing fuel oil offloading system; supply and installation of a vessel approach monitoring system; supply and installation of additional dock lighting and navigational aids; the completion of an engineering pile inspection; redesign of existing pile structure; and repairs to the shore arm link. The cost to complete this work was estimated at $20 million.

Alternative 2 – Replacement of the Marine Terminal

This alternative considered the construction of a new Marine Terminal facility. Work included in the estimate consisted of: the supply and installation of a new pile system; construction of a new unloading arm deck; construction of new shore arm links; supply and installation of life safety components; supply and installation of anode protection system; modifications and demolition to sections of the existing structure; construction of a new shore bollard system; supply and installation of new fuel oil loading system; supply and installation of dock approach warning system; and the supply and installation of new control building. The cost to complete this work was estimated at $28 million.

Alternative 3 – Upgrade Facility Extending Service Life to Completion of Labrador Infeed

The completion of least-cost alternatives for only those items believed to be critical to ensuring the safe reliable operation of the Marine Terminal facility prior to the completion of the Labrador Interconnection. Work under this alternative includes: the replacement of the missing concrete gravity fender 4; permanent repairs to fenders 3, 5 and 6; inspection of steel pile foundations; inspection of pile protection anodes; and the supply and installation of life safety upgrade equipment. The estimated cost for this alternative is $5,198,200.

Recognizing that the Marine Terminal facility is only required until the Labrador Interconnection is in service, Alternative 3 is the most viable option. With this in mind, alternatives were considered for each of the upgrades recommended under Alternative 3 prior to arriving at the proposed scope of work.

The main aspects of the work to be completed under this project have been categorized as follows:

- Fender replacement/repairs;
- Inspection of the steel piles, anodes and attachment brackets;
- Life safety issues; and
- Lighting upgrades.

Each of these categories has, in turn, been broken down into a number of subcategories which comprise the various aspects of this project. A listing of each subcategory followed by a description of the corresponding alternatives is presented below:

1. Fender 4 Complete Replacement

As outlined in the Hatch report[6], there are four critical fenders utilized during the docking process. Fender 4 is one of these critical fenders and must be replaced. There is no viable alternative.

2. Repairs to Fenders 3, 5 and 6

As per the Hatch report[7], fenders 3, 5 and 6 underwent temporary repairs in 2008. The report notes that these repairs are considered to be temporary and recommends that the support suspension arms be replaced in conjunction with the replacement of back support brackets, support pins and chains. Recent documentation provided by Hatch reinforces the need to complete permanent repairs on these fenders (see Appendix A). As these fenders are also critical to the docking process, there is no viable alternative outside of completing the recommended repairs.

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[6] See Page 12 of Hatch report

[7] See Page 13 of Hatch report

3. Inspect Steel Piles, Anodes and Attachment Brackets

The Hatch report has recommended the inspection of the steel piles in conjunction with the assessment and replacement, as required, of the sacrificial anodes[8]at an estimated cost of $473,400. While the anode replacement is believed to be essential to preserving the useful life of the Marine Terminal, it has not been included in the scope of work. In response to Board Order No. P.U. 5 (2012), an inspection only of the steel piles, anodes and attachment brackets will be completed under this project. Based on the findings of the inspection, funds to complete any necessary repairs or anode replacements work will be sought separate of this proposal. The cost to complete the substructure investigation is estimated at $176,400.

4. Install Evacuation Life Raft and Two Fixed Platforms to Allow Vessel Access

At present, there is no means of egress from the jetty to the water, were an emergency evacuation required. This creates a significant potential for loss of life or serious injury should an evacuation be required and egress via the shore arm link be prohibited. As previously discussed, the implementation of such a system would also provide a means of rescue in the event of a man-overboard situation. For this reason, the provision of a secondary egress, as outlined[9], is essential to the safety of this operation and there is no viable alternative outside of providing the required access.

5. Lighting Upgrades

The lighting upgrades, as outlined[10], are required to mitigate the risk to personnel safety during the frequent replacement of the bulbs. The existing fixtures measure approximately 35 feet high and, given the harsh weather conditions they are exposed to on a regular basis; the bulbs require replacement every six months. The harsh weather conditions, which contribute to the accelerated failure of the bulbs, also significantly increase the risks associated with the bulb replacement. The proposed lighting upgrades under this project would be installed at a much lower height to provide improved maintenance accessibility.

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[8] A metal anode that is more reactive to the corrosive environment of the system to be protected is electrically linked to the protected system, and partially corrodes or dissolves, which protects the metal of the system it is connected to.

[9] See Page 23 of Hatch report

[10] See Page 25 of Hatch report

Furthermore, the fixtures would be updated to a more current standard to provide an extended service life, thereby reducing the frequency of the bulb replacement. One alternative to providing new light fixtures would be to revise the current operating procedure for bulb replacement. A program could be implemented, whereby the bulbs are replaced on a more frequent basis when weather conditions do not create an additional hazard. Given the height of the current fixtures, bulb replacement poses an inherent risk to personnel irrespective of the weather. The required use of a bucket truck to complete the bulb replacement creates an added risk when attempting to access the jetty via the shore arm link. Furthermore, given the limited work space on the jetty deck orientating the truck to utilize the outriggers and access the fixtures can prove to be a daunting task. For this reason, it is recommended that the fixtures be upgraded at the estimated cost of $115,000.

5 CONCLUSION

The existing Marine Terminal has deteriorated to the state where it no longer meets the requirements of the larger, modern vessels utilizing the facility. Vessels offloading fuel oil, in recent years, have required the facility to function outside of its original design limitations which have elevated the risk of damage to both the Marine Terminal and the vessel.

The Holyrood Marine Terminal facility is an integral component of the fuel oil handling system, and is the single point of entry for all of the No.6 (Bunker C) fuel oil utilized by the plant. The failure of any component of the HTGS Marine Terminal facility will result in a complete cutoff of fuel oil supply.

The existing system can be refurbished and upgraded. The preferred alternative will extend the service life of the Marine Terminal facility an additional ten years, while enabling it to accommodate the larger, modern vessels presently using it.

5.1 Budget Estimate

The budget estimate for this project is shown in Table 5.

Table 5: Budget Estimate

Project Cost: *($ x1,000)*	**2013**	**2014**	**Beyond**	**Total**
Material Supply	281.0	0.0	0.0	281.0
Labour	104.8	0.0	0.0	104.8
Consultant	332.5	0.0	0.0	332.5
Contract Work	3,409.5	0.0	0.0	3,409.5
Other Direct Costs	4.5	0.0	0.0	4.5
Interest and Escalation	239.4	0.0	0.0	239.4
Contingency	826.5	0.0	0.0	826.5
TOTAL	**5,198.2**	**0.0**	**0.0**	**5,198.2**

5.2 Project Schedule

The anticipated project schedule is shown in Table 6.

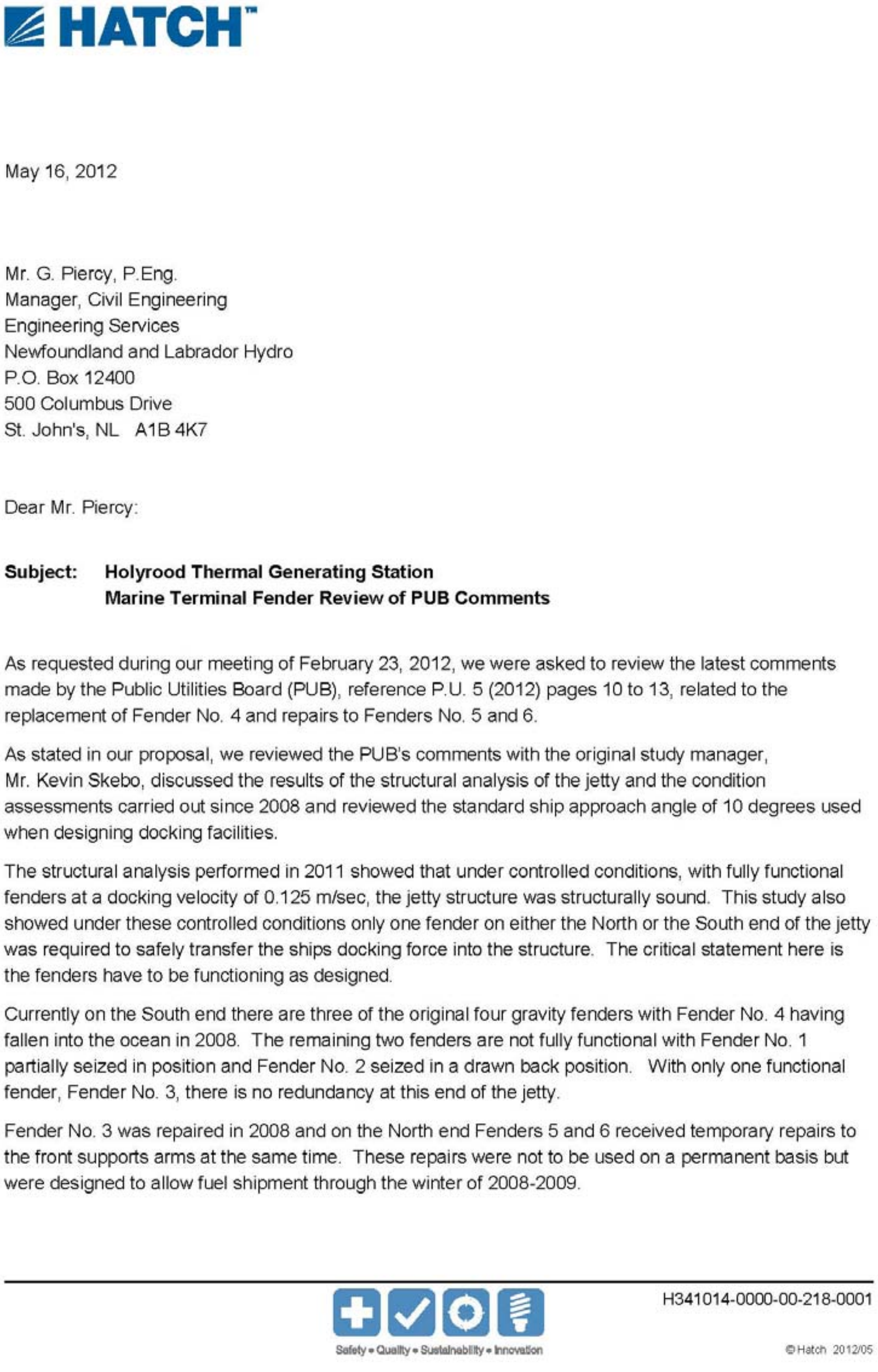
Table 6: Project Schedule

Activity		**Start Date**	**End Date**
Planning	Design Transmittal, Discussions with Holyrood personnel, etc.	February - March 2013	March 2013
Design	Preparation of Tender Package	March 2013	May 2013
Procurement	Purchase Materials	April 2013	June 2012
Tender	Tender/Award	May 2013	June 2013
Construction	Completion of Marine Terminal Upgrades	July 2013	October 2013
Commissioning	Final Inspection & Commissioning	-	October 2013
Closeout	Contract Closeout	-	November 2013

APPENDICES

APPENDIX A

Hatch Marine Terminal Fender Review (2012)



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May 16, 2012

Mr. G. Piercy, P.Eng.
Manager, Civil Engineering
Engineering Services
Newfoundland and Labrador Hydro
P.O. Box 12400
500 Columbus Drive
St. John's, NL A1B 4K7

Dear Mr. Piercy:

Subject: Holyrood Thermal Generating Station
Marine Terminal Fender Review of PUB Comments

As requested during our meeting of February 23, 2012, we were asked to review the latest comments made by the Public Utilities Board (PUB), reference P.U. 5 (2012) pages 10 to 13, related to the replacement of Fender No. 4 and repairs to Fenders No. 5 and 6.

As stated in our proposal, we reviewed the PUB's comments with the original study manager, Mr. Kevin Skebo, discussed the results of the structural analysis of the jetty and the condition assessments carried out since 2008 and reviewed the standard ship approach angle of 10 degrees used when designing docking facilities.

The structural analysis performed in 2011 showed that under controlled conditions, with fully functional fenders at a docking velocity of 0.125 m/sec, the jetty structure was structurally sound. This study also showed under these controlled conditions only one fender on either the North or the South end of the jetty was required to safely transfer the ships docking force into the structure. The critical statement here is the fenders have to be functioning as designed.

Currently on the South end there are three of the original four gravity fenders with Fender No. 4 having fallen into the ocean in 2008. The remaining two fenders are not fully functional with Fender No. 1 partially seized in position and Fender No. 2 seized in a drawn back position. With only one functional fender, Fender No. 3, there is no redundancy at this end of the jetty.

Fender No. 3 was repaired in 2008 and on the North end Fenders 5 and 6 received temporary repairs to the front supports arms at the same time. These repairs were not to be used on a permanent basis but were designed to allow fuel shipment through the winter of 2008-2009.

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Hatch was asked in the late summer or early fall of 2009, 2010 and 2011 to perform a visual inspection of the gravity fenders from the water. The purpose of this inspection was to identify any problems with the temporary repairs and identify other areas of concern that would require repair prior to the next shipping season. In each report, we stated the repairs completed on Fenders No. 5 and 6 were only temporary and that permanent repairs needed to be completed.

During the 2011 inspection, Hatch noted Fenders No. 5 and 6 were not moving freely on the temporary support arms and that these fenders needed to be monitored during the fuel delivery period and repaired. Based on observations made during the site inspections since 2008, all fenders appear to be seizing due to the corrosion of the hinged connections, wear in the pins and plates, and misalignment resulting in the fenders rubbing and leaning against the support piles. As a consequence, none of the fenders can be considered fully functional.

In our opinion, it is essential to have two functional fenders on both the North and South ends of the jetty. Currently and for all practical purposes there is only one functioning fender, Fender No. 3, on the South end of the terminal. On the North side of the jetty the two inside fenders, which are the most important fenders, as they are the first to contact the side of the ship during docking, are currently operating with temporary repairs and show signs of seizing up. As stated before, the structural integrity of the jetty is dependent on the transfer of the docking forces through properly functioning gravity fenders.

Hatch is concerned for the operational and environmental safety of the jetty. We cannot predict when the next failure will occur but we can identify where there are serious failure risks. In our opinion, continuing to dock vessels at the facility, without completing the permanent repairs to the North side fenders and installing a replacement for the missing fender on the South end, jeopardises the safe docking of fuel tankers.

Hatch has repeatedly requested permanent repairs to be made to this vital facility. We cannot over emphasize the potential risk to ship safety and the environment that currently exists at the marine terminal.

Yours truly,

G.D. Saunders, P.Eng.
Hatch St. John's, General Manager

GDS:smb

APPENDIX B

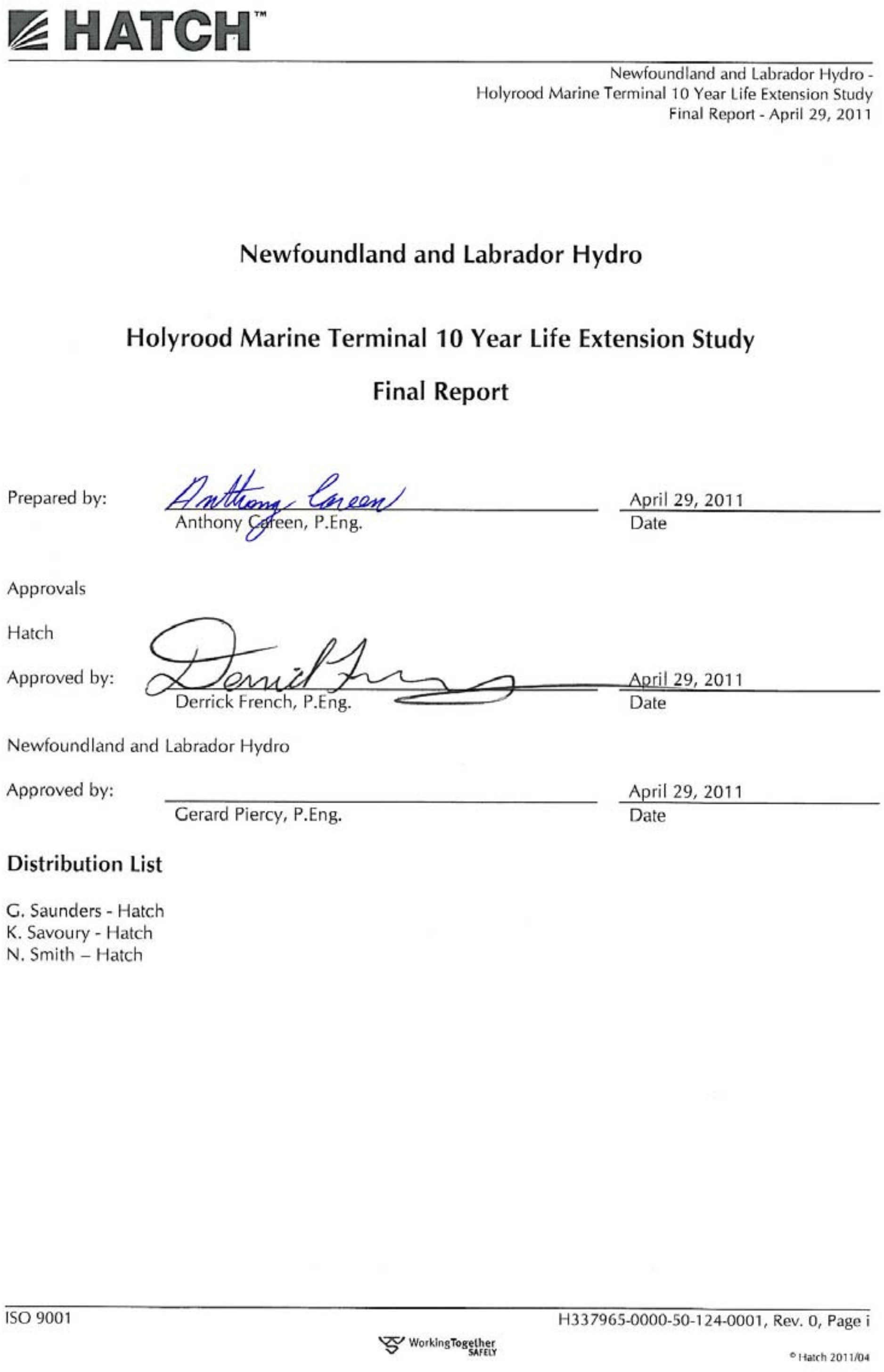
Holyrood Marine Terminal 10 Year Life Extension Study

Newfoundland and Labrador Hydro
Holyrood, NL

Final Report

Holyrood Marine Terminal 10 Year Life Extension Study

H337965-0000-50-124-0001
Rev. 0
April 29, 2011



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Newfoundland and Labrador Hydro -
Holyrood Marine Terminal 10 Year Life Extension Study
Final Report - April 29, 2011

Newfoundland and Labrador Hydro

Holyrood Marine Terminal 10 Year Life Extension Study

Final Report

Prepared by: Anthony Careen
Anthony Careen, P.Eng. — April 29, 2011 Date

Approvals

Hatch

Approved by: Derrick French, P.Eng. — April 29, 2011 Date

Newfoundland and Labrador Hydro

Approved by: Gerard Piercy, P.Eng. — April 29, 2011 Date

Distribution List

G. Saunders - Hatch
K. Savoury - Hatch
N. Smith – Hatch

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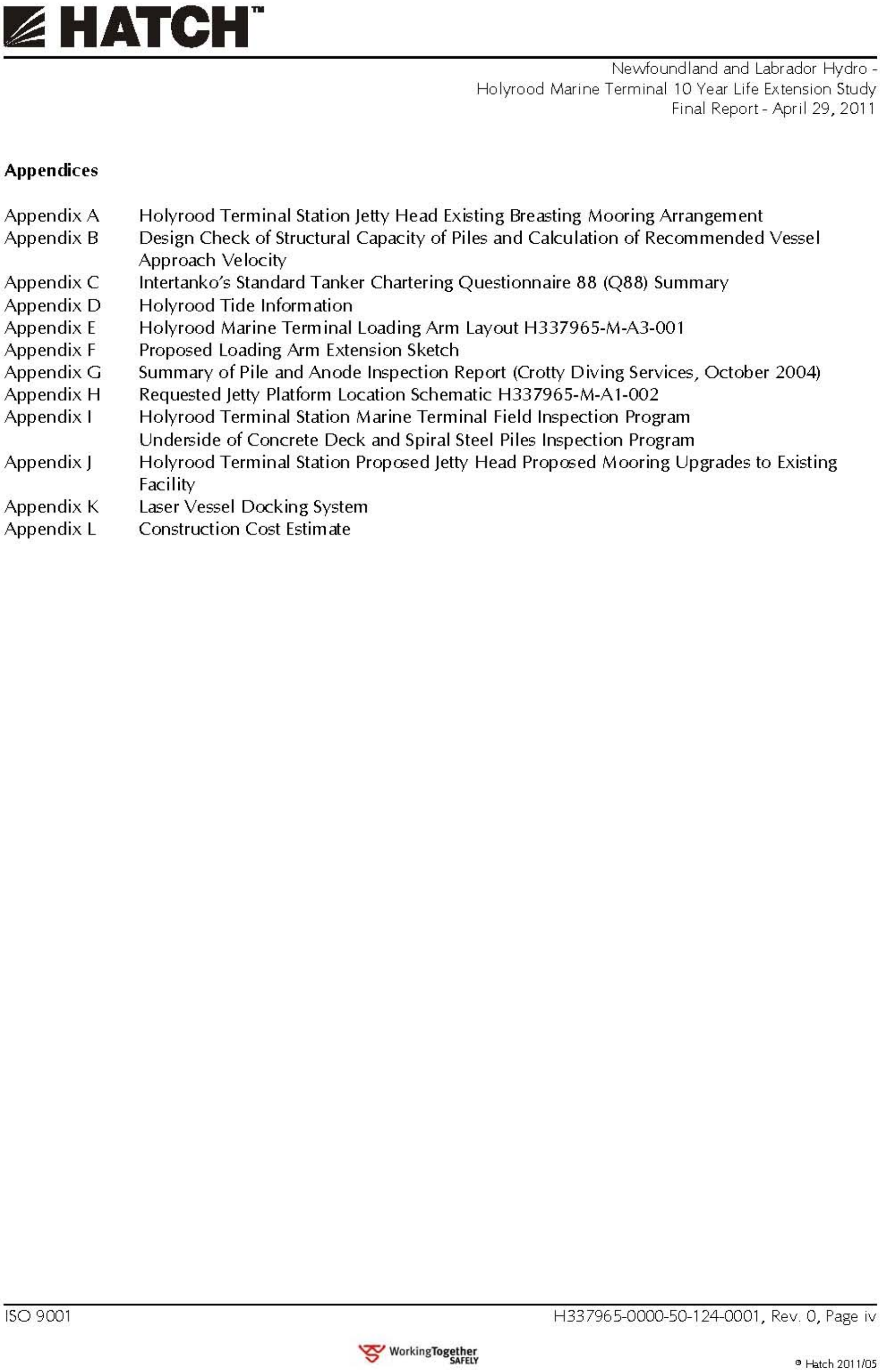

Appendices

Appendix A	Holyrood Terminal Station Jetty Head Existing Breasting Mooring Arrangement
Appendix B	Design Check of Structural Capacity of Piles and Calculation of Recommended Vessel Approach Velocity
Appendix C	Intertanko's Standard Tanker Chartering Questionnaire 88 (Q88) Summary
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Appendix E	Holyrood Marine Terminal Loading Arm Layout H337965-M-A3-001
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Appendix H	Requested Jetty Platform Location Schematic H337965-M-A1-002
Appendix I	Holyrood Terminal Station Marine Terminal Field Inspection Program Underside of Concrete Deck and Spiral Steel Piles Inspection Program
Appendix J	Holyrood Terminal Station Proposed Jetty Head Proposed Mooring Upgrades to Existing Facility
Appendix K	Laser Vessel Docking System
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1. Introduction

1.1 General

The purpose of this study was driven by Newfoundland and Labrador Hydro (Hydro) as a result of the following:

- The noted increase in vessel size since the Jetty was originally designed including:
  - vessels up to 55,000 deadweight tonnes (DWT), docking at the facility designed for 35,000 deadweight tonnes (DWT); and
  - double hull vessels which have a greater freeboard range than the facility's original design for single hull vessels.
- A 70 tonne concrete gravity fender had fallen off the Jetty structure in 2008.
- The remaining gravity fenders had deficiencies such as worn rotation support arms and pins.
- Two of the fenders, have been for some time, slightly retracted and seized in place.
- In the last number of years, there have been a number of protest letters from the incoming vessels on the condition of structure and the fuel offloading system.

Based on the above, Hydro requested Hatch complete an assessment for the Marine Terminal based on a 10 year life expectancy and provide recommendations for upgrades to the Holyrood Marine Terminal.

This work is performed in accordance with the proposal letter presented by Hatch dated December 23, 2010. As outlined in the proposal, the scope included:

1. Review the requirements for making the inside four (4) gravity, fenders No's. 3, 4, 5 and 6, functional and safe. The work will also include the preparation of a cost estimate and timeline for design and construction.
2. Review the expected vessel sizes that will be available to service the generating plant over the next 10-year period. Review the loading arm requirements and make recommendations for modification or replacement. The work will also include the preparation of a cost estimate and timeline for design and construction.
3. Prepare a methodology for inspection of steel pile and anodes.
4. Review life safety issues, in consultation with NLH, to determine minimum requirements for the life extension period. The work will also include the preparation of a cost estimate and timeline for design and construction.

While the existing marine terminal layout/location is unusual as per today's standards, it is not unique. Industry experience will not be a problem for this site.

1.2 Contacts and Resources Assisting with the Study

Hatch acknowledges and thanks the following Hydro personnel for providing information for input into the study.

- Terry LeDrew, P.Eng., Holyrood Plant Manager
- Gerard Piercy, P.Eng., Manager, Civil Engineering
- Jabe Hunter, P.Eng., Project Manager
- Mike Manual, Asset Manager
- Mike Flynn, Operations Manager
- Ron LeDrew, Emergency Response Coordinator
- Matthew Leonard, P.Eng, Civil Engineer

1.3 Documentation Available for Review

Information provided by Hydro for this study included:

- Letter dated December 11, 2009 from Atlantic Pilotage Authority RE: Mooring Equipment Guidelines.
- Newfoundland and Labrador Power Commission, Holyrood Generating Station, Specifications, Construction of Marine Landing Facility, April 1969.
- Newfoundland and Labrador Contract for Diving Services for Holyrood Marine Terminal, May 1984.
- Generation Operations Engineering Services (Mech). Holyrood Marine Terminal Anode and Pipe Inspection, September 1991.
- Report on Investigation of Damage and Proposed Repairs to Shore Arm, May 1983.
- Newfoundland and Labrador Power Commission, Holyrood Generating Station, Specifications, Marine Terminal Civil Works, October 1969.
- Engineering Report 1, Holyrood Newfoundland Marine Terminal, Damage of August 31, 1972. During currency of wharf repairs Contract and various internal memos from NL Hydro dated 1982-1983.
- Memo from Newfoundland and Labrador Hydro RE: Corrosion Survey of Pilings on the Offloading Dock dated, 1981.
- Memo from Wayne Rice dated 1988-11-25, RE: Inspection of Anodes on Holyrood Marine Terminal.
- Various Photos and Drawings: Dwg. Holyrood Generating Station, Plan 7 Profile of 18" diameter Fuel Oil Delivering & Trace Heating, 1970. Dwg: Holyrood Generating Station, Stage 1 – Fuel Handling Facility, Pipeline Grade from Dock to Tank 1987, Dwg: Pile Repairs details, 1972.

- Dwg: Existing Concrete Details, 1972. Dwg: Investigation of Wharf Damage at Holyrood\ Generating Station, 1971.
- Letter dated February 1988, Shaw Mont NL Limited RE: Holyrood Marine Terminal.
- Information from Owner, Internal memo from Kevin Skebo to Greg Saunders, March 15, 2010.
- Proposal to Hydro, Holyrood Dock, January 29, 2010.
- Request for Quotation of Loading Arms, 1969.
- Jetty Survey, 1972.
- Photos Tanker Collision Jetty 1 and 2, 1972.
- Jetty Questions from Atlantic Pilotage Authority, April 2008.
- Continental-Emsco Medium range Loading Arm Maintenance Manual.
- Continental-Emsco Loading Arm Drawings, 1970.
- ERM-08 Rescue - Confined Space/High Angle/Difficult, 2010.
- Intertanko's Standard Tanker Chartering Questionnaire 88 (Q88).
- Temporary Fender Repairs Hatch Drawings H331421-M-D-001/002, 2008.
- Pile and Anode Inspection Report, Crotty Diving Services, October 2004.
- Crotty Video Fender Inspection, October 2008.

1.4 Published Standards and Guidelines

Published Standards and Guidelines used for this study are from the following sources:

- Port Designer's Handbook; Carl A. Thoresen
- Design of Marine Facilities for Berthing, Mooring, and Repair of Vessels; John W. Gaythwaite
- US Army Corp of Engineers Marine Design Manual
- Transport Canada – Termpol Review Process – TP743E
- Oil Companies International Marine Forum – (Standard acknowledged by Atlantic Pilotage Authority)
- Permanent International Association of Navigational Congress

1.5 Acts and Regulations

Acts and Regulations that define requirements for constructing components similar to those at the Holyrood Marine Terminal include:

- Navigation Waters protection Act – Transport Canada.
- Canadian Environmental Assessment Act.
- The Fisheries Act.
- Species at Risk Act.
- Transportation of Dangerous Goods Act.
- Canadian Shipping Act.
- Pilotage Act – (Atlantic Pilotage Authority).

2. General Description of the Existing Harbour and Facility

A general description of the Holyrood Marine Facility and the location is described as follows and is demonstrated in Figure No.'s 1, 2 and 3.

- The facility is located at the south end and along the eastern shore of Conception Bay.
- The facility is unprotected from the strong north winds and the rough seas created by the winds.
- The harbour is generally considered ice free. However, on rare occasions, a combination of constant northerly winds and arctic pack ice from the Labrador Sea ice has filled the bay.
- The Marine Facility was constructed in 1969 and consisted of a concrete deck supported on circular steel piles. The components of the Marine Facility include:
  - bridge support on piled bents;
  - combination two breasting dolphins and offloading platform;
  - an underdeck swinging gravity fenders system consisting of 8 - 70 tonne concrete fenders;
  - two fuel offloading arms; and
  - one 18 inch diameter offloading pipeline.
- The harbour shore consists of exposed granite bedrock.
- The harbour bottom consists of a till overlay on top of the granite.

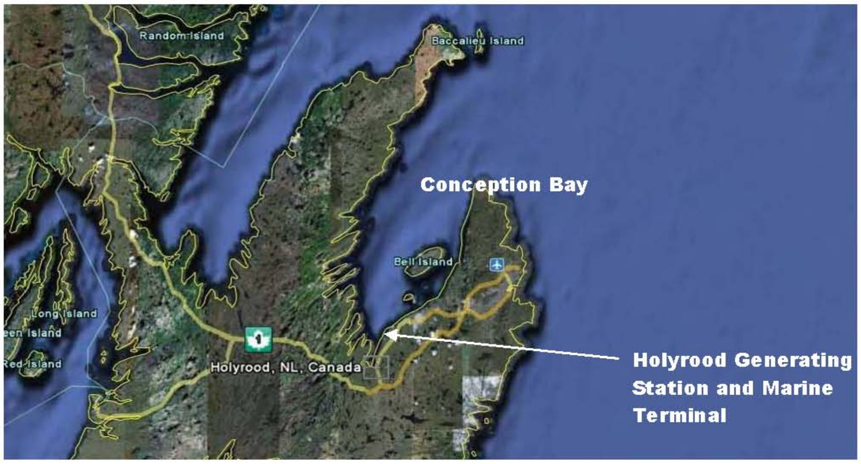


Figure No. 1

Figure No. 2

Figure No. 3

3. Jetty Condition Review and Recommendations

3.1 General

The Holyrood Marine Terminal was designed and constructed in 1969 to meet the standard practices and sizes of vessels of that time. Its purpose is the offloading of No. 6 fuel oil from incoming tankers for the Holyrood Generating Station.

The Marine Facility is a "L" shaped configured structure comprised of:

- A shore link access bridge of approximately 410 ft in length and a 20.6 ft wide concrete deck.
- A 241.7 ft long by 39.4 ft wide Jetty structure for ship berthing, breasting and mooring.
- A system of four shore mooring dolphins each equipped with two bollards and one capstan.

The layout of the facility can be found in Appendix A.

Major incidents requiring repairs to the bridge and Jetty have included:

- The north dolphin portion of the Jetty structure required a major repair in 1972 as a result of a vessel impact.
- Several of the bridge piled support bents required a major repair in 1983 as a result of heavy ice flow damage.
- In 2008, Gravity Fender No. 4 became disengaged from the supporting deck structure and fell to the bottom of the harbour. An investigation into the condition of the other three fender supports required immediate temporary repairs.

3.2 Berthing Structure

The existing Jetty structure was designed to accommodate the 35,000 DWT tanker vessels and the structure consists of a 241.7 ft long by 39.4 ft wide, 2 to 3.5 ft thick, concrete deck supported on eighty-two 600 mm diameter concreted filled steel piles.

The north and south quartiles of the Jetty project out beyond the centre portion of the structure and act as the breasting and mooring façade for the vessels. Each of these breasting points engages 25 of the piles and four 70 tonne swinging concrete gravity fenders. These structural components absorb the forces from the vessels impact.

The four gravity fenders at each end of the Jetty are aligned on a circular arc to ensure a least one of the fenders is engaged by the ships hull as it approaches and makes contact on an 11° angle with the Jetty.

The centre fifty percent of the Jetty structure, which supports the fuel offloading system, is set back approximately 6.5 ft from the breasting face. Although this section is set back, so not to take any impact forces from a berthing ship, the 30 supporting piles are designed to accommodate longitudinal berthing loads. In our opinion, this arrangement is contrary to current practice as piled structures used for loading platforms should be free from normal berthing forces (Port Designers Handbook – Carl A. Thoresen).

Based on observations from the deck surface, the overall physical condition of the 42-year old Jetty structure is in good condition and piles appear well maintained. The gravity fenders are in poor condition, with one fender missing having fallen to the harbour bottom and two of the remaining seven fenders seized in a retracted position. See Section 4 for fender assessment.

3.2.1 *Capacity of Existing Structure*

Hatch completed a review of the "1988 Shawmont Letter Report" and reviewed their methodology regarding their calculation of the Jetty's structural ability to take impacts from 65,000 DWT tankers.

Hatch subsequently completed a review of the Jetty structure to confirm the conclusions identified in the "1988 Shawmont Letter Report". The structural review was completed using modern computer and analysis techniques of the energy absorption capacity of the gravity fenders, an analysis of the pile loading and capacity and tension capacity of the support arms. Appendix B contains the report findings and recommendations of the analytical model that encompasses the following:

- The absorption and transfer of forces into the structure from a properly functioning gravity fender system (50 percent transfer of energy to deck in 1988).
- The absorption and transfer of forces into the structure from a seized functioning gravity fender system (possibly 100 percent transfer of energy to deck due to seized gravity fenders).
- The number of piles under compression and load under impact.
- The number of piles under tension and the load under impact (1988 letter report identifies 14 piles under tension; Hatch's review indicates this could be as low as 11 piles).
- Identifies piles that take deck loading instead of assuming only piles in tension that take full weight of the concrete deck.
- Evaluated the impact velocities noting:
  - An increase of velocity impact from 0.7 ft/sec to 0.9 ft/sec increases the energy to the structure by 65 percent.
  - A decrease to the velocity impact from 0.7 ft/sec to 0.5 ft/sec decreases the energy to the structure by 50 percent.

Due to the condition of the Jetty's gravity fenders, the Jetty structure is incapable to take a design impact load from any vessel that is docking at the facility today.

Currently, vessels of less than 55,000 DWT and shorter than 656 ft long are able to dock at the Jetty, as docking is being performed in a controlled manner with a very low impact velocity.

Therefore, until reinstatement of the fendering system is completed, the docking of ships should be completed under very controlled parameters such as moderate to low wind speeds and the use of tractor tug(s).

A detailed structural analysis of the concrete deck was not considered necessary as the thinnest part is approximately 3.3 ft. A manual calculation of the deck's punching shear capacity was completed and it was found to be satisfactory.

3.2.2 *Approach Velocity of Docking Vessels*

The analysis of the Jetty structure determined vessels larger that those used in the original design of 35,000 DWT can be safely docked at the facility but the approach velocity has to be controlled. For vessels of 55,000 DWT the recommended approach velocity is 0.410 ft/s.

There are no records at the Marine Terminal of the required approach velocity or any means of measuring and recording this velocity. Any velocity records are currently the property of the vessel operators.

To assist Hydro control and record vessel velocities, we recommend the installation of a laser sensor, display and recording system be installed. A typical laser docking system can be found in Appendix K.

3.3 Breasting Fender Spacing

The breasting system was designed and constructed to accommodate 35,000 DWT tankers that would engage four of the eight gravity fenders.

Once the gravity fenders neutralize the impact of the vessel and the vessel is stabilized at the Jetty face, the vessel centres itself about the loading arms and the vessel breasts against the inner two gravity fenders on the north and south mooring face. The vessels generally do not breast against the outer four fenders as they are on an arc which falls away from the tangent.

This operation of centering the vessel on the breasting dolphins and tying up to equal positions on both bow and stern ends gives the vessel the most stability during offloading operations at the Jetty face.

The vessels are designed with flat parallel faces to accommodate the breasting position and these sections are located in the centre 40 percent of the vessel at light ship conditions.

The range for the distance between breasting points, for a stabile vessel at the Jetty face, is between 0.25 LOA (overall length) and 0.4 LOA with the ideal breasting position being 0.3 LOA.

Given the distance between breasting gravity fenders that the vessel may contact is 178.4 ft (see Appendix A), the length of ships using the Holyrood Marine Facility should be as follows.

Minimum Length	- 439.5 ft
Ideal Length	- 595.3 ft
Maximum Length	- 715.0 ft

Based on records provided (Appendix C), it is noted that all ships docking at the facility in 2009 and 2010 were near the ideal length for the existing Jetty.

To meet the requirements of stabilizing vessels at the Jetty face, it is recommended Hydro adopt measures restricting the docking tankers to a minimum length of 525 ft and a maximum length of 656 ft.

3.3.1 *Vessels Docking at the Holyrood Marine Terminal*

A review of the data presented in Appendix C of this report, Intertanko's Standard Tanker Chartering Questionnaire 88 (Q88) Summary, indicates the following range of vessel size's that are safely docking at the facility since 2009 (questionnaires reported in metric):

Typical Smallest – Kandilousa – 600 ft LOA (overall length) – 105.6 ft Beam – 40,000 Maximum Assigned DWT.

Typical Largest – Aris – 611.5 ft LOA (overall length) – 105.6 ft Beam – 53,000 Maximum Assigned DWT.

3.4 Mooring System

3.4.1 *Bollard Capacity*

According to the original drawings, the mooring system was designed to accommodate 35,000 DWT vessels using a combination of four shore and four berth 70 tonne mooring bollard systems.

The original 1969 specification did not require a pull test on these bollards and there is no evidence that a pull test was ever completed to certify their capacity. There is no evidence that the capacity of the bollards was ever issued to the Masters of vessels before docking at the facility.

It is noted there are additional 15 tonne capacity bollards on the Jetty but their purpose is undefined. In our opinion, their purpose is excluded from mooring vessels.

After 42 plus years service, due to environmental deterioration, the bollards could have a reduced capacity. In particular, there is a risk of bollard failure either from the use of high capacity vessel winches or from a vessel using several mooring lines on the same bollard.

3.4.1.1 *Bollard Capacity Investigation*

Ships of approximately 50,000 displacement tonnes would generally expect a bollard capacity in the order of 90 tonnes (according to Port Designers Handbook – Carl A. Thoresen).

It is recommended Hydro design a procedure and complete a pull test on all bollards to certify the bollards for a specific rating. Upon preliminary review, our recommendation would be certification for a rated capacity of 70 tonnes. Further investigation into the required bollard rated capacity based on vessels that are safely docking at the facility today should be validated prior to certification.

The rated capacity of the bollards should be visibly posted for docking vessels.

3.4.2 *Bollard / Mooring Line spacing*

The mooring system was designed and constructed to accommodate 35,000 DWT vessels using four shore dolphins complete with two bollards each and four bollards on the Jetty.

The Marine Terminal uses a variety of vessels under charter services and the Masters and Pilots guiding the ships have different preferences for mooring configurations. We would like to point out, however, OCIMF recommends the bow and stern mooring lines to be located 15 degrees off the perpendicular of the vessel.

During meetings held with the APA, we have been given varying opinions of the required mooring arrangements. These conflicting preferences are outlined below:

- In addition to meeting the OCIMF guidelines, consideration should be given to the addition of separate bow and stern lines set at 45 degrees off the perpendicular (May 2010).
- The only requirement is having the bow and stern line arrangement conform to the OCIMF guidelines as stated above, located 15 degrees of the perpendicular (October 2010).

Hydro representatives noted the long mooring lines from the ship to the shore presented a number of challenges and hazards and they are listed as follows.

1. The mooring lines on some ships are not long enough to reach the shoreline bollards. This means there are challenges tying up the vessels as the mooring lines must be extended by tying to shore tender lines.
2. The mooring lines sometimes get stuck on the rocks along the shore and on the harbour bottom and there are safety concerns when trying to untangle the lines.
3. It was noted the walkways along the shoreline are embedded into a steep slope and there have been periodic landslides damaging the walkway. These incidents affect the tying of mooring lines and safety of the workers.

The current mooring arrangement does not meet either the OCIMF standards or the APA's preference for berthing a vessel. The possibility exists that a Master of a vessel could refuse berthing if the mooring configuration is not updated to meet today's industry standards.

Hydro to correspond with vessel owner's to obtain their acceptance for docking under the existing mooring arrangement. If a new mooring arrangement is required, a complete mooring system design and installation program is recommended based on the requirements of today's standards. The new design should comply with the requirements of OCIMF and wherever possible meet the requirements of the Atlantic Pilot Association.

Appendix J shows a new mooring configuration (not priced in the estimate) that will meet OCIMF standards for 600 ft long tanker vessels (vessels near the ideal length for the existing Jetty) with capacities of 55,000 DWT. The mooring configuration gives consideration to local tide and wind conditions.

4. Fender Refurbishment and Replacement

4.1 Description of Existing Fenders

As described above, the Jetty was originally constructed with four gravity fenders at each end of the Jetty aligned on a circular arc to ensure at least one of the fenders is engaged by the ships hull as it approaches and makes contact with the Jetty.

Based on the following, it has been determined that only gravity fenders No. 3, 4, 5 and 6 (see Appendix H for fender numbering) are utilized during docking given:

- The current size of the vessels (Appendix C);
- The current docking procedure with the assistance of tractor tugs and the requirement to dock parallel to the Jetty façade, and;
- The recommended approach velocity.

4.2 Fender Deficiencies

Gravity fender No. 4 fell off the super structure in 2008 from a failure in the support arm. Due to this failure, temporary work has taken place over the past few years to keep the remaining fenders operational.

The impact to the structure of another gravity fender falling from the superstructure could be catastrophic as a fender could fall against a pile and cause a portion of the supporting pile structure to collapse or it could fall against a ship and cause a puncture in the vessel. A further detailed investigation of the fenders existing condition is required to assess the required remedial work.

Two of the fenders, have been for some time, slightly retracted and seized in place. These fenders are not critical and will not be looked at in the scope.

4.3 Proposed Inspection, Modifications and Replacement

4.3.1 Fender Inspection

The proposed work involves a complete review of the fenders functionality with key aspects of the inspection to include:

- The integrity of the timbers: look for pieces of timber cracked or split off, ensure HDPE rubbing strips are intact against the timbers.
- Suspension / Retraction brackets: visually inspect all embedded connections and supports for noticeable wear, NDE inspection on critical components or parts that have wear.
- Support pins: the support trunnion pins have been gouged severely and analysis of a case by case is required to determine if they are still suitable.
- Support Arms: the clevis and linkage arms that support the pins in the front and back of the fender have been worn considerably. Tolerance and thickness checks will be required.

As part of the inspection, scaffolding will be required around the perimeter of each fender to allow for a proper inspection of the fender from all sides.

4.3.2 Fender Modifications

Prior to completing any fender modifications, all critical supports and components shall be water blast cleaned before performing NDE thickness readings. The required work will require extensive scaffolding to be erected.

A complete list of recommended repairs will be generated as a result of the inspections listed in 4.3.1. Based on current knowledge, the following will be required as a minimum.

4.3.2.1 Fender No. 3

The front support suspension arms were replaced in 2008. Inspect, and repair as necessary, the support arms for the back suspension as well as all the pins and associated nuts. Replace all chains.

4.3.2.2 Fender No. 5 & 6

Replace support suspension arms at the front of fenders No. 5 and 6. These components are known to be quite worn and are currently using a temporary support to hold them in place. Inspect and repair the back support brackets and all support pins and associated nuts. Replace all chains.

4.3.3 Fender Replacement

Fender No. 4 detached and broke free from the Marine Terminal. This is one of the critical fenders required for safely mooring the vessel alongside the Jetty. Video analysis by divers show the fender lying on the ocean floor with severe structural damage to the supports and the back of the fender.

From the videos we know that the fallen fenders are not near the piles and are in deep water. There is no harm in leaving them where they fell as they pose no risk to the jetty piles or the docking vessels. These fenders are quite heavy and it could pose a risk in trying to lift the large odd shape concrete fender onto a barge and bring to shore for repair. Based on past experience, the cost to recover, clean, inspect and repair the damaged fender, would be significantly higher than the price to replace it.

We anticipate the following steps to replace the lost fender.

- A scaffold will have to be setup to inspect the area around the missing fender and verify the integrity of the embedded support components.
- If the existing components are structurally sound they can be reused. If not then the supports will have to be replaced. New stabilizing and retraction chains will be required.
- To replace the fender a steel box frame, in the shape of the fender, is prepared and brought to the Jetty on a flat bed. A crane with a minimum capacity of 20 tonnes will be required to lift the fender frame. The crane then lowers the frame vertically over the side of the Jetty, where chains are attached to the retraction bracket with chain falls. This permits the chain fall to pull the fender frame into the horizontal position while simultaneously lowering the frame with the crane. The fender frame is then secured in its final position with the suspension brackets and

support pins. Concrete is then poured into the frame to form the fender. Four (4) timbers are then attached to the front side as the point of contact with the vessels.

5. Loading Arm Modification or Replacement

5.1 General

As part of the 10 year life extension study of the Marine Terminal, Hatch has completed a detailed review of the existing loading arm operating envelope and recommended least cost modifications to meet the design requirements of vessels that are docking at the facility today.

5.2 Description of Existing Fuel Offloading System

The existing marine facilities two fuel loading arms were manufactured by Continental-Emsco and classified as medium range load arms and are original to the facility. The load arm size specifications were based on single hull ships of 35,000 DWT and an off loading rate of approximately 5000 BBL/h, per arm, for a total design rate into the pipeline of 10,000 BBL/h.

The loading arms are summarized as follows:

- A 12 inch flange connection which accommodated the original 35,000 DWT tankers;
- Stripping capabilities for the Jetty side portion of the arm;
- Gravity drainage to the tanker for the vessel portion of the arm, and;
- The arms are not insulated nor heat traced.

The offloading arms are connected to an existing 18 inch diameter pipeline which transfers the No. 6 fuel oil to a four tank fuel storage field. The furthest tank is located approximately 4000 ft from the Jetty.

During the site visit, there was no offloading activity and the load arms were secured in the storage position. The load arms appeared to be in good repair as a result of a preventative maintenance program.

5.3 Design Considerations

The design conditions outlined below were assumed to remain unchanged from the original construction of the Marine Terminal:

- Jetty deck is 22.5 feet above the low water level;
- Fore and aft drift is 30 feet total;
- Fluid Characteristics: No. 6 fuel oil with a viscosity 500 S.S.F. @ 122°F and specific gravity 0.96;
- Product temperature is 120°F minimum;
- Tanker discharge pressure is 100 psig with maximum pressure drop through loading arm at 10 psi;
- Ambient temperature variation -21 to 93°F;

- Design wind velocity 100 mph in stored position;
- Distance between loading arm support columns C/L and edge of Jetty is 4.5 feet;
- Maximum tidal variation is 5.25 feet, and;
- Distance between Jetty and tanker at rest (ie. Berthing line) is 12 feet.

Tidal information as published by the Department of Fisheries and Oceans for St. John's during the year of 2010 was reviewed and compared against tidal data during the original design (Appendix D). The original design information of 5.25 feet between low and high water level is accurate today.

The following original design considerations are documented for a comparison basis of the operating envelopes below:

- Tanker freeboard when loaded is 11 feet;
- Tanker freeboard when unloaded is 35 feet, and;
- Tanker manifold location: 4-5 feet above freeboard and 15-20 feet inboard from side.

5.4 Loading Arm Deficiencies

5.4.1 Review of Expected Vessel Sizes

A review of the freeboard data for vessels that have frequented the facility in the last couple of years is presented in Appendix C of this report, Intertanko's Standard Tanker Chartering Questionnaire 88 (Q88) Summary.

The operating envelope is defined from the data presented for 40,000-55,000 DWT vessels as follows:

- Smallest tanker freeboard when loaded is 25.4 feet (including height from ship deck to manifold centerline);
- Largest tanker freeboard when unloaded is 60.2 feet (including height from ship deck to manifold centerline);
- Average tanker freeboard at normal ballast is 45.1 feet (including height from ship deck to manifold centerline), and;
- Tanker manifold location ranges: 5.4-7.2 feet above ship deck and 15–17 feet inboard from ships side.

Based on the information presented in the manufactures "Marine Loading Arm Description" drawing and the vessel questionnaires, Hatch Drawing. No. 337965-M-A3-001 "Holyrood Marine Terminal Loading Arm Layout" (Appendix E) provides a comparison of the existing loading arm operating envelope and the required operating envelope (Appendix C). This illustration indentifies the limits of the loading arms can be severely exceeded during offloading operations if the ship is not ballasted properly.

For simplicity, the following is provided as a summary of the existing and required operating envelopes:

- The existing loading arm operates between 7.5 feet below to 22.75 feet above the Jetty deck;
- The required safe operating envelope is 2.9 to 43 feet above the Jetty deck (based on Appendix C);
- During normal ballast condition the ships manifold flange connection is located 27.9 feet above the Jetty deck (Appendix C), and;
- The location of the ships manifold flange connection inboard from the ships side (based on Appendix C) is within the existing loading arms operating envelope of 15 to 20 feet.

When the unloaded (lightship) occurs at high tide, the range of the loading arm is exceeded by approximately 20 feet requiring vessels to bring onboard ballast to prevent the loading arms from being over extended.

When the vessels are at normal ballast freeboard, the loading arms range limit is exceeded by approximately 5 feet. When the normal loading arm range is exceeded there is difficulty in disconnecting the lines from the ship which could lead to a spill.

Both above noted situations can and are being dealt with by taking on ballast water. It should be noted however, taking on cold ballast water for certain vessel tank configurations can be problematic because of the cooling effect and the consequential increasing of the viscosity of the fuel being transferred.

Due to the flanged connections at the ship, it takes several hours to complete a fuel line disconnection. This creates a potential for severe consequences in the following emergency situations:

- a fire and the ship must leave the Jetty;
- rapid deterioration in weather;
- the ship breaks away from its mooring position, and;
- or the ship extends its freeboard past it's reach.

In all cases there is a possibility of damaging the existing loading arms and causing a hydrocarbon spill.

The loading arms present a significant hydrocarbon spill risk. The current environmental response, as a preventative measure, is to install a boom around the vessel during the offloading process. This can only be employed during favourable weather conditions and is stored a considerable distance away in the town of Holyrood.

Any other hydrocarbon spill response is sub-contracted and located off site. Hydro should review the risks, their procedures and response times for potential environmental spills.

5.5 Proposed Modifications or Replacement

5.5.1 Investigation

To meet the operating envelope of vessels frequenting the facility today, Hatch reviewed the possibilities of:

a) Providing a structural foundation to raise the loading arm base to match the new low point reach (smallest tanker freeboard) of 2.9 feet above the Jetty deck, and;

b) Providing arm extensions to the existing loading arms to match the new high point reach (largest tanker freeboard) of 43 feet above the Jetty deck.

A requisition was forwarded to the loading arm manufacture, presently known as Emco Wheaton, for permissible modifications to the existing loading arms. The basis of the request outlined: the loading arm original design with its operating envelope, the condition of the loading arms, the change in vessel size docking at the facility with the updated safe operating envelope, the plans to raise the base support to meet the new low point reach and the request for budgetary pricing for arm extensions to meet the new high point reach.

Upon review of the design, the manufacturer's representative responded with their concern of the age of the loading arms coupled with such factors as unforeseen stresses that may have been applied to the arm, corrosion in the piping and the fact that these arms were originally not designed for this length of service. Adding additional length to the arms would result in more counterweights and thus additional loading on the base swivels. The general consensus appears that modifications to the loading arm is not advised, however the manufacture does not oppose raising the load arm base with a structural support.

Based on the manufacturer's recommendations, Hatch is proposing to raise the loading arms as outlined below and advise Hydro to ballast, as required, with water to prevent the loading arms from being over extended. Raising the base support 10 feet to meet the new low point reach requirements will bring the new operating envelope to approximately 2.5 to 32.75 feet above the Jetty deck. Ballasting would commence only after the ships manifold connection is beyond 32.75 feet above the Jetty deck. The questionnaires indicated that all vessels docking at the facility today have ballasting capabilities.

The existing loading arms are equipped with 12 inch flange connectors which require an adapter to couple to the ships manifold connection. A review of the data presented in the vessel questionnaires indicates the ships manifold connections are 12/14/16 inch with on-board reducer's capable of mating to the loading arm flanges.

5.5.2 Loading Arm Modifications

As discussed above, in order to raise the loading arms the required height of approximately 10 feet, it is proposed to install a new column pedestal, which could be anchored to the main deck using the existing anchor bolt arrangement. Preliminarily, it is proposed to use a 24" STD pipe for the pedestal, with gusset plates at the top and bottom for stiffening (see sketch located in Appendix F). Design loadings at the base will need to be confirmed prior to final design and drawing preparation.

The proposed modifications assume the load arms are in good repair as a result of a preventative maintenance program.

The modifications to the loading arm base will require minimal changes to the existing piping configuration. A flanged spool piece will be added from the base of the loading arm to the Jetty piping tie point and supported mid-way from the new pedestal foundation. It is assumed the ship's cargo pumps have the additional capacity for the change in elevation head and the pipe friction losses approximated at less than 1 foot.

Hatch will perform an investigation of installing a quick coupler release to the exiting loading arms. An analysis and physical simulation will be required to determine the suitability of adding the additional weight to the existing 42 year old loading arms. If the loading arms are deemed structurally adequate for this modification, it will reduce the time to connect / disconnect to the ships flange and provide a better method of spill prevention.

Market research has been conducted for a commercially available quick coupler release product(s) to connect to the existing loading arm flanges. An acceptable coupler has not been sourced to date.

5.5.3 *Loading Arm Replacement*

To meet the requirements for the proper reach of the loading arms for the largest 55,000 DWT tankers and to simplify the draining of the loading arms after each use, we recommend Hydro budget for the replacement of the existing systems with two new long range loading arms capable of 15,000 BBL/hr (2400 m3/hr) each. The loading arms would be equipped with the following features:

- 16 inch (400 mm) coupler connection;
- Isolation flange;
- Hydraulic operation;
- Quick coupler release;
- Nitrogen purge line;
- Vacuum breaker;
- Emergency release system;
- Drain connections;
- Heat traced and insulated; and
- Control systems.

The over capacity offloading arms would be beneficial on a life cycle basis should it be decided in the near future to upgrade or twin the existing 18 inch (450 mm) diameter transfer main to the storage tanks.

Should the facility upgrade the loading arms, we recommend determining if the existing 18 inch transfer line can operate at an increased pressure and thus increase the overall transfer rate of the product. A full investigation of the existing piping and valve sizing and functionality with the new loading arms will need to be completed as part of the new installation.

5.5.4 Loading Arm Cleanout System

Currently after the vessel has offloaded the fuel oil, the loading arms remain full. Over time the oil can harden causing problems to occur during the next operation. At present there is no way to expunge the left over oil to the storage tanks or return it to the ship. An investigation will be performed to determine a method of removing the oil from the loading arms after the system is shut down. Any new system will require upgrades to the electrical system including the existing MCC's in the marine terminal enclosure.

6. Pile Inspection & Anode Replacement

6.1 General

The existing Jetty structure was designed to accommodate the 35,000 DWT tanker vessels; the concrete deck is supported on eighty-two 600 mm diameter concreted filled steel piles. The breasting points engages 25 of the piles and four 70 tonne swinging concrete gravity fenders; these structural components absorb the forces from the vessels impact.

6.2 Condition Review

As mentioned previously, the overall physical condition of the 42-year old Jetty structure is good and piles appear well maintained.

Even though the Jetty's structural piles appear well maintained, a visual inspection from the deck noted that the splash zone coating system is starting to degrade. This will lead to surface pitting corrosion. The last thickness survey of the piles was performed in 1980. We understand that in 1983 anodes were installed to the piles to reduce their corrosion rate and the anodes are inspected on a periodic basis with the last inspection completed in 2004.

6.3 Proposed Inspection and Replacement

6.3.1 Inspection

Based on the information presented above, it is recommended to complete a site inspection and perform a steel measurement program on the Jetty piles.

Hatch recommends to complete a detailed inspection of the metal thickness of the piles and a visual inspection of the underside of the deck. Hatch has prepared and issued, under a separate cover, a specification for a complete metal thickness measurement program for the Jetty piles and a complete inspection of the underside of concrete deck (Appendix I). These inspections will provide a representative view of the integrity of the structure.

6.3.2 Anode Replacement

In 2004, Crotty Diving Services performed a complete visual inspection of each pile and anode on both the Jetty head and shore arm from seabed to splashzone and recorded the amount of deterioration on each. The results are in Appendix G.

From Appendix G, assuming no anodes were replaced following the 2004 inspection, we can conclude that 107 anodes either need immediate replacement or will need to be replaced within 10 years. It is anticipated, the remaining 125 anodes will surpass the expected life of 10 years for the Marine Terminal and replacement is not required.

It is recommended that an underwater video and visual inspection of each anode and all attachment brackets on each pile be performed to confirm / verify the conclusions stated above. The inspection, using methodologies outlined in Appendix I, will provide a representative view of the current integrity of the anodes, confirm the number of anodes to be replaced and help plan the required work. The plan and methodology shall be developed in conjunction with a certified diving contractor in strict accordance with all Newfoundland and Labrador Hydro, Provincial and Federal diving regulations. As noted above, thickness measurements of the steel piles shall be recorded at time of inspection.

During the inspection, review the requirement of painting exposed piles on a case by case basis to reduce the corrosion rate to meet the expected life of the Marine Terminal. Painting of the piles shall only be considered if the associated pile anode is not being replaced.

7. Safety Upgrades

7.1 Emergency Evacuation

Presently if an incident or accident occurs at the offloading arm location, due to fire for example, there is no adequate method of emergency evacuation from the south end of the Jetty. Currently the only method of evacuation is the using the Jetty ladders to evacuate to the water.

Risk No.1

There is the possibility of personnel injury or death if a person was trapped at the south end of the Jetty due to a major fire at the offloading arms.

Mitigation of Risk No.1

No. 1: Install 2 fixed platforms at separate ends of the Jetty, facing the shore. The platform system will also allow access to the Jetty from a docking and undocking support vessel. The approximately 8 ft x 12 ft platform will be located 6.5 feet above the high tide water line with a set of stairs up to the top of the Jetty. Hatch will further investigate other requirements with Hydro including final location and method of support. A hinged gangway with a float at the bottom will be used to bring the walkway down to the water level. Lighting will be provided along with manual winch, to secure the gangway up to the platform height when not in use. See Appendix H for schematic (Drawing No. H337965-M-A1-002).

No. 2: Install an Ovatek (or approved equivalent) 4 persons rigid fibreglass life raft complete with mounting cradle that is secured to the Jetty at the south end. Individuals who would be trapped from the main egress would get into the life raft, pull the internal lever and drop safely into the bay where they would be picked by another vessel.

7.2 Man Overboard

Ongoing maintenance, periodic inspections and fuel offloading all require personnel to be located in the Jetty area. This activity can lead to the potential of someone falling into the water. Man overboard scenarios include:

Risk No. 1
Vessel offloading

In the event a vessel is on route, moored or departing the Jetty, personnel will be present at the Marine Terminal.

Mitigation of Risk No.1

Should an individual fall overboard, Hydro's Emergency Response team does have a procedure in place to facilitate a rescue.

- Shout "Man Overboard" three (3) times and immediately deploy the site life rings and Mustang Rescue Sticks located on dock. One person will maintain visual contact and physically point at the person in the water.
- If tanker is approaching the dock, contact the pilot to cease approach to the dock. If already alongside, instruct tanker captain to cease transfer of fuel if pumping operations are in effect.
- Instruct tanker captain to assist by deploying additional life-saving equipment and drop vessel's cargo netting down the outboard side of the dock.
- Contact Shift Supervisor to declare Man Overboard. Give location, number of persons in the water and general situation (i.e.; conscious/responsive).
- Shift Supervisor immediately contacts ER Technicians, 911, Canadian Coast Guard and RCMP informing them of the man overboard situation.
- Alert the boom deployment support vessel, if available.
- ER Techs will deploy the HTGS boom deployment craft only if marine weather conditions are determined safe by the OSC-1.
- Apply First Aid.
- Call for medical assistance as required.

Risk No. 2
Jetty Construction Maintenance

When ongoing maintenance/repairs are being made at the Marine Terminal there is the risk of a worker falling into the water.

Mitigation of Risk No.2

The Marine Terminal is treated as a confined space and workers must be wearing life jackets and tied off when near the edge of the Jetty.

Hydro's emergency response team will have 2 members of their team fully set up in survival gear for the duration of the work. The emergency response deployment support vessel is prepared and placed in the water for immediate assistance. Radio communication is required to call for help in the event someone falls overboard.

Risk No. 3

Maintenance Inspection

When travelling to the Jetty for general inspection, a minimum of two (2) workers are required. Life jackets again are mandatory as well as a radio to call for help.

This scenario presents the highest risk as the sole means to call for help, in the event that someone falls overboard, is the radio. There are a couple chain ladders on the Jetty to allow a responsive victim a chance to get out of the water, however they do not extend all the way into the water at low tide. In the event the victim is unconscious, the partner would have little chance to get the victim out of the water by themselves. There is an inflatable boat inside a locked building on the Jetty, but there is no adequate method to place the boat in the water with rescuers aboard. Besides calling for help the individual would keep an eye on the victim as the normal current in the area tends to flow down the bay towards the town of Holyrood.

Mitigation of Risk No.3

No. 1: Install a fall restraint system in critical areas near the edge of the Jetty. This would require personnel working in high risk locations to be tied-off to prevent anyone from going over. Recessed connect plates will be installed on the bay side of the Jetty. In the event of a trip or strong wind near the Jetty edge, the individual would be held back by their lanyard and prevent them from falling into the ocean. A review of Hydro's practice and procedures at the Marine Terminal will be required.

No.2: A rescue winch to be located on top of the Jetty near each of the 2 existing hand ladders to aid rescuers in recovering any injured personnel who have fallen overboard.

No. 3: Provide staff members with water activated locator beacons to alert the emergency response team in the event someone falls overboard.

7.3 Lighting upgrades

The existing light fixtures on the jetty are extremely high, making replacement of the bulbs difficult in good weather, let alone in nasty conditions. A new style of fixture with improved maintenance accessibility is recommended to ease in the replacement of the bulbs, but still provide adequate lighting for the workers on the jetty.

8. Regulatory Approvals

8.1 General

As detailed in previous sections, the scope of work of the project could include the following proposed modifications:

- installation of structures along the shoreline;
- Modification/repair to piled structures in the harbour bottom; and/or
- demolition over and in the harbour.

The undertaking will trigger the provincial and federal environmental assessment process. Several departments will be involved to address the potential effects of the project. The following sections describe the triggers and the anticipated departments and agencies that will be involved.

8.2 NL Department of Environment and Conservation

A project that must be registered for the provincial environmental assessment process is referred to as an undertaking. As per the *NL Environmental Protection Act* an undertaking is defined as:

> "an enterprise, activity, project, structure, work or proposal and a modification, abandonment, demolition, decommissioning, rehabilitation and an extension of them that may, in the opinion of the minister, have a significant environmental effect".
> *Section 2 (mm)*

The purpose of the environmental assessment process is to: (a) protect the environment and quality of life of the people of the province; and (b) facilitate the wise management of the natural resources of the province (*NL Environmental Protection Act, Section 46*).

The provincial assessment process is triggered by the Environmental Assessment Regulations (*NL Regulation 54/03*), Section 35(a) which states the following:

> "An undertaking that will be engaged in the construction of a breakwater structure where the breakwater will be more than 100 m in length."

8.3 Transport Canada

Transport Canada will be involved in the approval process under *The Navigable Waters Protection Act* and as a Responsible Authority under the *Canadian Environmental Assessment Act.*

<u>Navigable Waters Protection Act</u>

Section 5 of the NWPA states the following:

> "No work shall be built or placed in, on, over, under, through or across any navigable water without the Minister's prior approval of the work, its site and the plans for it."

Section 16 of the NWPA states the following:

> "The Minister may cause any wreck, vessel or part of a vessel resulting from the wrecking, sinking, partial sinking, lying ashore or grounding of a vessel, or may cause any other thing, to be secured, removed or destroyed in the manner that the Minister considers appropriate if, in the Minister's opinion,
>
> a. the navigation of any navigable water over which Parliament has jurisdiction is obstructed, impeded or rendered more difficult or dangerous for more than 24 hours by the wreck, vessel, part of a vessel or thing;
>
> b. the wreck, vessel, part of a vessel or thing has been in a position for more than 24 hours that is likely to obstruct, impede or render more difficult or dangerous the navigation of any such navigable water; or
>
> c. the wreck, vessel, part of a vessel or thing is cast ashore, stranded or left on any property belonging to Her Majesty in right of Canada and has been an obstruction or obstacle, for more than 24 hours, to the use of that property as may be required for the public purposes of Canada."

Historical knowledge indicates that there may be shipwrecks present at or near the proposed work location. During preliminary discussions with regional Transport Canada representatives, it was confirmed that the provincial archaeologist must be consulted prior to any proposed dredging operations.

The application process and required documentation is determined by the regional Navigable Waters Protection Program (NWPP) office. The application will include at a minimum:

1. Details of work:
   a. clearly identify the proponent; this must be a single body, company, etc.
   b. proposed construction schedule
   c. description of work
   d. status of work (existing, proposed or both)
   e. name of waterway, including width and depth
   f. chart and topographic map number
   g. latitude and longitude of the work site
   h. legal description (section, lot number, concession etc)
   i. identification of upland property owners
   j. method of construction (i.e. equipment to be used etc)

2. Plans:
   a. drawings completed to scale with all dimensions
   b. indicate if any plans have been registered/deposited at your local land registry; if so, include registration number
   c. identify which government regulatory agencies have been forwarded copies of the plans

3. Additional information:
   a. history of the waterway, including all navigational uses
   b. characteristics of the waterway
   c. pictures of the work location, as well as upstream and downstream views

The above is intended to provide an overview of information that may be required for the application; again, the specific application requirements must be confirmed with the regional NWPP office.

Canadian Environmental Assessment Act

Part V of the Inclusion List Regulations (SOR/94-637), Transportation, Section 36 states the following:

> "Dredge or fill operations in a navigation channel of a historic canal or other navigable water for the purpose of ensuring the navigability of the historic canal or other navigable water."

This will trigger the federal EA process and include Transport Canada as a Responsible Authority.

8.4 Fisheries and Oceans Canada

The Department of Fisheries and Oceans (DFO) will be involved in the approval process under *The Fisheries Act* and as a Responsible Authority under the *Canadian Environmental Assessment Act.* DFO will also be included under the *Species at Risk Act*; this is discussed further in Section 5.5.

The Fisheries Act

Section 35 of the Fisheries Act addresses the harmful alteration, disruption or destruction of fish habitat, Subsections (1) and (2) state the following:

1) No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat.

2) No person contravenes subsection (1) by causing the alteration, disruption or destruction of fish habitat by any means or under any conditions authorized by the Minister or under regulations made by the Governor in Council under this Act.

While all efforts and best practices will be incorporated into the project planning phase to minimize any impact on fish or fish habitat, some disturbance may be unavoidable. As per the requirements of DFO, and in accordance with the *Proponent's Guide to Information Requirements for Review under the Fish Habitat Protection Provisions of the Fisheries Act (April 2009)*, the proponent will prepare a Development Proposal. The document will include the following:

1. Contact information for proponent, contractor and consultants
2. location of the proposed development:
    a. nearest community
    b. name of watercourse likely to be impacted
    c. coordinates of the proposed development
    d. map to show how to access the proposed development
    e. illustrate location on a nautical chart if requested
3. description of the aquatic environment:
    a. type of watercourse, water body
    b. biophysical characteristics of the site:
        - channel width

        - type of flow
        - tides
        - water depth
        - substrate type and density
        - aquatic vegetation type and density
        - other aquatic organisms
        - presence of fish species
    c. drawings and/or photos of the aquatic environment
4. description of the proposed development:
    a. components (permanent and temporary structures, project activities)
    b. methods, materials and equipment
    c. affected area
    d. plans, maps and/or drawings
    e. fish and fish habitat protection measures
    f. implementation schedule
    g. life expectancy

The submission of the Development Proposal will allow the DFO to assess the undertaking and the impact on fish and fish habitat.

Canadian Environmental Assessment Act

Part VII of the Inclusion List Regulations (SOR/94-637), Fisheries, Sections 42, 43 and 45 state the following:

> (42) The destruction of fish by any means other than fishing, where the destruction requires the authorization of the Minister of Fisheries and Oceans under section 32 of the Fisheries Act or authorization under regulations made by the Governor in Council under that Act.
>
> (43) The harmful alteration, disruption or destruction of fish habitat by means of physical activities carried out in a water body, including dredge or fill operations, that require the authorization of the Minister of Fisheries and Oceans under subsection 35(2) of the Fisheries Act or authorization under regulations made by the Governor in Council under that Act.
>
> (45) The harmful alteration, disruption or destruction of fish habitat by means of erosion control measures adjacent to a water body that require the authorization of the Minister of Fisheries and Oceans under subsection 35(2) of the Fisheries Act or authorization under regulations made by the Governor in Council under that Act.

The proposed undertaking may involve one or all of the above and will trigger the federal environmental assessment process and include the Department of Fisheries and Oceans as a Responsible Authority.

It is expected that there will be some overlap between the *Fisheries Act* requirements and the Environmental Assessment document. Specifically, regarding mitigation measures with respect to the protection of fish habitat. The Department of Fisheries and Oceans strives to achieve no net loss, this is intended to balance unavoidable habitat losses with habitat replacement on a project-specific basis.

8.5 Environment Canada

Environment Canada will be involved in the approval process under *The Canadian Environmental Protection Act* and *The Species at Risk Act*.

Species at Risk Act

Under Sections 32 and 33 the Species at Risk Act (SARA—2002, c. 29), it is an offence to:

- kill, harm, harass, capture or take an individual of a listed species that is extirpated, endangered or threatened;
- possess, collect, buy, sell or trade an individual of a listed species that is extirpated, endangered or threatened, or its part or derivative;
- damage or destroy the residence of one or more individuals of a listed endangered or threatened species or of a listed extirpated species if a recovery strategy has recommended its reintroduction into the wild in Canada.

The Act allows the issuance of a permit or agreement authorizing a person to affect a listed species so long as certain conditions are first met. Under Section 73 of SARA, the Minister of Fisheries and Oceans may enter into an agreement with a person, or issue a permit to a person, authorizing the person to engage in an activity affecting a listed aquatic species, any part of its critical habitat, or the residences of its individuals.

Under section 73(2) of SARA, the agreement may be entered into, or the permit issued, only if the Minister is of the opinion that:

- the activity is scientific research relating to the conservation of the species and conducted by qualified persons;
- the activity benefits the species or is required to enhance its chance of survival in the wild; or
- affecting the species is incidental to the carrying out of the activity.

http://www.dfo-mpo.gc.ca/species-especes/permits-permis/guidelines-directives-eng.htm

The above refers to all species at risk, not just aquatic. It is understood that all potential species at risk will be considered in the review (mammals, birds, aquatic etc). This will involve both DFO and Environment Canada as Responsible Authorities. All requirements under the Species at Risk Act will be incorporated into the EA document.

8.6 Summary

Transport Canada, the Department of Fisheries and Oceans, the NL Department of Environment and Conservation and Environment Canada are anticipated to be the primary contributors to the approval and permitting processes required for the proposed undertaking. It is recognized that through the Federal Coordination Regulations, other departments/ agencies will potentially be involved in the review process. It is also recognized that there may be overlap in submission requirements, the proponent will maintain continuous contact with regulators, and the Lead Responsible Authority, to minimize duplication of effort and facilitate streamlining the process. Based on the various permit applications, surveys and environmental assessment documentation, it is estimated that the process will take approximately 6 months from initiation to final approval.

9. Cost Estimates for Jetty Upgrades

9.1 General

To assist Hydro with their assessment of risk mitigation at the Holyrood Marine Terminal, we have completed an order of magnitude cost estimate for the upgrading of individual components.

The order of magnitude construction cost estimates are based on similar types of work completed in Atlantic Canada and on costs supplied by contractors who are familiar with this type of work.

Fender Replacement/Repairs	**$1,874,300**
• Fender No. 4 complete replacement	$633,500
• Repairs to Fenders No. 3,5&6	$1,139,500
• Engineering	$101,300
Vessel Approach/Loading Arms	**$711,800**
• Modify existing loading arms.	$211,500
• Radar System	$110,000
• Loading Arm Drainage System	$280,000
• Engineering	$110,300
Anode Inspection/Replacement	**$504,800**
• Inspect all anodes and replace as required	$473,400
• Engineering	$31,400
Life Safety Issues	**$832,225**
• Install a 4 persons evacuation life raft. Install 2 fixed platforms below deck to allow access to vessels	$592,000
• Lighting Upgrades	$65,000
• Engineering	$175,225
General	**$1,624,506**
• Mobilization/Demobilization	$50,000
• On-Site Facilities	$581,225
• Contingency	$595,968
• Overhead and Profit	$397,313
Total	**$5,547,631**

A detailed breakdown of the estimated construction cost is attached in Appendix L.

10. Schedule

10.1 General

From the cost estimate Hatch approximates two (2) to three (3) months of engineering from design to tendering.

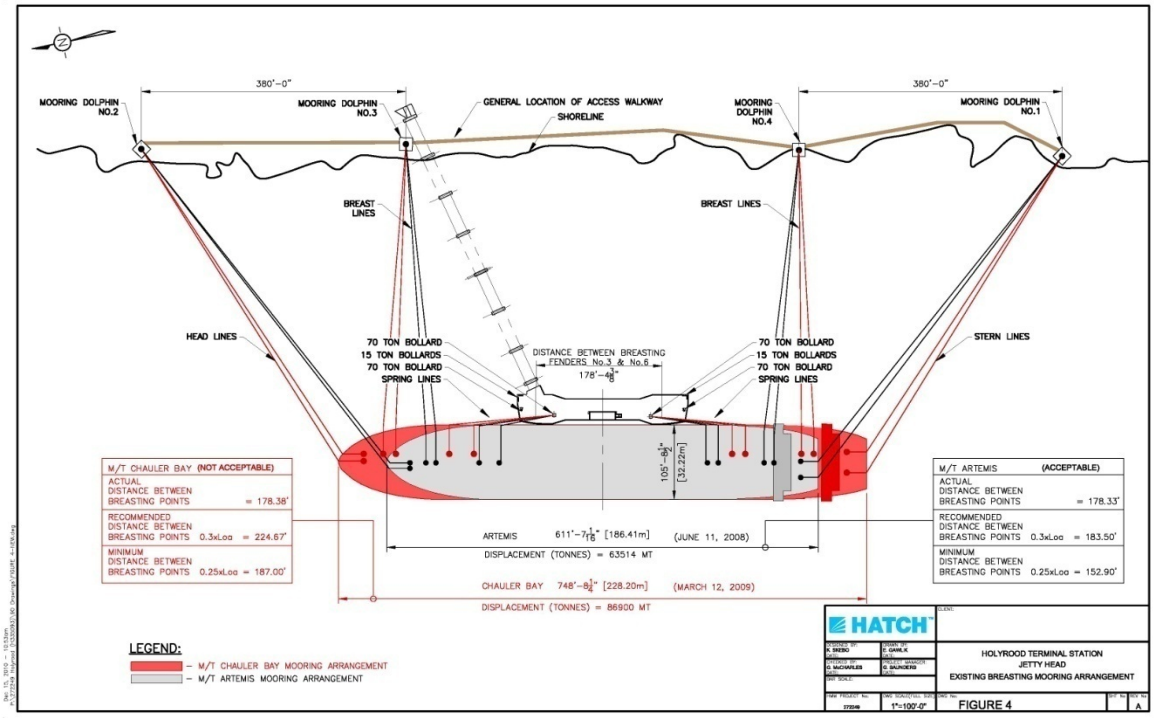
Based on Hatch's preliminary assessment of the existing structures and previous experience, we anticipate approximately four (4) months to complete the construction phase. This work will take place during Hydro's construction season, May to October.

The final schedule will require the delivery times for long lead items that may delay or prolong the construction stage.

Depending on climate conditions, construction may commence earlier than May given that engineering is completed one month after the start of construction.

Appendix A

Holyrood Terminal Station Jetty Head Existing Breasting Mooring Arrangement


380'-0"
MOORING DOLPHIN NO.2
MOORING DOLPHIN NO.3
GENERAL LOCATION OF ACCESS WALKWAY
SHORELINE
MOORING DOLPHIN NO.4
380'-0"
MOORING DOLPHIN NO.1
BREAST LINES
BREAST LINES
HEAD LINES
70 TON BOLLARD
15 TON BOLLARDS
70 TON BOLLARD
SPRING LINES
DISTANCE BETWEEN BREASTING FENDERS No.3 & No.6
178'-4 3/8"
70 TON BOLLARD
15 TON BOLLARDS
70 TON BOLLARD
SPRING LINES
STERN LINES
105'-8 1/2" [32.22m]
M/T CHAULER BAY (NOT ACCEPTABLE)
ACTUAL DISTANCE BETWEEN BREASTING POINTS = 178.38'
RECOMMENDED DISTANCE BETWEEN BREASTING POINTS 0.3xLoa = 224.67'
MINIMUM DISTANCE BETWEEN BREASTING POINTS 0.25xLoa = 187.00'
M/T ARTEMIS (ACCEPTABLE)
ACTUAL DISTANCE BETWEEN BREASTING POINTS = 178.33'
RECOMMENDED DISTANCE BETWEEN BREASTING POINTS 0.3xLoa = 183.50'
MINIMUM DISTANCE BETWEEN BREASTING POINTS 0.25xLoa = 152.90'
ARTEMIS 611'-7 1/16" [186.41m] (JUNE 11, 2008)
DISPLACEMENT (TONNES) = 63514 MT
CHAULER BAY 748'-8 1/4" [228.20m] (MARCH 12, 2009)
DISPLACEMENT (TONNES) = 86900 MT
LEGEND:
– M/T CHAULER BAY MOORING ARRANGEMENT
– M/T ARTEMIS MOORING ARRANGEMENT
HATCH
CLIENT:
DESIGNED BY: K. SKEBO
DRAWN BY: E. GAWLIK
CHECKED BY: G. McCHARLES
PROJECT MANAGER: G. SAUNDERS
BAR SCALE:
HOLYROOD TERMINAL STATION
JETTY HEAD
EXISTING BREASTING MOORING ARRANGEMENT
HMM PROJECT No. 272249
DWG SCALE(FULL SIZE) 1"=100'-0"
DWG No. FIGURE 4
SHT No.
REV No. A

Appendix B

Design Check of Structural Capacity of Piles and Calculation of Recommended Vessel Approach Velocity

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List of Tables

1. Introduction

At the request of Newfoundland and Labrador Hydro, Hatch has carried out structural analyses of the jetty structure at the Holyrood Marine Terminal for the purpose of determining acceptable vessel berthing practices, specifically as it relates to 55,000 DWT tanker vessels. The following report summarizes the details of the analyses along with the conclusions derived from them. The capacity of the jetty when vessels are in a moored condition was not part of the scope of work.

2. Description of Work

To perform these analyses, several assumptions were required and are listed below:

- The gravity fenders and their support mechanisms are in good working order;
- The driving resistances of the piles, as noted on the original design drawings, are valid. A factor of safety of 2.0 was used to derive an allowable bearing load from these driving resistances;
- The point of pile base fixity was determined to be approximately 10′ (3.0m) below the seabed. The average depth to the seabed below the underside of concrete deck was assumed to be approximately 65′ (20m) based on original borehole survey data;
- The mass of each gravity fender is 66 tonnes (calculated);
- The berthing energy of a vessel will be absorbed by a minimum of two (2) concrete gravity fenders and these fenders will deflect the same amount during berthing;
- In accordance with established practice, an eccentricity (berthing) coefficient of 0.5 and a safety factor for abnormal berthing of 2.0 were applied to the calculated berthing energies;
- The lateral movement of the fenders is only significant in the direction perpendicular to the fender's berthing face; i.e. there is no appreciable side to side movement during vessel berthing;
- A deck live loading of 12.5 kPa (250 psf).

A 3-dimensional STAAD model of the jetty deck and pile structure was created for the structural analyses. Capacities were then checked manually using limit states design in accordance with CSA S16.1.

Analyses were run for 45,000 and 55,000 DWT vessels with berthing velocities of 0.10 m/s, 0.15 m/s, and 0.20 m/s perpendicular to the face of the jetty. For the purpose of creating a baseline for the results, an analysis was run for a 35,000 DWT vessel, the original design vessel displacement, berthing at 0.10 m/s and 0.15 m/s. An equivalent static force was determined based on the required energy absorption for each case. This force was divided into two (2) equal parts for both fenders and applied directly to the concrete deck.

The following procedure was carried out for each berthing (loading) condition:

- The allowable energy absorption of two (2) fenders was compared with the berthing energy for each vessel at each berthing velocity. The allowable energy absorption was determined based on the potential energy of each fender rising up to the level of the underside of the jetty deck.
- The maximum tension and compression loads in the piles were determined from the results of the STAAD model. The pile compression capacity was calculated as the minimum of either the

structural capacity of the pile or the final driving resistance indicated on the drawings. Punching shear through the concrete deck was also calculated and it was found not to govern the design. The driven tensile capacity of the piles is not indicated on the original drawings, nor is there any construction detail showing a tensile resistance connection of the pile and deck. It was decided to determine the maximum pile tension based on the original design condition of 35,000 DWT at 0.15 m/s and limit the allowable tensile forces for the other analyses to this value.

- The axial load in each of the fender support arms was determined based on static equilibrium at the point of maximum fender deflection. This axial load was then compared with the tensile and shear capacities of the support arms. The clevis plates' capacities were not checked as they are thicker than the support arms and each plate only carries approximately half the load of the support arms. The concrete embedment capacity of the clevis plates was not checked.

3. Results

3.1 Energy Absorption Capacity of Fenders

It was found that at 0.10 m/s and 0.15 m/s, two fenders were capable of absorbing the energy of all three vessel sizes analyzed. At 0.20 m/s, however, the fenders would rotate far enough under 45,000DWT and 55,000 DWT vessel berthing that they could strike the underside of the concrete deck. As this was considered the limiting case, this berthing velocity was not considered as an option. Table 3.1 shows the raised heights of the fenders required to fully dissipate the berthing energies.

Table 3.1: Raised Height Required for Energy Dissipation

DWT	Displaced Tonnage	Velocity	Required Height	Allowable Height	Energy U/R
t	t	m/s	mm	mm	
55000	65000	0.100	454	1362	0.33
		0.125	709	1362	0.52
		0.150	1021	1362	0.75
		0.200	1815	1362	1.33
45000	55000	0.100	371	1362	0.27
		0.150	834	1362	0.61
		0.200	1483	1362	1.09
35000	46000	0.100	315	1362	0.23
		0.150	709	1362	0.52
		0.200	1261	1362	0.93

Note: Highlighted regions indicate cases that exceed the allowable limits

3.2 Tension/Compression Capacity of Piles

The 55,000 DWT vessel at 0.15 m/s was found to produce compression loads in the piles that overloaded the allowable driving resistance with a utilization ratio of approximately 1.07. The 0.10 m/s berthing velocity was found to produce acceptable compression loads with a utilization ratio of 1.0.

Using the tension loads from the baseline analysis of the 35,000 DWT vessel, a velocity was determined for the 55,000 DWT vessel that would produce similar tensile pile loads in the jetty. This velocity was determined to be 0.125 m/s, which produces berthing loads that are nearly identical to the baseline analysis. Tables 3.2 and 3.3 show the compression and tension utilization ratios of the piles, respectively.

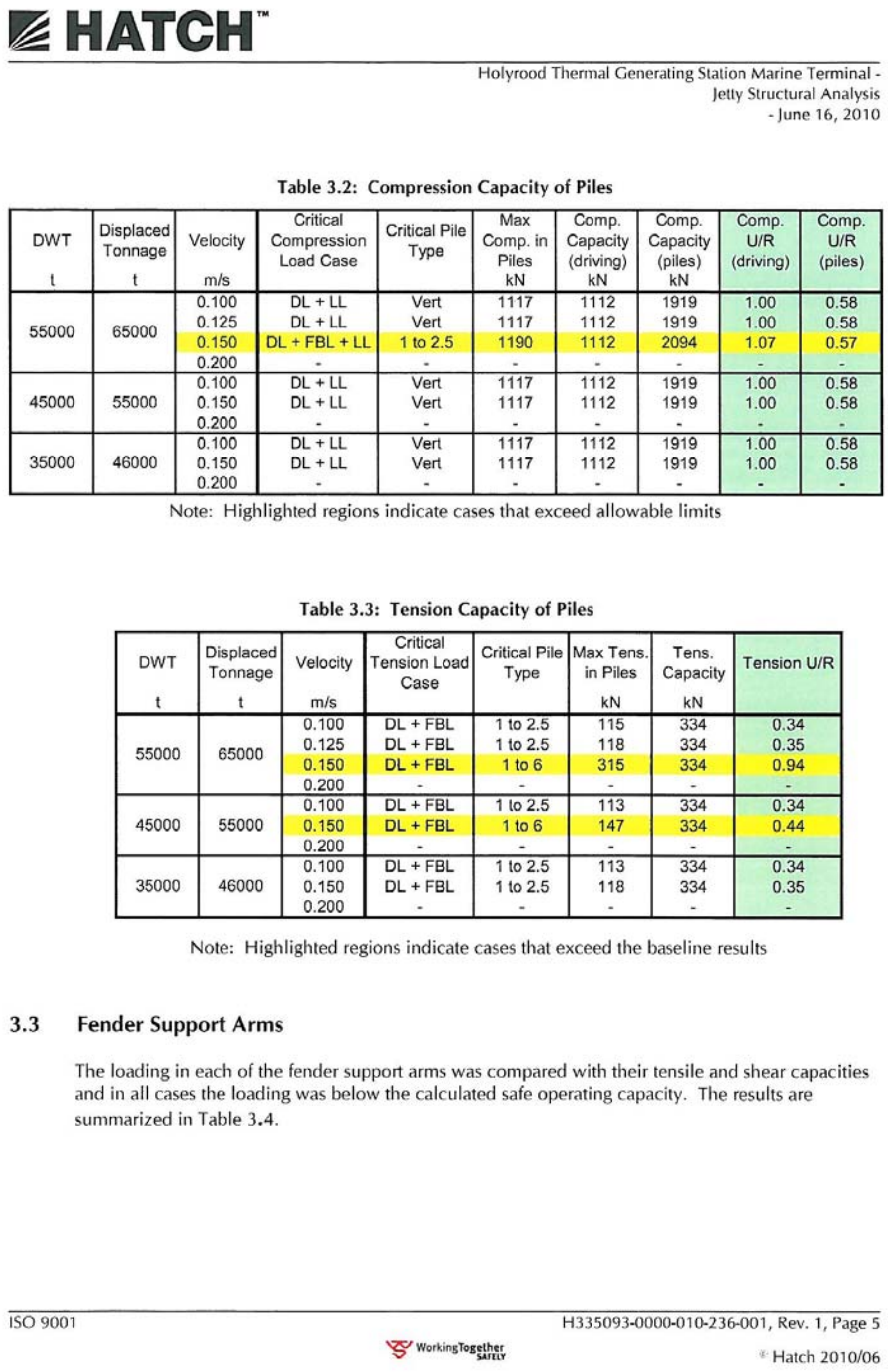


Table 3.2: Compression Capacity of Piles

DWT t	Displaced Tonnage t	Velocity m/s	Critical Compression Load Case	Critical Pile Type	Max Comp. in Piles kN	Comp. Capacity (driving) kN	Comp. Capacity (piles) kN	Comp. U/R (driving)	Comp. U/R (piles)
55000	65000	0.100	DL + LL	Vert	1117	1112	1919	1.00	0.58
		0.125	DL + LL	Vert	1117	1112	1919	1.00	0.58
		0.150	DL + FBL + LL	1 to 2.5	1190	1112	2094	1.07	0.57
		0.200	-	-	-	-	-	-	-
45000	55000	0.100	DL + LL	Vert	1117	1112	1919	1.00	0.58
		0.150	DL + LL	Vert	1117	1112	1919	1.00	0.58
		0.200	-	-	-	-	-	-	-
35000	46000	0.100	DL + LL	Vert	1117	1112	1919	1.00	0.58
		0.150	DL + LL	Vert	1117	1112	1919	1.00	0.58
		0.200	-	-	-	-	-	-	-

Note: Highlighted regions indicate cases that exceed allowable limits

Table 3.3: Tension Capacity of Piles

DWT t	Displaced Tonnage t	Velocity m/s	Critical Tension Load Case	Critical Pile Type	Max Tens. in Piles kN	Tens. Capacity kN	Tension U/R
55000	65000	0.100	DL + FBL	1 to 2.5	115	334	0.34
		0.125	DL + FBL	1 to 2.5	118	334	0.35
		0.150	DL + FBL	1 to 6	315	334	0.94
		0.200	-	-	-	-	-
45000	55000	0.100	DL + FBL	1 to 2.5	113	334	0.34
		0.150	DL + FBL	1 to 6	147	334	0.44
		0.200	-	-	-	-	-
35000	46000	0.100	DL + FBL	1 to 2.5	113	334	0.34
		0.150	DL + FBL	1 to 2.5	118	334	0.35
		0.200	-	-	-	-	-

Note: Highlighted regions indicate cases that exceed the baseline results

3.3 Fender Support Arms

The loading in each of the fender support arms was compared with their tensile and shear capacities and in all cases the loading was below the calculated safe operating capacity. The results are summarized in Table 3.4.

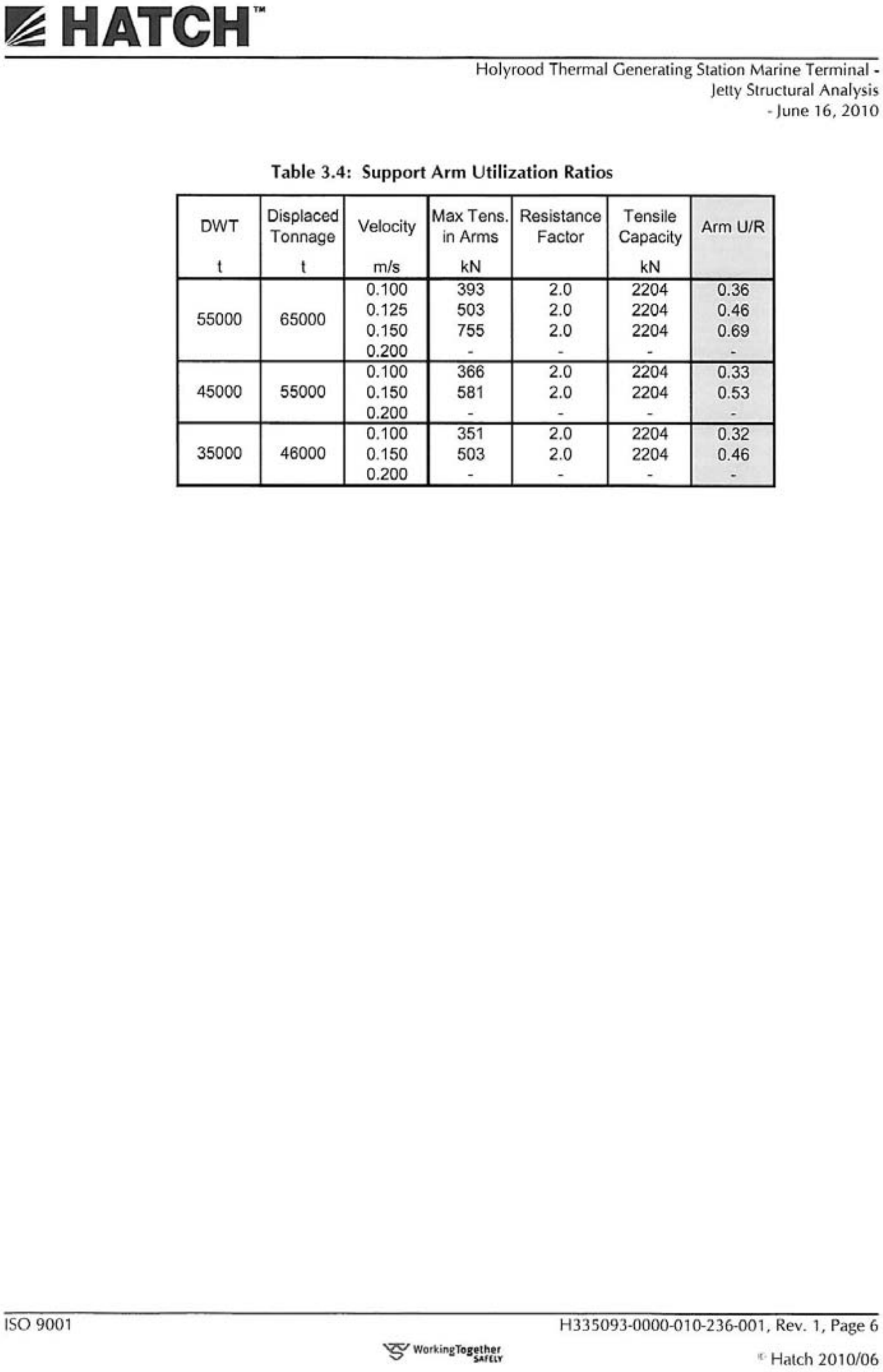


Table 3.4: Support Arm Utilization Ratios

DWT t	Displaced Tonnage t	Velocity m/s	Max Tens. in Arms kN	Resistance Factor	Tensile Capacity kN	Arm U/R
55000	65000	0.100	393	2.0	2204	0.36
		0.125	503	2.0	2204	0.46
		0.150	755	2.0	2204	0.69
		0.200	-	-	-	-
45000	55000	0.100	366	2.0	2204	0.33
		0.150	581	2.0	2204	0.53
		0.200	-	-	-	-
35000	46000	0.100	351	2.0	2204	0.32
		0.150	503	2.0	2204	0.46
		0.200	-	-	-	-

4. Conclusions

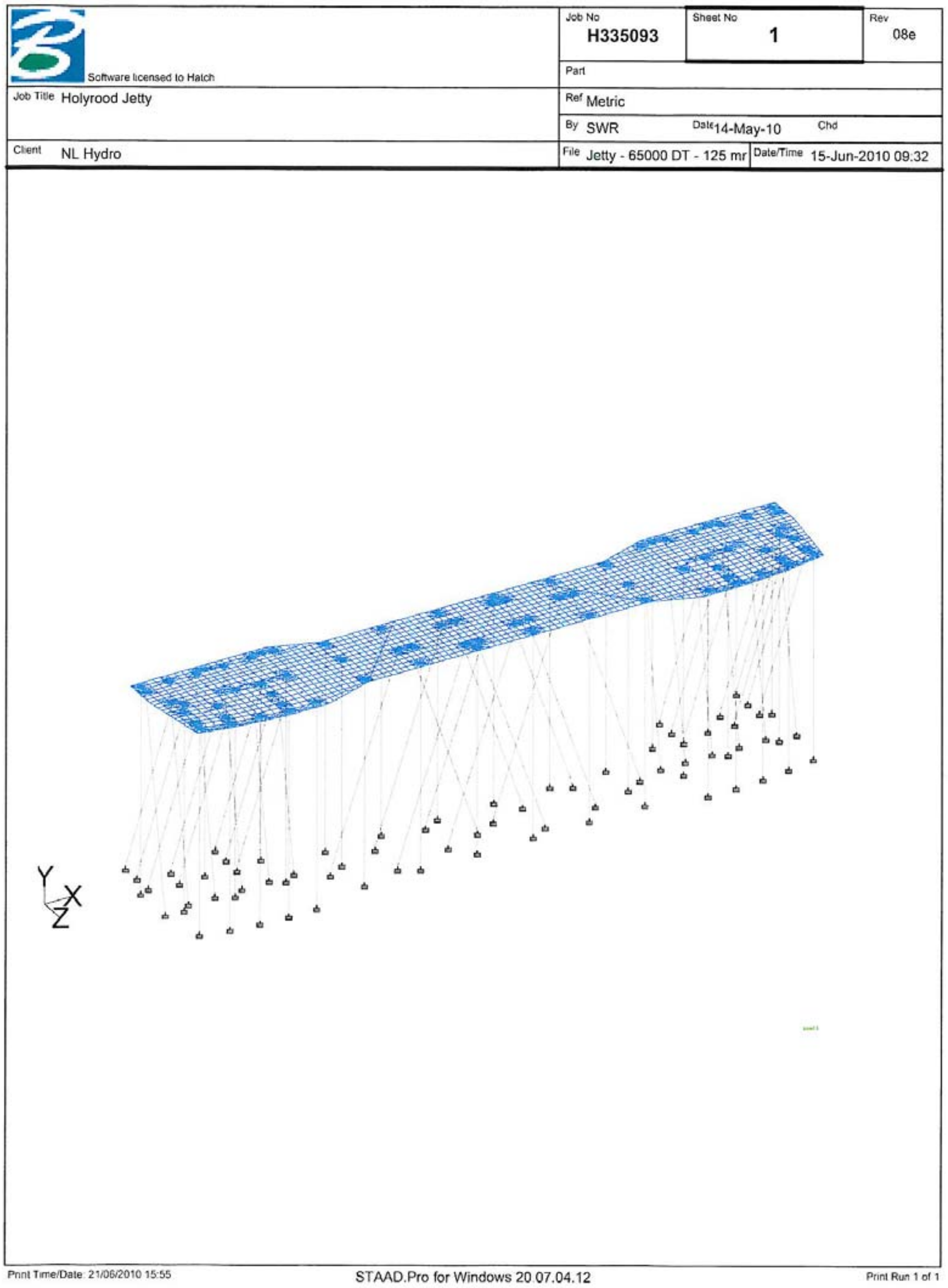
Based on the structural analysis of the jetty, it was determined that the jetty is capable of withstanding the berthing forces from a 55,000 DWT vessel at a maximum berthing velocity of 0.125 m/s without exceeding the capacity of the piles, support arms, or available potential energy in two simultaneously displaced fenders. The 55,000 DWT vessel at 0.125 m/s produces very similar results to the assumed original design criteria of a 35,000 DWT vessel at 0.15 m/s. This determination includes a safety factor to account for abnormal berthing energy due to the occurrence of docking problems caused by human error, malfunctions, exceptional weather conditions, or a combination of these factors.

As mentioned in the description of work, the results of these analyses are dependent on the fenders and their support mechanisms being in good working order. If any of these components are not in good working order, these less than ideal conditions will increase the loads on the jetty, which could cause it to be overloaded for a 55,000 DWT vessel berthing at 0.125 m/s.

An analysis while the vessel is in a moored condition may also be required to determine the capacities of mooring aids such as bollards and capstans.

Appendix A

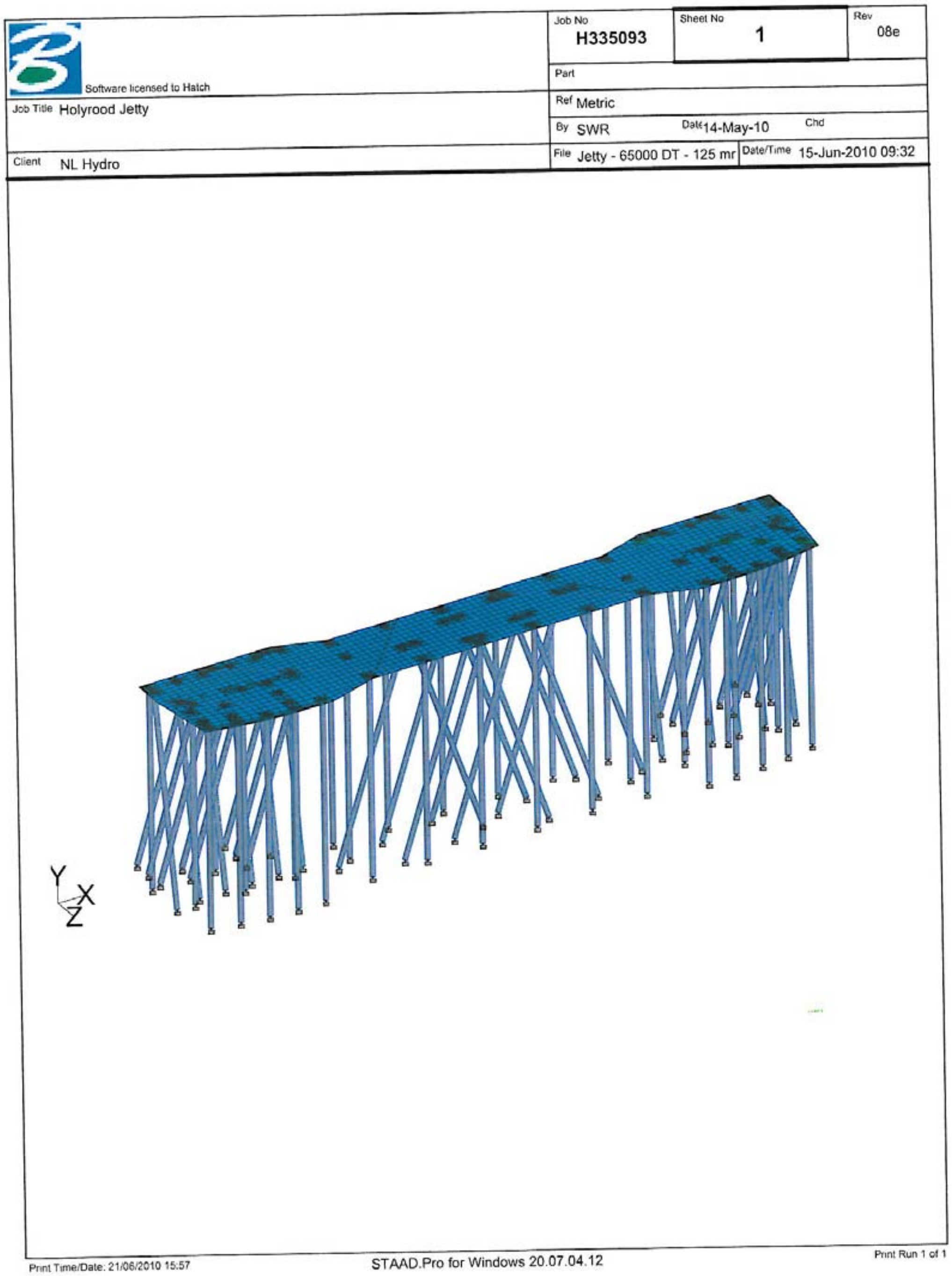
STAAD Model Printouts



Software licensed to Hatch

Job No H335093
Sheet No 1
Rev 08e
Part
Job Title Holyrood Jetty
Ref Metric
By SWR
Date 14-May-10
Chd
Client NL Hydro
File Jetty - 65000 DT - 125 mr
Date/Time 15-Jun-2010 09:32

Print Time/Date: 21/06/2010 15:55
STAAD.Pro for Windows 20.07.04.12
Print Run 1 of 1



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Job Title Holyrood Jetty

Client NL Hydro

Job No H335093

Sheet No 1

Rev 08e

Part

Ref Metric

By SWR

Date 14-May-10

Chd

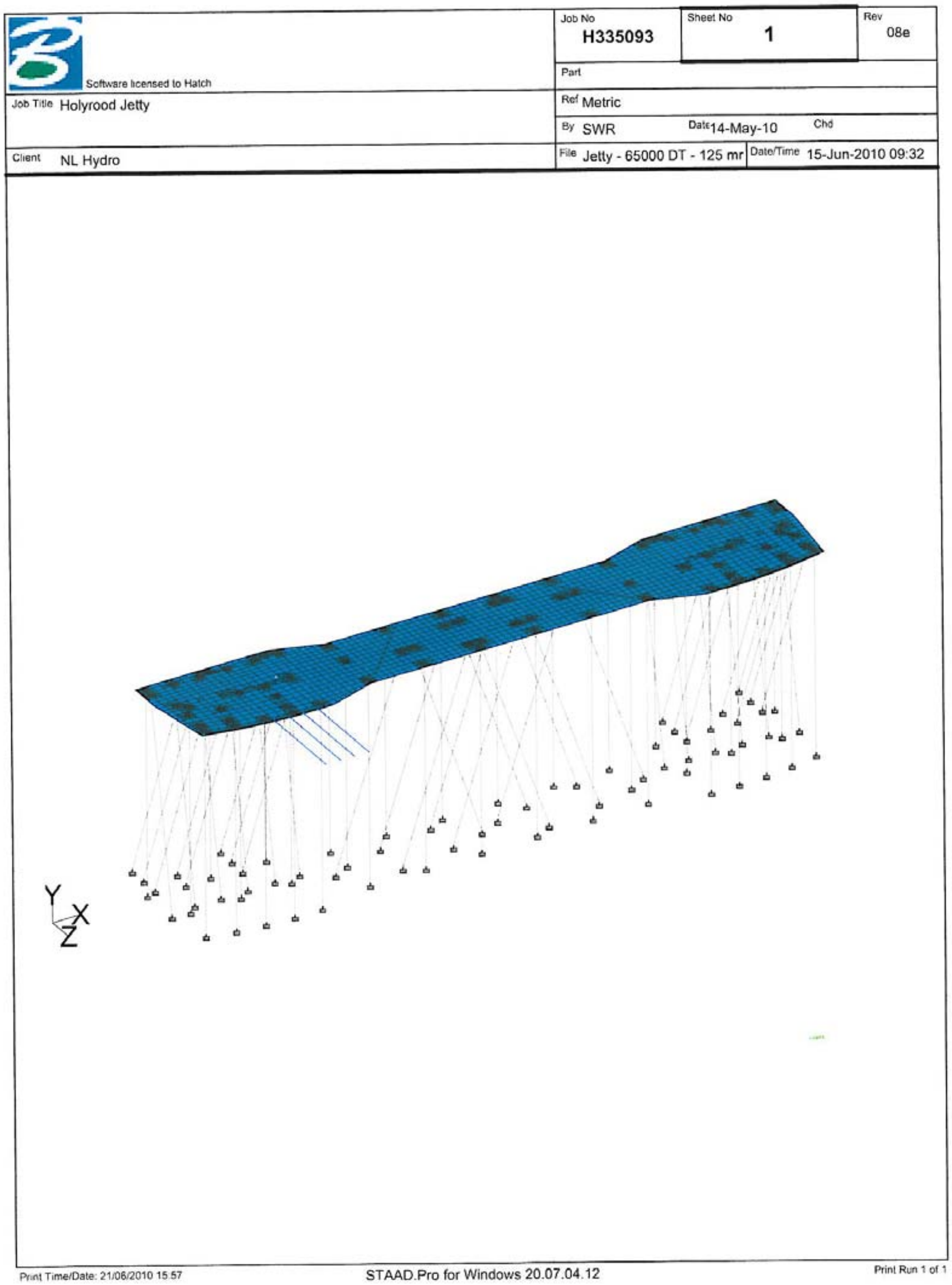
File Jetty - 65000 DT - 125 mr

Date/Time 15-Jun-2010 09:32

Print Time/Date: 21/06/2010 15:57

STAAD.Pro for Windows 20.07.04.12

Print Run 1 of 1



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Sheet No 1

Rev 08e

Part

Job Title Holyrood Jetty

Ref Metric

By SWR

Date 14-May-10

Chd

Client NL Hydro

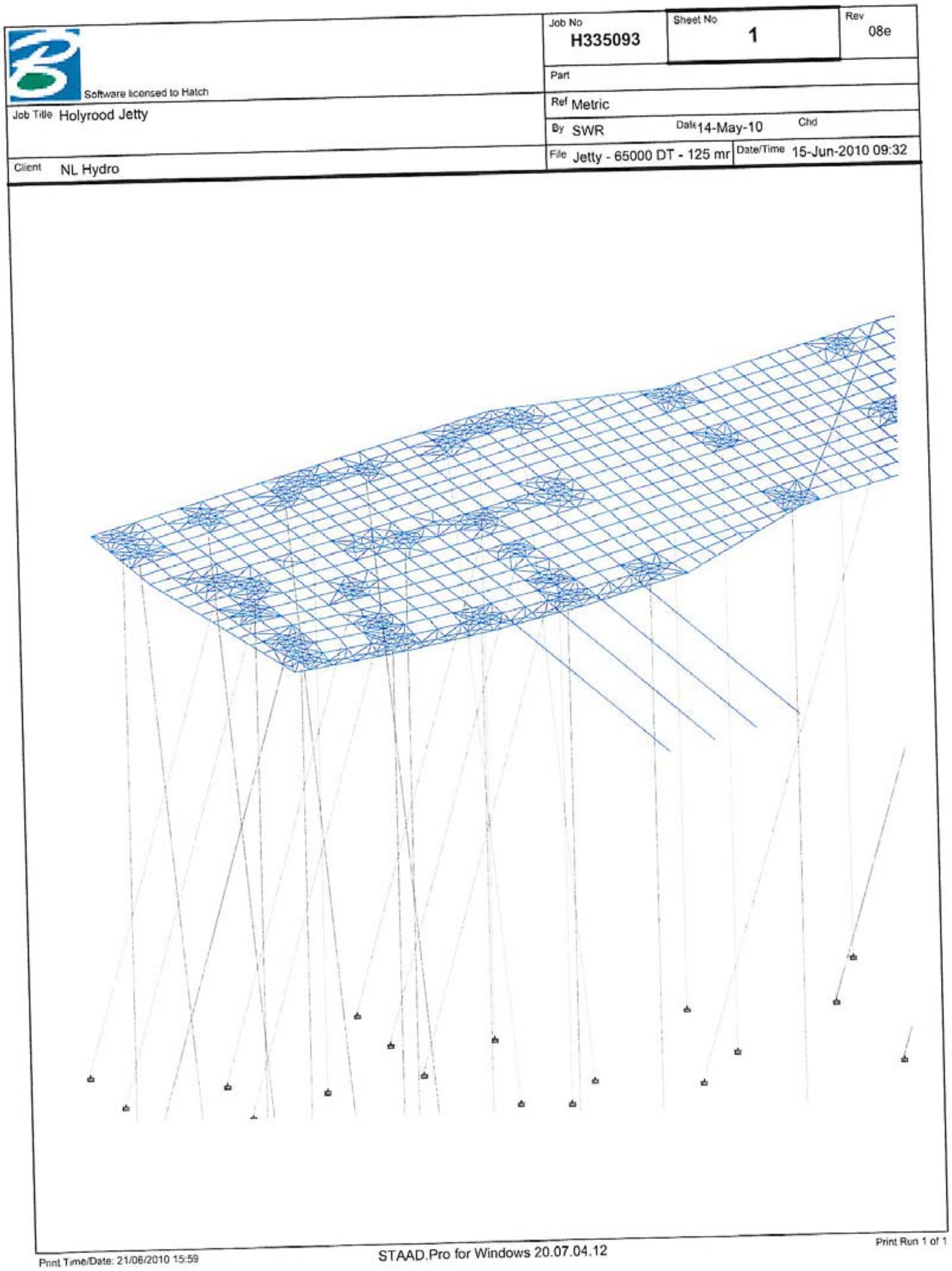
File Jetty - 65000 DT - 125 mr

Date/Time 15-Jun-2010 09:32

Print Time/Date: 21/06/2010 15:57

STAAD.Pro for Windows 20.07.04.12

Print Run 1 of 1



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Job No H335093
Sheet No 1
Rev 08e
Part
Ref Metric
By SWR
Date 14-May-10
Chd
File Jetty - 65000 DT - 125 mr
Date/Time 15-Jun-2010 09:32

Job Title Holyrood Jetty

Client NL Hydro

Print Time/Date: 21/06/2010 15:59
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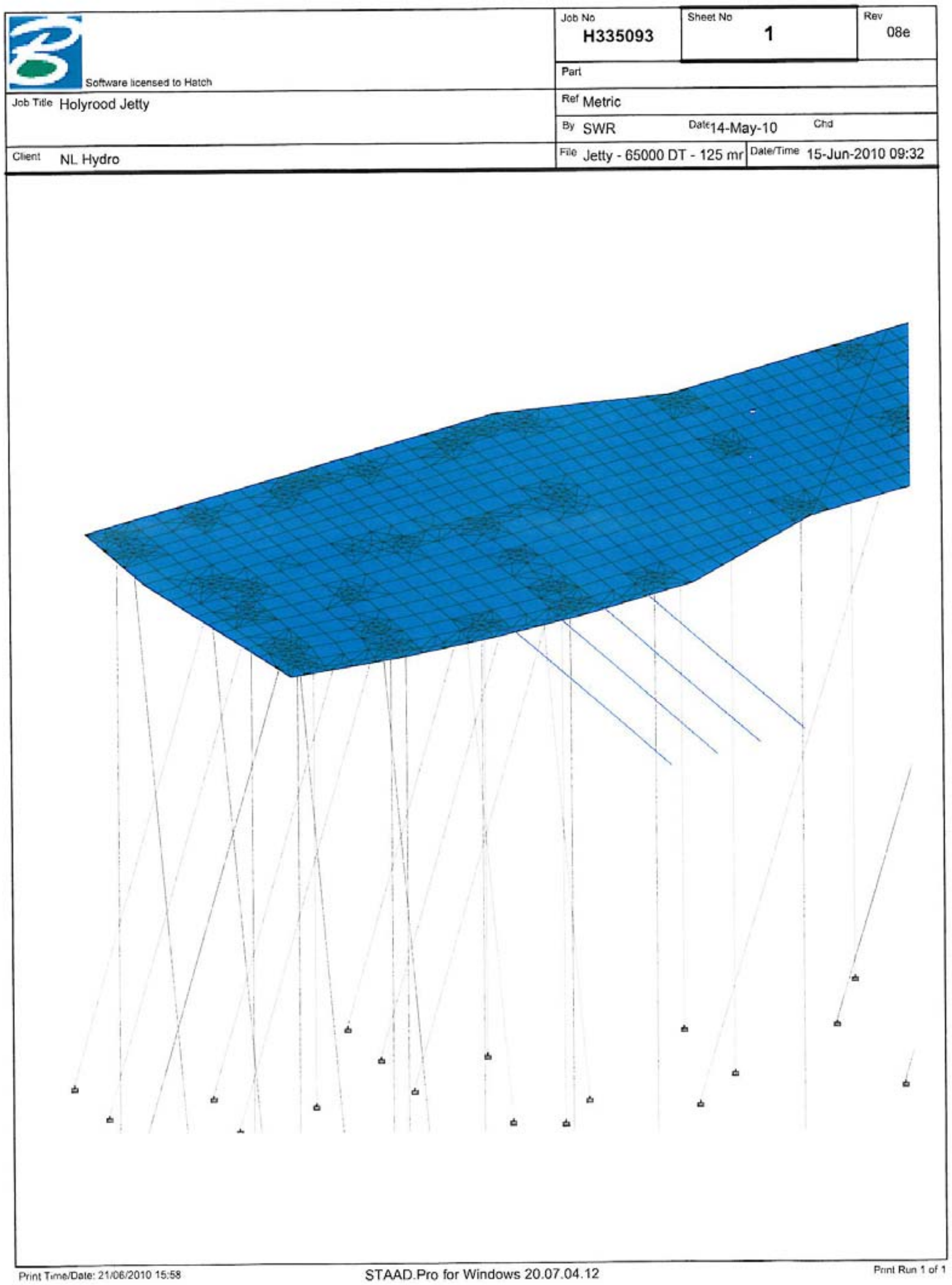
Print Run 1 of 1



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Job No H335093

Sheet No 1

Rev 08e

Part

Ref Metric

By SWR

Date 14-May-10

Chd

File Jetty - 65000 DT - 125 mr

Date/Time 15-Jun-2010 09:32

Job Title Holyrood Jetty

Client NL Hydro

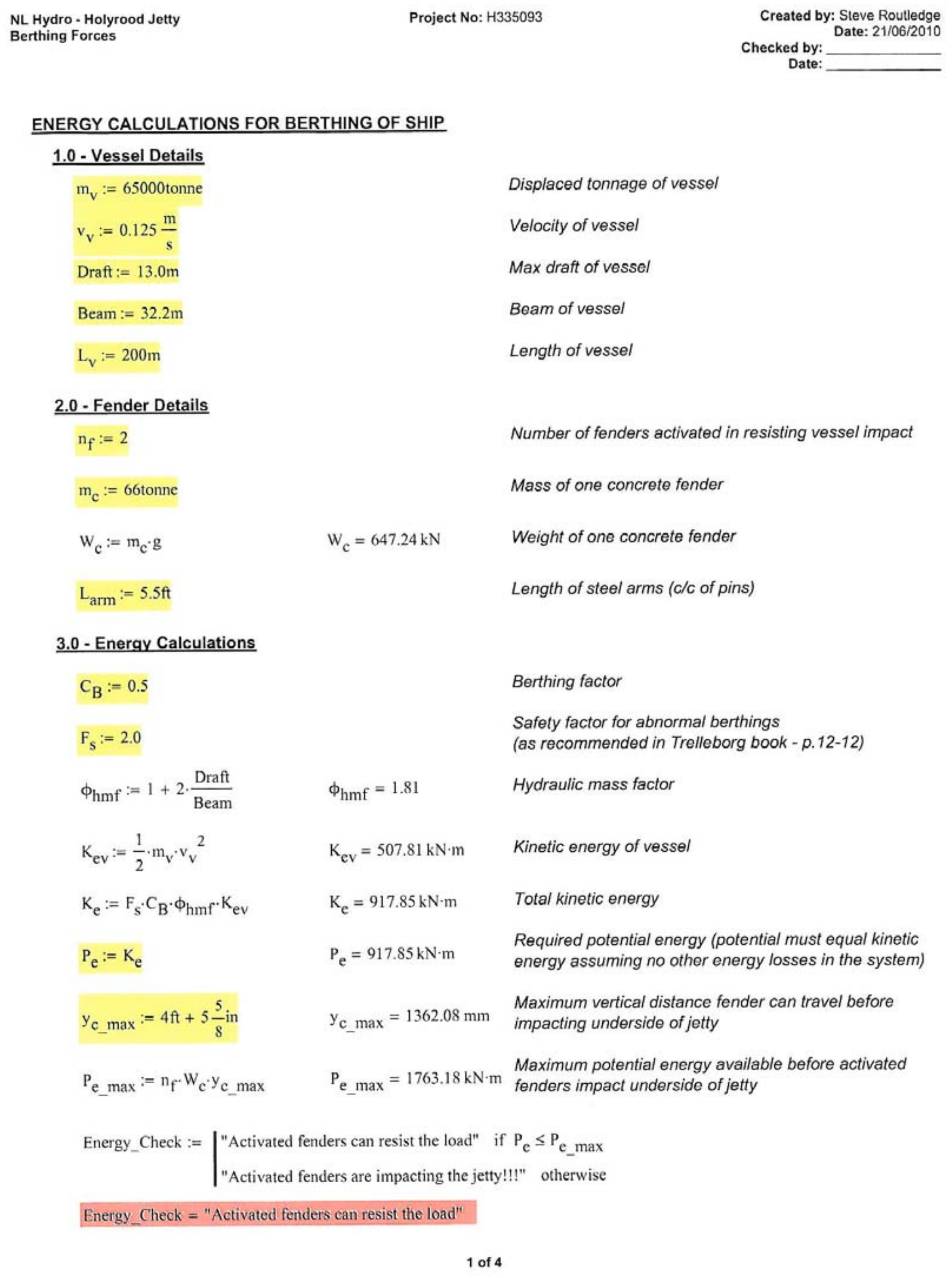
Print Time/Date: 21/06/2010 15:58

STAAD.Pro for Windows 20.07.04.12

Print Run 1 of 1

Appendix B

Fender Berthing Loads Calculation



ENERGY CALCULATIONS FOR BERTHING OF SHIP

1.0 - Vessel Details

$m_v := 65000\text{tonne}$		*Displaced tonnage of vessel*
$v_v := 0.125\,\frac{m}{s}$		*Velocity of vessel*
$\text{Draft} := 13.0\text{m}$		*Max draft of vessel*
$\text{Beam} := 32.2\text{m}$		*Beam of vessel*
$L_v := 200\text{m}$		*Length of vessel*

2.0 - Fender Details

$n_f := 2$		*Number of fenders activated in resisting vessel impact*
$m_c := 66\text{tonne}$		*Mass of one concrete fender*
$W_c := m_c \cdot g$	$W_c = 647.24\,\text{kN}$	*Weight of one concrete fender*
$L_{arm} := 5.5\text{ft}$		*Length of steel arms (c/c of pins)*

3.0 - Energy Calculations

$C_B := 0.5$		*Berthing factor*
$F_s := 2.0$		*Safety factor for abnormal berthings* *(as recommended in Trelleborg book - p.12-12)*
$\phi_{hmf} := 1 + 2\cdot\frac{\text{Draft}}{\text{Beam}}$	$\phi_{hmf} = 1.81$	*Hydraulic mass factor*
$K_{ev} := \frac{1}{2}\cdot m_v \cdot {v_v}^2$	$K_{ev} = 507.81\,\text{kN}\cdot\text{m}$	*Kinetic energy of vessel*
$K_e := F_s \cdot C_B \cdot \phi_{hmf} \cdot K_{ev}$	$K_e = 917.85\,\text{kN}\cdot\text{m}$	*Total kinetic energy*
$P_e := K_e$	$P_e = 917.85\,\text{kN}\cdot\text{m}$	*Required potential energy (potential must equal kinetic energy assuming no other energy losses in the system)*
$y_{c\_max} := 4\text{ft} + 5\frac{5}{8}\text{in}$	$y_{c\_max} = 1362.08\,\text{mm}$	*Maximum vertical distance fender can travel before impacting underside of jetty*
$P_{e\_max} := n_f \cdot W_c \cdot y_{c\_max}$	$P_{e\_max} = 1763.18\,\text{kN}\cdot\text{m}$	*Maximum potential energy available before activated fenders impact underside of jetty*

$$\text{Energy\_Check} := \left| \begin{array}{ll} \text{"Activated fenders can resist the load"} & \text{if } P_e \le P_{e\_max} \\ \text{"Activated fenders are impacting the jetty!!!"} & \text{otherwise} \end{array} \right.$$

$\text{Energy\_Check} = \text{"Activated fenders can resist the load"}$

4.0 - Displacement Calculations

$y_c := \frac{P_e}{n_f \cdot W_c}$ $y_c = 709.05\,\text{mm}$ *Total required vertical rise of activated fenders from equilibrium (when arms are vertical)*

$\theta := \text{acos}\left(1 - \frac{y_c}{L_{arm}}\right)$ $\theta = 54.76 \cdot \text{deg}$ *Total required arm rotation from vertical*

$x_c := L_{arm} \cdot \sin(\theta)$ $x_c = 1369.14\,\text{mm}$ *Total required horizontal displacement of fender*

$x_{ci} := 7\text{in}$ $x_{ci} = 177.8\,\text{mm}$ *Initial horizontal displacement of fender due to retraction chains*

$\Delta_x := x_c - x_{ci}$ $\Delta_x = 1191.34\,\text{mm}$ *Relative horizontal displacement of fender*

5.0 - Static Force Calculations

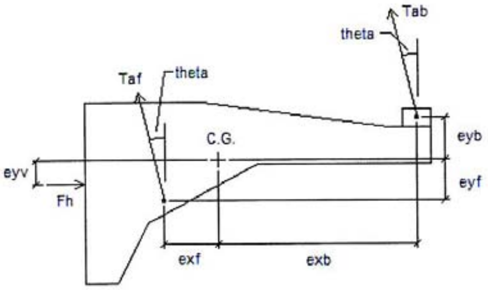
$e_{xf} := 3\text{ft} + 4\frac{5}{8}\text{in}$ $e_{xf} = 1031.88\,\text{mm}$

$e_{yf} := 2\text{ft} + 7\frac{5}{8}\text{in}$ $e_{yf} = 803.27\,\text{mm}$

$e_{xb} := 20\text{ft} + 0\frac{3}{8}\text{in}$ $e_{xb} = 6105.52\,\text{mm}$

$e_{yb} := 3\text{ft} + 10\frac{3}{8}\text{in}$ $e_{yb} = 1177.93\,\text{mm}$

$e_{yv} := 2\text{ft} + 7\frac{5}{8}\text{in}$ $e_{yv} = 803.27\,\text{mm}$



5.1 - Summation of moments about front support hinge

$$T_{ab} := \frac{W_c \cdot e_{xf}}{(e_{xf} + e_{xb}) \cdot \cos(\theta) + (e_{yf} + e_{yb}) \cdot \sin(\theta)}$$

<--- $e_{yv} = e_{yf}$, therefore F_h has no component in the summation of moments calculation

$T_{ab} = 116.42\,\text{kN}$ *Axial force in rear arm*

5.2 - Summation of forces in Y-axis

$$T_{af} := \frac{\frac{W_c}{\cos(\theta)} - T_{ab}}{2}$$

$T_{af} = 502.61\,\text{kN}$ *Axial force in each front arm*

5.3 - Summation of forces in X-axis

$$F_h := 2 \cdot T_{af} \cdot \sin(\theta) + T_{ab} \cdot \sin(\theta)$$

$F_h = 916.07\,\text{kN}$ *Horizontal force on each fender at max displacement*

NL Hydro - Holyrood Jetty
Berthing Forces

Project No: H335093

Created by: Steve Routledge
Date: 21/06/2010
Checked by: ______________
Date: ______________

6.0 - Fender Arm Capacity

$t := 1\frac{3}{8}\text{in}$	*Thickness of arm*
$b := 18\text{in}$	*Width of arm*
$d := 6\text{in}$	*Diameter of pin*
$d_h := 6\frac{1}{16}\text{in}$	*Diameter of hole for pin*
$e_p := 10\text{in}$	*Distance from centre of pin to end of arm*
$F_y := 230\text{MPa}$	*Yield strength of arm*
$F_u := 400\text{MPa}$	*Ultimate strength of arm*
$\phi_s := 0.9$	*Steel resistance factor*
$\phi_{br} := 0.67$	*Bearing resistance factor*

6.1 - Gross Tension

$A_{tg} := t \cdot b$	$A_{tg} = 15967.71\ \text{mm}^2$	*Gross tensile area*
$T_{tg} := \phi_s \cdot A_{tg} \cdot F_y$	$T_{tg} = 3305.32\ \text{kN}$	*Gross tensile capacity*

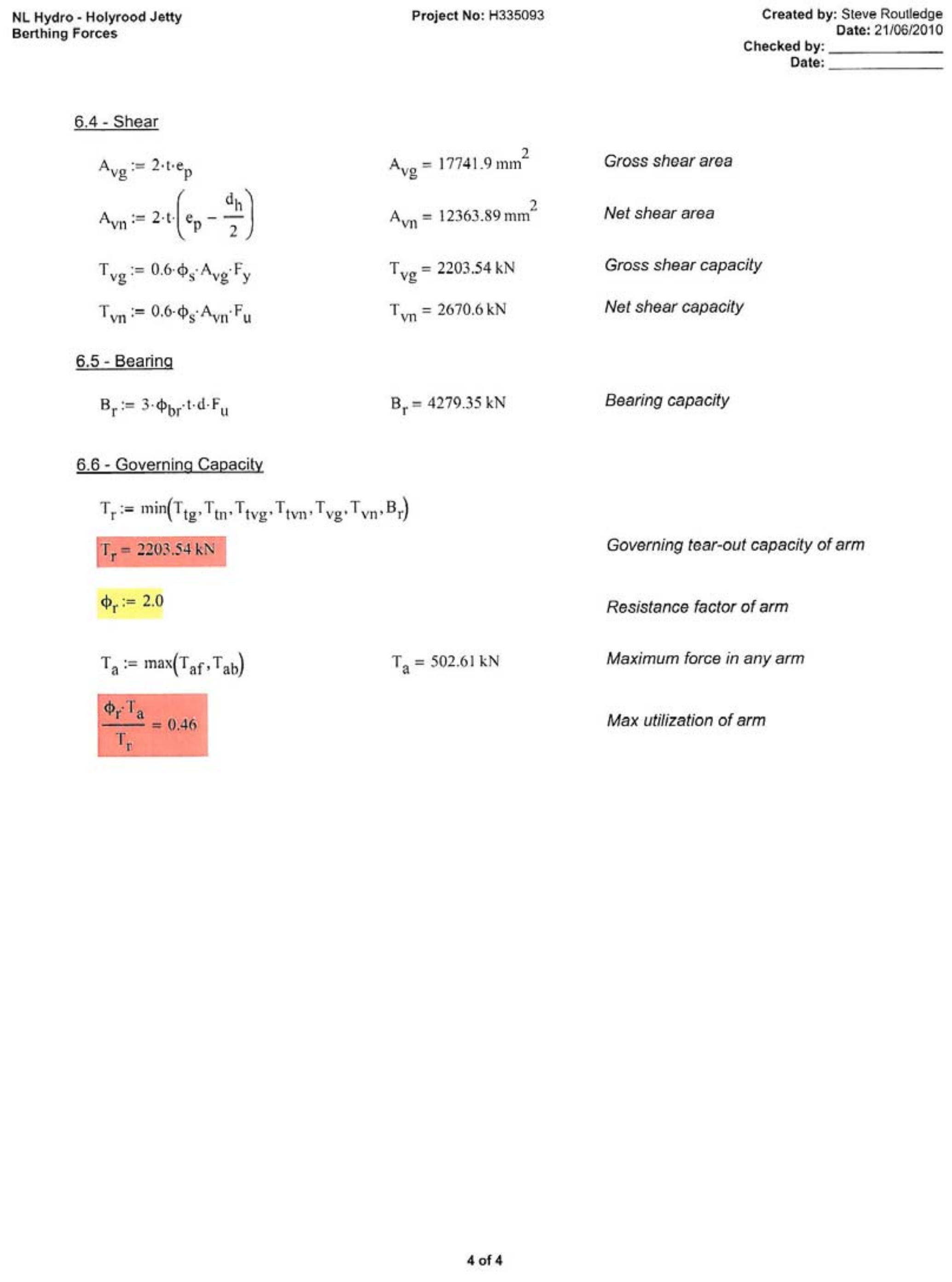
6.2 - Net Tension

$A_{tn} := t \cdot (b - d_h)$	$A_{tn} = 10589.7\ \text{mm}^2$	*Net tensile area*
$T_{tn} := 0.85 \cdot \phi_s \cdot A_{tn} \cdot F_u$	$T_{tn} = 3240.45\ \text{kN}$	*Net tensile capacity*

6.3 - Shear/Tension

$A_{tn} := t \cdot \frac{(b - d_h)}{2}$	$A_{tn} = 5294.85\ \text{mm}^2$	*Net tensile area*
$A_{vg} := t \cdot e_p$	$A_{vg} = 8870.95\ \text{mm}^2$	*Gross shear area*
$A_{vn} := t \cdot \left(e_p - \frac{d_h}{2}\right)$	$A_{vn} = 6181.94\ \text{mm}^2$	*Net shear area*
$T_{tvg} := \phi_s \cdot A_{tn} \cdot F_u + 0.6 \cdot \phi_s \cdot A_{vg} \cdot F_y$	$T_{tvg} = 3007.92\ \text{kN}$	*Net tensile / gross shear tear-out capacity*
$T_{tvn} := \phi_s \cdot A_{tn} \cdot F_u + 0.6 \cdot \phi_s \cdot A_{vn} \cdot F_u$	$T_{tvn} = 3241.45\ \text{kN}$	*Net tensile / net shear tear-out capacity*

3 of 4



NL Hydro - Holyrood Jetty
Berthing Forces

Project No: H335093

Created by: Steve Routledge
Date: 21/06/2010
Checked by: ______________
Date: ______________

6.4 - Shear

$A_{vg} := 2 \cdot t \cdot e_p$	$A_{vg} = 17741.9\,\text{mm}^2$	*Gross shear area*
$A_{vn} := 2 \cdot t \cdot \left(e_p - \frac{d_h}{2}\right)$	$A_{vn} = 12363.89\,\text{mm}^2$	*Net shear area*
$T_{vg} := 0.6 \cdot \phi_s \cdot A_{vg} \cdot F_y$	$T_{vg} = 2203.54\,\text{kN}$	*Gross shear capacity*
$T_{vn} := 0.6 \cdot \phi_s \cdot A_{vn} \cdot F_u$	$T_{vn} = 2670.6\,\text{kN}$	*Net shear capacity*

6.5 - Bearing

$B_r := 3 \cdot \phi_{br} \cdot t \cdot d \cdot F_u$	$B_r = 4279.35\,\text{kN}$	*Bearing capacity*

6.6 - Governing Capacity

$T_r := \min\left(T_{tg}, T_{tn}, T_{tvg}, T_{tvn}, T_{vg}, T_{vn}, B_r\right)$

$T_r = 2203.54\,\text{kN}$		*Governing tear-out capacity of arm*
$\phi_r := 2.0$		*Resistance factor of arm*
$T_a := \max\left(T_{af}, T_{ab}\right)$	$T_a = 502.61\,\text{kN}$	*Maximum force in any arm*
$\frac{\phi_r \cdot T_a}{T_r} = 0.46$		*Max utilization of arm*

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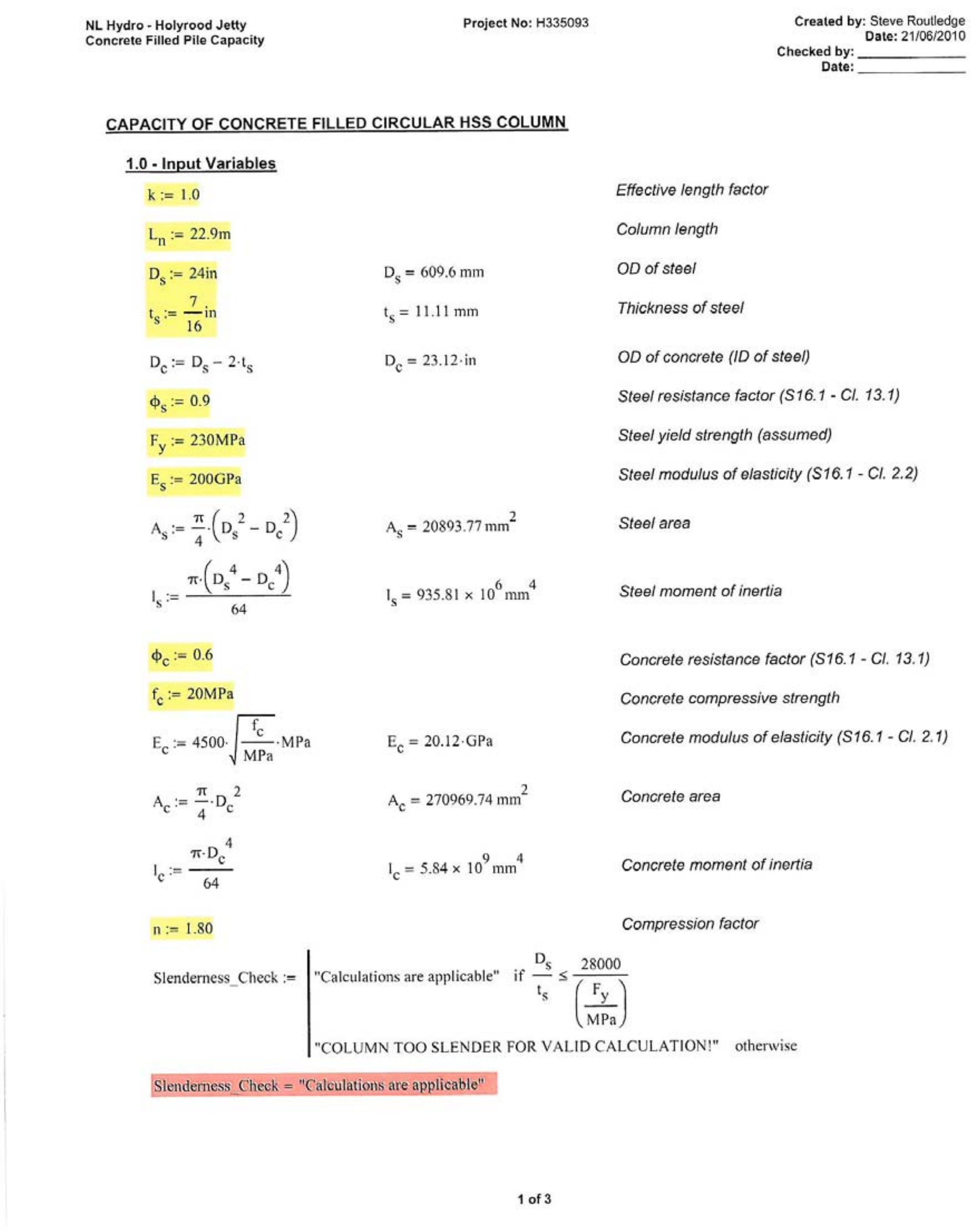
Appendix C

Pile Capacity Calculation



NL Hydro - Holyrood Jetty
Concrete Filled Pile Capacity

Project No: H335093

Created by: Steve Routledge
Date: 21/06/2010
Checked by: ______________
Date: ______________

CAPACITY OF CONCRETE FILLED CIRCULAR HSS COLUMN

1.0 - Input Variables

$k := 1.0$		*Effective length factor*
$L_n := 22.9\text{m}$		*Column length*
$D_s := 24\text{in}$	$D_s = 609.6\ \text{mm}$	*OD of steel*
$t_s := \frac{7}{16}\text{in}$	$t_s = 11.11\ \text{mm}$	*Thickness of steel*
$D_c := D_s - 2 \cdot t_s$	$D_c = 23.12 \cdot \text{in}$	*OD of concrete (ID of steel)*
$\phi_s := 0.9$		*Steel resistance factor (S16.1 - Cl. 13.1)*
$F_y := 230\text{MPa}$		*Steel yield strength (assumed)*
$E_s := 200\text{GPa}$		*Steel modulus of elasticity (S16.1 - Cl. 2.2)*
$A_s := \frac{\pi}{4} \cdot \left(D_s^{\ 2} - D_c^{\ 2}\right)$	$A_s = 20893.77\ \text{mm}^2$	*Steel area*
$I_s := \frac{\pi \cdot \left(D_s^{\ 4} - D_c^{\ 4}\right)}{64}$	$I_s = 935.81 \times 10^6\ \text{mm}^4$	*Steel moment of inertia*
$\phi_c := 0.6$		*Concrete resistance factor (S16.1 - Cl. 13.1)*
$f_c := 20\text{MPa}$		*Concrete compressive strength*
$E_c := 4500 \cdot \sqrt{\frac{f_c}{\text{MPa}}} \cdot \text{MPa}$	$E_c = 20.12 \cdot \text{GPa}$	*Concrete modulus of elasticity (S16.1 - Cl. 2.1)*
$A_c := \frac{\pi}{4} \cdot D_c^{\ 2}$	$A_c = 270969.74\ \text{mm}^2$	*Concrete area*
$I_c := \frac{\pi \cdot D_c^{\ 4}}{64}$	$I_c = 5.84 \times 10^9\ \text{mm}^4$	*Concrete moment of inertia*
$n := 1.80$		*Compression factor*

$$\text{Slenderness\_Check} := \left| \begin{array}{l} \text{"Calculations are applicable"} \quad \text{if } \frac{D_s}{t_s} \le \frac{28000}{\left(\frac{F_y}{\text{MPa}}\right)} \\ \text{"COLUMN TOO SLENDER FOR VALID CALCULATION!"} \quad \text{otherwise} \end{array} \right.$$

$\text{Slenderness\_Check} = \text{"Calculations are applicable"}$

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NL Hydro - Holyrood Jetty
Concrete Filled Pile Capacity

Project No: H335093

Created by: Steve Routledge
Date: 21/06/2010
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Date: ______________

2.0 - Calculate Compressive Resistance (S16.1 - Cl. 18.2.2)

2.1 - Computed Variables

$$\rho := 0.02\cdot\left(25 - \frac{L_n}{D_s}\right) \qquad \rho = -0.25$$

Compression factor

$$\tau := \left| \begin{array}{l} \left(\dfrac{1}{\sqrt{1+\rho+\rho^2}}\right) \text{ if } \dfrac{L_n}{D_s} < 25 \\ 1.0 \text{ otherwise} \end{array} \right.$$

Compression factor for steel

$$\tau = 1$$

$$\tau' := \left| \begin{array}{l} \left[1 + \left[\dfrac{25\cdot\rho^2\cdot\tau}{\left(\dfrac{D_s}{t_s}\right)}\right]\cdot\left(\dfrac{F_y}{0.85 f_c}\right)\right] \text{ if } \dfrac{L_n}{D_s} < 25 \\ 1.0 \text{ otherwise} \end{array} \right.$$

Compression factor for concrete

$$\tau' = 1$$

$$C_p := \left[\tau\cdot(1.0)\cdot A_s\cdot F_y + \tau'\cdot 0.85\cdot(1.0)\cdot A_c\cdot f_c\right]\cdot\left[1 + (0)^{2\cdot n}\right]^{-\frac{1}{n}}$$

$$C_p = 9412.05\text{ kN}$$

Idealized compression resistance

$$\%DL_f := \frac{2}{3}$$

Ratio of sustained (dead) load to total load (assumed)

$$EI_e := E_s\cdot I_s + \frac{0.6\cdot E_c\cdot I_c}{1 + \%DL_f} \qquad EI_e = 229.49\times 10^{12}\cdot\text{N}\cdot\text{mm}^2$$

Effective inertia for column

$$C_{ec} := \frac{\pi^2\cdot EI_e}{\left(k\cdot L_n\right)^2} \qquad C_{ec} = 4319.15\text{ kN}$$

Euler compression resistance

$$\lambda := \sqrt{\frac{C_p}{C_{ec}}} \qquad \lambda = 1.48$$

Compression factor

2.2 - Compression Resistance

$$C_{rc} := \left(\tau\cdot\phi_s\cdot A_s\cdot F_y + \tau'\cdot 0.85\cdot\phi_c\cdot A_c\cdot f_c\right)\cdot\left(1 + \lambda^{2\cdot n}\right)^{-\frac{1}{n}}$$

$$C_{rc} = 2878.79\text{ kN}$$

Compression resistance of composite column

$$\phi_r := 1.5$$

Overall compression resistance factor

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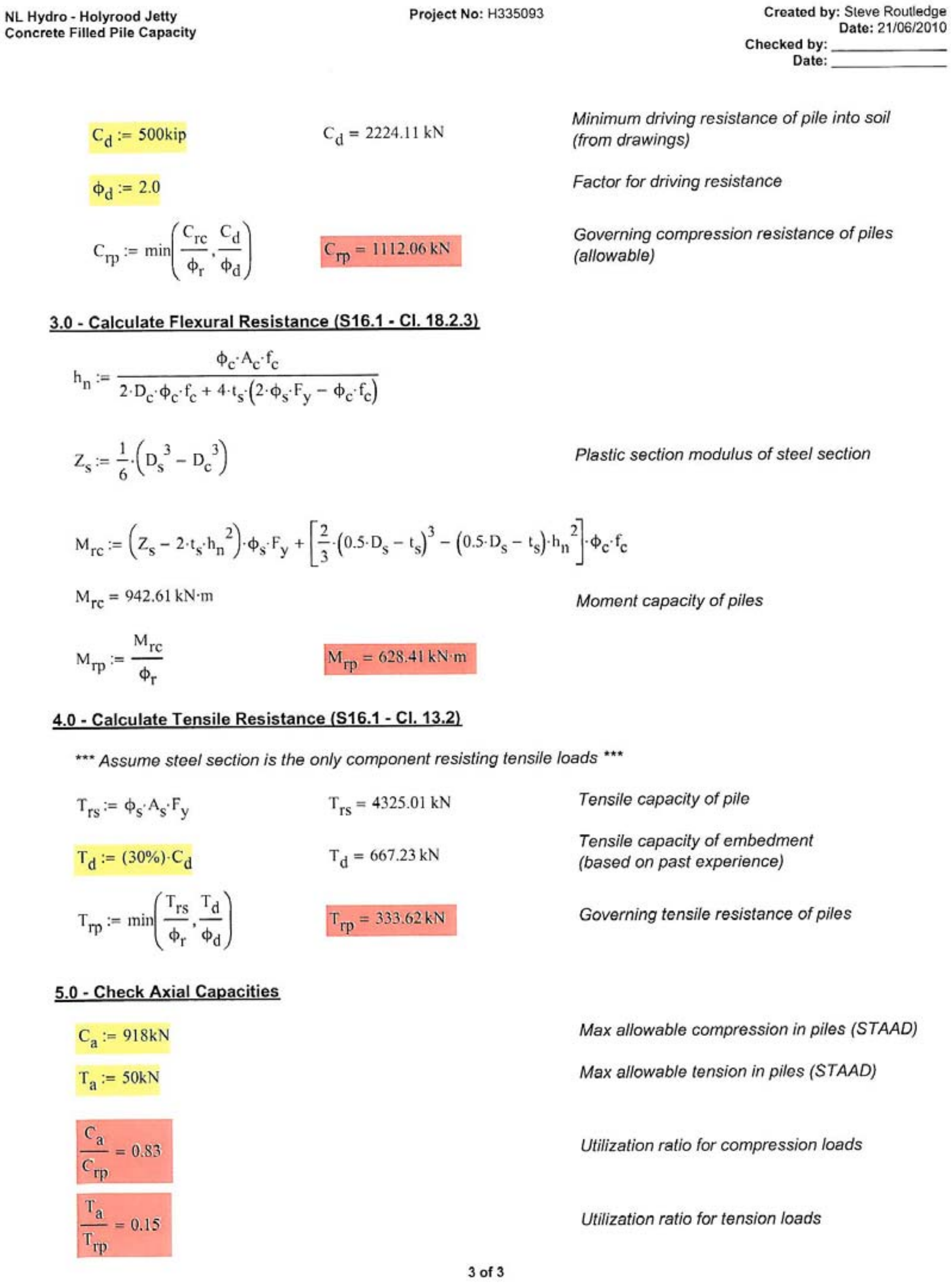

NL Hydro - Holyrood Jetty
Concrete Filled Pile Capacity

Project No: H335093

Created by: Steve Routledge
Date: 21/06/2010
Checked by: ______________
Date: ______________

$C_d := 500\text{kip}$ $\quad C_d = 2224.11\ \text{kN}$ — *Minimum driving resistance of pile into soil (from drawings)*

$\phi_d := 2.0$ — *Factor for driving resistance*

$C_{rp} := \min\left(\frac{C_{rc}}{\phi_r}, \frac{C_d}{\phi_d}\right)$ $\quad C_{rp} = 1112.06\ \text{kN}$ — *Governing compression resistance of piles (allowable)*

3.0 - Calculate Flexural Resistance (S16.1 - Cl. 18.2.3)

$$h_n := \frac{\phi_c \cdot A_c \cdot f_c}{2 \cdot D_c \cdot \phi_c \cdot f_c + 4 \cdot t_s \cdot (2 \cdot \phi_s \cdot F_y - \phi_c \cdot f_c)}$$

$$Z_s := \frac{1}{6} \cdot \left(D_s^3 - D_c^3\right)$$

Plastic section modulus of steel section

$$M_{rc} := \left(Z_s - 2 \cdot t_s \cdot h_n^2\right) \cdot \phi_s \cdot F_y + \left[\frac{2}{3} \cdot (0.5 \cdot D_s - t_s)^3 - (0.5 \cdot D_s - t_s) \cdot h_n^2\right] \cdot \phi_c \cdot f_c$$

$M_{rc} = 942.61\ \text{kN} \cdot \text{m}$ — *Moment capacity of piles*

$M_{rp} := \frac{M_{rc}}{\phi_r}$ $\quad M_{rp} = 628.41\ \text{kN} \cdot \text{m}$

4.0 - Calculate Tensile Resistance (S16.1 - Cl. 13.2)

*** *Assume steel section is the only component resisting tensile loads* ***

$T_{rs} := \phi_s \cdot A_s \cdot F_y$ $\quad T_{rs} = 4325.01\ \text{kN}$ — *Tensile capacity of pile*

$T_d := (30\%) \cdot C_d$ $\quad T_d = 667.23\ \text{kN}$ — *Tensile capacity of embedment (based on past experience)*

$T_{rp} := \min\left(\frac{T_{rs}}{\phi_r}, \frac{T_d}{\phi_d}\right)$ $\quad T_{rp} = 333.62\ \text{kN}$ — *Governing tensile resistance of piles*

5.0 - Check Axial Capacities

$C_a := 918\text{kN}$ — *Max allowable compression in piles (STAAD)*

$T_a := 50\text{kN}$ — *Max allowable tension in piles (STAAD)*

$\frac{C_a}{C_{rp}} = 0.83$ — *Utilization ratio for compression loads*

$\frac{T_a}{T_{rp}} = 0.15$ — *Utilization ratio for tension loads*

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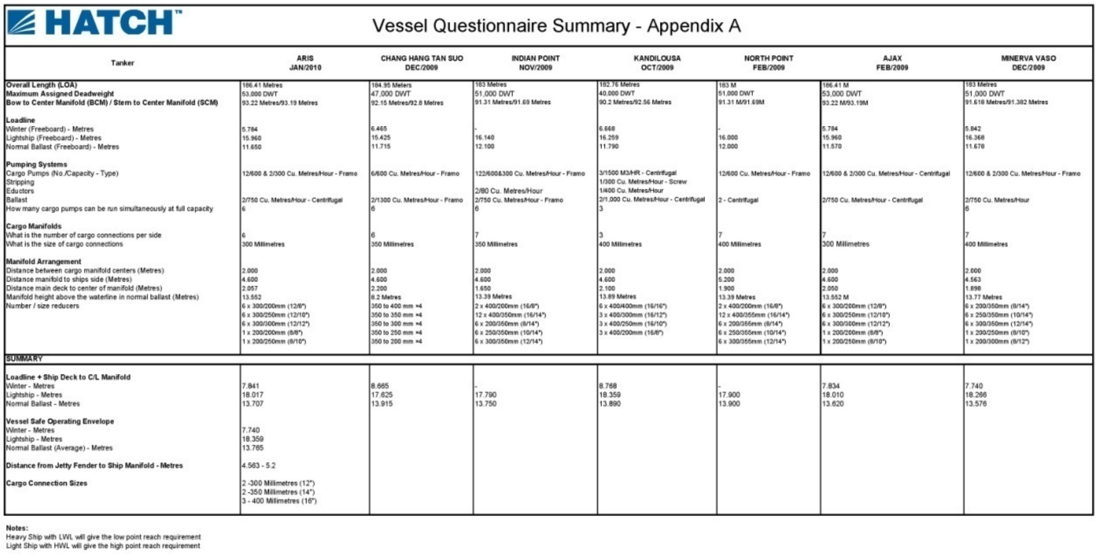
Appendix C

Intertanko's Standard Tanker Chartering Questionnaire 88 (Q88) Summary



Vessel Questionnaire Summary - Appendix A

Tanker	ARIS JAN/2010	CHANG HANG TAN SUO DEC/2009	INDIAN POINT NOV/2009	KANDILOUSA OCT/2009	NORTH POINT FEB/2009	AJAX FEB/2009	MINERVA VASO DEC/2009
Overall Length (LOA)	186.41 Metres	184.95 Meters	183 Metres	182.76 Metres	183 M	186.41 M	183 Metres
Maximum Assigned Deadweight	53,000 DWT	47,000 DWT	51,000 DWT	40,000 DWT	51,000 DWT	53,000 DWT	51,000 DWT
Bow to Center Manifold (BCM) / Stern to Center Manifold (SCM)	93.22 Metres/93.19 Metres	92.15 Metres/92.8 Metres	91.31 Metres/91.69 Metres	90.2 Metres/92.56 Metres	91.31 M/91.69M	93.22 M/93.19M	91.618 Metres/91.382 Metres
Loadline							
Winter (Freeboard) - Metres	5.784	6.465	-	6.668	-	5.784	5.842
Lightship (Freeboard) - Metres	15.960	15.425	16.140	16.259	16.000	15.960	16.368
Normal Ballast (Freeboard) - Metres	11.650	11.715	12.100	11.790	12.000	11.570	11.678
Pumping Systems							
Cargo Pumps (No./Capacity - Type)	12/600 & 2/300 Cu. Metres/Hour - Framo	6/600 Cu. Metres/Hour - Framo	122/600&300 Cu. Metres/Hour - Framo	3/1500 M3/HR - Centrifugal	12/600 Cu. Metres/Hour - Framo	12/600 & 2/300 Cu. Metres/Hour - Centrifugal	12/600 & 2/300 Cu. Metres/Hour - Framo
Stripping				1/300 Cu. Metres/Hour - Screw			
Eductors			2/80 Cu. Metres/Hour	1/400 Cu. Metres/Hour			
Ballast	2/750 Cu. Metres/Hour - Centrifugal	2/1300 Cu. Metres/Hour - Framo	2/750 Cu. Metres/Hour - Framo	2/1,000 Cu. Metres/Hour - Centrifugal	2 - Centrifugal	2/750 Cu. Metres/Hour - Centrifugal	2/750 Cu. Metres/Hour
How many cargo pumps can be run simultaneously at full capacity	6	6	6	3			6
Cargo Manifolds							
What is the number of cargo connections per side	6	6	7	3	7	7	7
What is the size of cargo connections	300 Millimetres	350 Millimetres	350 Millimetres	400 Millimetres	400 Millimetres	300 Millimetres	400 Millimetres
Manifold Arrangement							
Distance between cargo manifold centers (Metres)	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Distance manifold to ships side (Metres)	4.600	4.600	4.600	4.600	5.200	4.600	4.563
Distance main deck to center of manifold (Metres)	2.057	2.200	1.650	2.100	1.900	2.050	1.898
Manifold height above the waterline in normal ballast (Metres)	13.552	8.2 Metres	13.39 Metres	13.89 Metres	13.39 Metres	13.552 M	13.77 Metres
Number / size reducers	6 x 300/200mm (12/8") 6 x 300/250mm (12/10") 6 x 300/300mm (12/12") 1 x 200/200mm (8/8") 1 x 200/250mm (8/10")	350 to 400 mm ×4 350 to 350 mm ×4 350 to 300 mm ×4 350 to 250 mm ×4 350 to 200 mm ×4	2 x 400/200mm (16/8") 12 x 400/350mm (16/14") 6 x 200/350mm (8/14") 6 x 250/350mm (10/14") 6 x 300/350mm (12/14")	6 x 400/400mm (16/16") 3 x 400/300mm (16/12") 3 x 400/250mm (16/10") 3 x 400/200mm (16/8")	2 x 400/200mm (16/8") 12 x 400/355mm (16/14") 6 x 200/355mm (8/14") 6 x 250/355mm (10/14") 6 x 300/355mm (12/14")	6 x 300/200mm (12/8") 6 x 300/250mm (12/10") 6 x 300/300mm (12/12") 1 x 200/200mm (8/8") 1 x 200/250mm (8/10")	6 x 200/350mm (8/14") 6 x 250/350mm (10/14") 6 x 300/350mm (12/14") 1 x 200/250mm (8/10") 1 x 200/300mm (8/12")
SUMMARY							
Loadline + Ship Deck to C/L Manifold							
Winter - Metres	7.841	8.665	-	8.768	-	7.834	7.740
Lightship - Metres	18.017	17.625	17.790	18.359	17.900	18.010	18.266
Normal Ballast - Metres	13.707	13.915	13.750	13.890	13.900	13.620	13.576
Vessel Safe Operating Envelope							
Winter - Metres	7.740						
Lightship - Metres	18.359						
Normal Ballast (Average) - Metres	13.765						
Distance from Jetty Fender to Ship Manifold - Metres	4.563 - 5.2						
Cargo Connection Sizes	2 -300 Millimetres (12") 2 -350 Millimetres (14") 3 - 400 Millimetres (16")						

Notes:
Heavy Ship with LWL will give the low point reach requirement
Light Ship with HWL will give the high point reach requirement

Appendix D

Holyrood Tide Information

ST JOHN'S NST Z+3.5 **2010** **TIDE TABLES**

January-janvier

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0107	1.3	0.4	16	0158	1.3	0.4
	0743	5.2	1.6		0813	4.6	1.4
FR	1423	0.7	0.2	SA	1448	1.3	0.4
VE	2013	3.9	1.2	SA	2050	3.6	1.1
2	0203	1.3	0.4	17	0232	1.3	0.4
	0832	5.2	1.6		0840	4.6	1.4
SA	1510	0.7	0.2	SU	1514	1.3	0.4
SA	2106	3.9	1.2	DI	2121	3.9	1.2
3	0259	1.3	0.4	18	0303	1.3	0.4
	0919	5.2	1.6		0906	4.6	1.4
SU	1557	0.7	0.2	MO	1539	1.3	0.4
DI	2155	4.3	1.3	LU	2150	3.9	1.2
4	0353	1.3	0.4	19	0336	1.6	0.5
	1006	4.9	1.5		0934	4.6	1.4
MO	1645	1.0	0.3	TU	1605	1.3	0.4
LU	2242	4.3	1.3	MA	2217	3.9	1.2
5	0447	1.3	0.4	20	0410	1.6	0.5
	1051	4.6	1.4		1005	4.3	1.3
TU	1732	1.0	0.3	WE	1633	1.6	0.5
MA	2326	4.3	1.3	ME	2246	3.9	1.2
6	0540	1.6	0.5	21	0448	1.6	0.5
	1137	4.3	1.3		1039	4.3	1.3
WE	1819	1.3	0.4	TH	1704	1.6	0.5
ME				JE	2317	3.9	1.2
7	0011	3.9	1.2	22	0532	1.6	0.5
	0633	1.6	0.5		1118	3.9	1.2
TH	1226	3.9	1.2	FR	1739	1.6	0.5
JE	1906	1.6	0.5	VE	2354	3.6	1.1
8	0057	3.9	1.2	23	0629	2.0	0.6
	0733	2.0	0.6		1203	3.6	1.1
FR	1323	3.3	1.0	SA	1822	2.0	0.6
VE	1952	1.6	0.5	SA			
9	0151	3.9	1.2	24	0042	3.6	1.1
	0846	2.0	0.6		0743	2.0	0.6
SA	1440	3.0	0.9	SU	1301	3.3	1.0
SA	2041	2.0	0.6	DI	1916	2.0	0.6
10	0255	3.9	1.2	25	0150	3.6	1.1
	1013	2.0	0.6		0909	2.0	0.6
SU	1611	3.0	0.9	MO	1421	3.0	0.9
DI	2136	2.0	0.6	LU	2020	2.0	0.6
11	0406	3.9	1.2	26	0315	3.9	1.2
	1129	1.6	0.5		1030	2.0	0.6
MO	1722	3.0	0.9	TU	1556	3.0	0.9
LU	2239	2.0	0.6	MA	2133	2.0	0.6
12	0515	3.9	1.2	27	0438	3.9	1.2
	1226	1.6	0.5		1135	1.6	0.5
TU	1815	3.0	0.9	WE	1714	3.3	1.0
MA	2343	1.6	0.5	ME	2251	1.6	0.5
13	0614	4.3	1.3	28	0546	4.6	1.4
	1310	1.3	0.4		1230	1.3	0.4
WE	1859	3.3	1.0	TH	1816	3.6	1.1
ME				JE			
14	0037	1.6	0.5	29	0004	1.6	0.5
	0702	4.3	1.3		0644	4.9	1.5
TH	1347	1.3	0.4	FR	1319	1.0	0.3
JE	1939	3.3	1.0	VE	1911	3.9	1.2
15	0121	1.6	0.5	30	0106	1.3	0.4
	0741	4.6	1.4		0735	5.2	1.6
FR	1419	1.3	0.4	SA	1406	0.7	0.2
VE	2016	3.6	1.1	SA	2003	4.3	1.3
				31	0202	1.0	0.3
					0822	5.2	1.6
				SU	1451	0.7	0.2
				DI	2052	4.3	1.3

February-février

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0253	1.0	0.3	16	0247	1.3	0.4
	0907	5.2	1.6		0843	4.6	1.4
MO	1535	0.7	0.2	TU	1503	1.3	0.4
LU	2137	4.6	1.4	MA	2119	3.9	1.2
2	0343	1.0	0.3	17	0319	1.3	0.4
	0951	4.9	1.5		0911	4.6	1.4
TU	1618	0.7	0.2	WE	1526	1.3	0.4
MA	2219	4.6	1.4	ME	2145	4.3	1.3
3	0431	1.0	0.3	18	0352	1.3	0.4
	1032	4.6	1.4		0942	4.3	1.3
WE	1659	1.0	0.3	TH	1550	1.3	0.4
ME	2258	4.6	1.4	JE	2213	4.3	1.3
4	0518	1.3	0.4	19	0429	1.3	0.4
	1112	4.3	1.3		1015	3.9	1.2
TH	1740	1.3	0.4	FR	1614	1.6	0.5
JE	2336	4.3	1.3	VE	2243	3.9	1.2
5	0607	1.6	0.5	20	0511	1.6	0.5
	1151	3.6	1.1		1050	3.6	1.1
FR	1821	1.6	0.5	SA	1639	1.6	0.5
VE				SA	2317	3.9	1.2
6	0014	4.3	1.3	21	0606	2.0	0.6
	0702	2.0	0.6		1130	3.3	1.0
SA	1235	3.3	1.0	SU	1715	2.0	0.6
SA	1904	2.0	0.6	DI			
7	0058	3.9	1.2	22	0001	3.9	1.2
	0814	2.0	0.6		0720	2.0	0.6
SU	1340	3.0	0.9	MO	1223	3.3	1.0
DI	1953	2.0	0.6	LU	1820	2.0	0.6
8	0201	3.6	1.1	23	0106	3.9	1.2
	0952	2.0	0.6		0846	2.0	0.6
MO	1550	2.6	0.8	TU	1345	3.0	0.9
LU	2057	2.3	0.7	MA	1949	2.0	0.6
9	0338	3.6	1.1	24	0245	3.6	1.1
	1121	2.0	0.6		1007	2.0	0.6
TU	1716	3.0	0.9	WE	1541	3.0	0.9
MA	2218	2.0	0.6	ME	2121	2.0	0.6
10	0510	3.9	1.2	25	0428	3.9	1.2
	1217	1.6	0.5		1113	1.6	0.5
WE	1806	3.0	0.9	TH	1707	3.3	1.0
ME	2335	2.0	0.6	JE	2250	2.0	0.6
11	0609	4.3	1.3	26	0539	4.3	1.3
	1257	1.6	0.5		1208	1.3	0.4
TH	1846	3.3	1.0	FR	1805	3.6	1.1
JE				VE			
12	0029	1.6	0.5	27	0004	1.6	0.5
	0651	4.3	1.3		0634	4.6	1.4
FR	1328	1.3	0.4	SA	1257	1.0	0.3
VE	1922	3.6	1.1	SA	1856	3.9	1.2
13	0110	1.3	0.4	28	0103	1.0	0.3
	0724	4.6	1.4		0721	4.9	1.5
SA	1355	1.3	0.4	SU	1342	0.7	0.2
SA	1955	3.6	1.1	DI	1944	4.3	1.3
14	0145	1.3	0.4				
	0752	4.6	1.4				
SU	1418	1.3	0.4				
DI	2026	3.9	1.2				
15	0216	1.3	0.4				
	0817	4.6	1.4				
MO	1440	1.3	0.4				
LU	2053	3.9	1.2				

March-mars

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0154	1.0	0.3	16	0157	1.0	0.3
	0806	4.9	1.5		0750	4.3	1.3
MO	1425	0.7	0.2	TU	1359	1.0	0.3
LU	2029	4.6	1.4	MA	2018	4.3	1.3
2	0241	0.7	0.2	17	0229	1.0	0.3
	0849	4.9	1.5		0818	4.3	1.3
TU	1506	0.7	0.2	WE	1423	1.0	0.3
MA	2112	4.6	1.4	ME	2045	4.3	1.3
3	0327	0.7	0.2	18	0302	1.0	0.3
	0930	4.9	1.5		0848	4.3	1.3
WE	1545	0.7	0.2	TH	1448	1.3	0.4
ME	2150	4.9	1.5	JE	2114	4.3	1.3
4	0411	1.0	0.3	19	0337	1.0	0.3
	1009	4.3	1.3		0921	3.9	1.2
TH	1622	1.0	0.3	FR	1513	1.3	0.4
JE	2226	4.6	1.4	VE	2145	4.3	1.3
5	0455	1.3	0.4	20	0417	1.3	0.4
	1046	3.9	1.2		0955	3.9	1.2
FR	1658	1.3	0.4	SA	1537	1.3	0.4
VE	2259	4.6	1.4	SA	2218	4.3	1.3
6	0541	1.6	0.5	21	0502	1.6	0.5
	1121	3.6	1.1		1032	3.6	1.1
SA	1734	1.6	0.5	SU	1604	1.6	0.5
SA	2333	4.3	1.3	DI	2255	4.3	1.3
7	0633	2.0	0.6	22	0558	1.6	0.5
	1159	3.3	1.0		1115	3.3	1.0
SU	1815	2.0	0.6	MO	1646	2.0	0.6
DI				LU	2339	3.9	1.2
8	0013	3.9	1.2	23	0708	2.0	0.6
	0742	2.3	0.7		1212	3.3	1.0
MO	1253	3.0	0.9	TU	1811	2.0	0.6
LU	1910	2.3	0.7	MA			
9	0111	3.6	1.1	24	0044	3.9	1.2
	0923	2.3	0.7		0827	2.0	0.6
TU	1532	3.0	0.9	WE	1339	3.0	0.9
MA	2024	2.3	0.7	ME	1948	2.3	0.7
10	0307	3.6	1.1	25	0230	3.6	1.1
	1058	2.3	0.7		0941	2.0	0.6
WE	1700	3.0	0.9	TH	1535	3.3	1.0
ME	2158	2.3	0.7	JE	2121	2.0	0.6
11	0458	3.6	1.1	26	0420	3.9	1.2
	1152	2.0	0.6		1045	1.6	0.5
TH	1744	3.3	1.0	FR	1651	3.6	1.1
JE	2321	2.0	0.6	VE	2250	1.6	0.5
12	0550	3.9	1.2	27	0526	4.3	1.3
	1227	1.6	0.5		1139	1.3	0.4
FR	1820	3.6	1.1	SA	1744	3.9	1.2
VE				SA	2358	1.3	0.4
13	0013	1.6	0.5	28	0616	4.6	1.4
	0626	4.3	1.3		1228	1.0	0.3
SA	1254	1.6	0.5	SU	1832	4.3	1.3
SA	1853	3.6	1.1	DI			
14	0052	1.3	0.4	29	0052	1.0	0.3
	0656	4.3	1.3		0702	4.6	1.4
SU	1316	1.3	0.4	MO	1312	0.7	0.2
DI	1923	3.9	1.2	LU	1918	4.6	1.4
15	0125	1.3	0.4	30	0140	0.7	0.2
	0723	4.3	1.3		0745	4.6	1.4
MO	1338	1.3	0.4	TU	1354	0.7	0.2
LU	1951	3.9	1.2	MA	2001	4.6	1.4
				31	0225	0.7	0.2
					0827	4.6	1.4
				WE	1432	0.7	0.2
				ME	2042	4.9	1.5

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TABLE DES MARÉES **2010** **ST JOHN'S** HNTN Z+3.5

April-avril

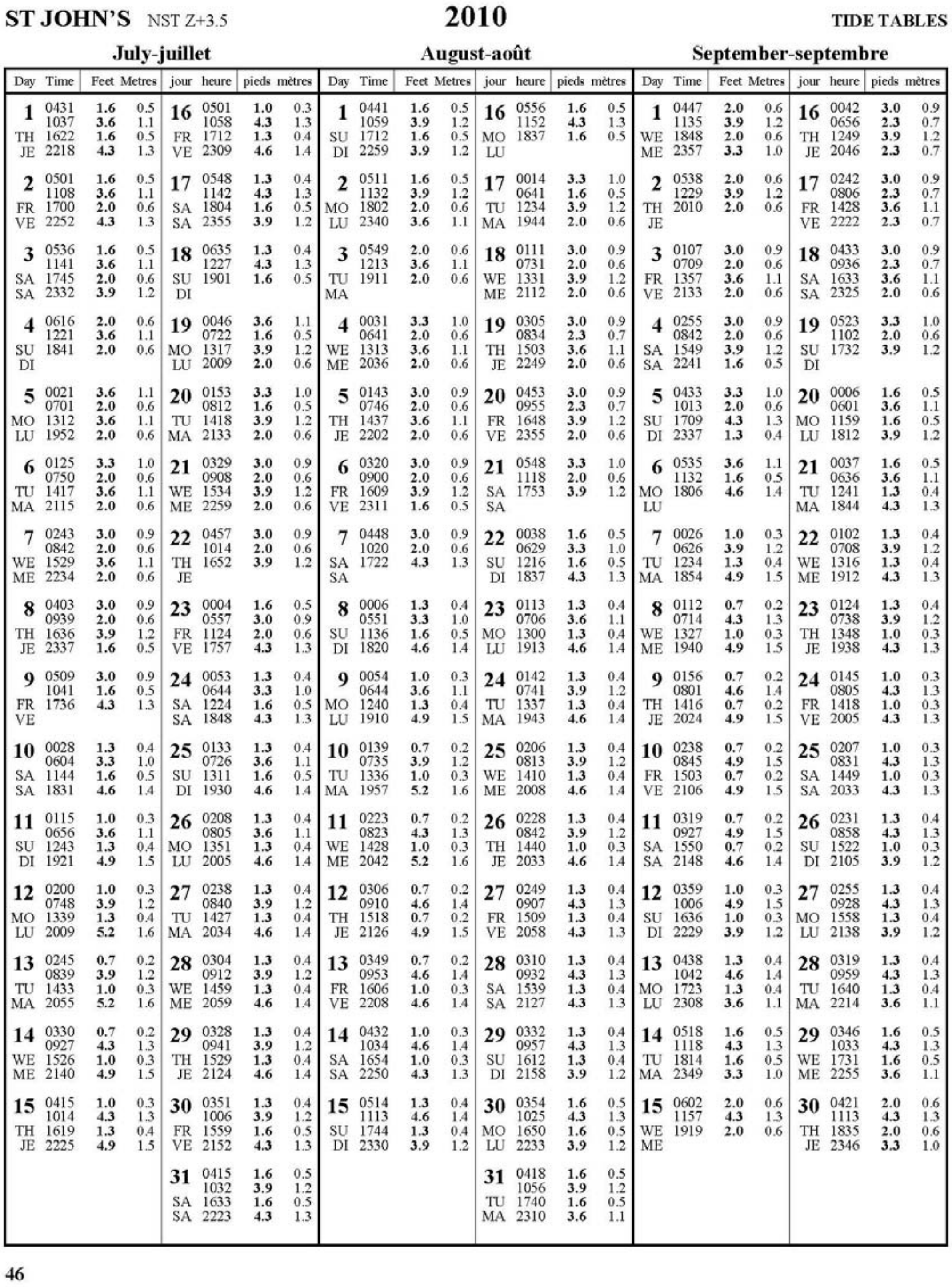
Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0308	0.7	0.2	16	0245	0.7	0.2
	0907	4.3	1.3		0826	3.9	1.2
TH	1509	1.0	0.3	FR	1415	1.0	0.3
JE	2120	4.9	1.5	VE	2048	4.6	1.4
2	0351	1.0	0.3	17	0325	1.0	0.3
	0946	3.9	1.2		0903	3.9	1.2
FR	1543	1.3	0.4	SA	1446	1.3	0.4
VE	2154	4.9	1.5	SA	2125	4.6	1.4
3	0433	1.3	0.4	18	0408	1.0	0.3
	1022	3.6	1.1		0943	3.6	1.1
SA	1617	1.6	0.5	SU	1519	1.3	0.4
SA	2227	4.6	1.4	DI	2203	4.6	1.4
4	0516	1.6	0.5	19	0456	1.3	0.4
	1058	3.6	1.1		1026	3.6	1.1
SU	1652	2.0	0.6	MO	1601	1.6	0.5
DI	2259	4.3	1.3	LU	2243	4.3	1.3
5	0604	2.0	0.6	20	0552	1.6	0.5
	1135	3.3	1.0		1116	3.3	1.0
MO	1736	2.0	0.6	TU	1707	2.0	0.6
LU	2338	3.9	1.2	MA	2331	4.3	1.3
6	0708	2.3	0.7	21	0657	1.6	0.5
	1227	3.0	0.9		1218	3.3	1.0
TU	1836	2.3	0.7	WE	1828	2.0	0.6
MA				ME			
7	0030	3.6	1.1	22	0036	3.9	1.2
	0834	2.3	0.7		0805	2.0	0.6
WE	1438	3.0	0.9	TH	1341	3.3	1.0
ME	1950	2.3	0.7	JE	1951	2.0	0.6
8	0203	3.6	1.1	23	0218	3.6	1.1
	1001	2.3	0.7		0911	1.6	0.5
TH	1620	3.0	0.9	FR	1515	3.3	1.0
JE	2120	2.3	0.7	VE	2117	2.0	0.6
9	0414	3.6	1.1	24	0358	3.6	1.1
	1057	2.0	0.6		1011	1.3	0.4
FR	1706	3.3	1.0	SA	1623	3.6	1.1
VE	2247	2.0	0.6	SA	2238	1.6	0.5
10	0510	3.6	1.1	25	0502	3.9	1.2
	1133	1.6	0.5		1105	1.3	0.4
SA	1742	3.6	1.1	SU	1715	3.9	1.2
SA	2343	1.6	0.5	DI	2343	1.3	0.4
11	0548	3.9	1.2	26	0553	3.9	1.2
	1200	1.6	0.5		1154	1.0	0.3
SU	1813	3.6	1.1	MO	1803	4.3	1.3
DI				LU			
12	0025	1.3	0.4	27	0037	1.0	0.3
	0620	3.9	1.2		0639	4.3	1.3
MO	1225	1.3	0.4	TU	1239	1.0	0.3
LU	1842	3.9	1.2	MA	1848	4.6	1.4
13	0100	1.0	0.3	28	0124	0.7	0.2
	0650	3.9	1.2		0723	4.3	1.3
TU	1250	1.3	0.4	WE	1321	1.0	0.3
MA	1911	4.3	1.3	ME	1932	4.6	1.4
14	0134	1.0	0.3	29	0208	0.7	0.2
	0720	3.9	1.2		0805	3.9	1.2
WE	1317	1.0	0.3	TH	1359	1.0	0.3
ME	1941	4.3	1.3	JE	2013	4.9	1.5
15	0209	0.7	0.2	30	0251	0.7	0.2
	0752	3.9	1.2		0847	3.9	1.2
TH	1346	1.0	0.3	FR	1436	1.3	0.4
JE	2014	4.6	1.4	VE	2052	4.9	1.5

May-mai

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0332	1.0	0.3	16	0313	1.0	0.3
	0926	3.6	1.1		0852	3.6	1.1
SA	1512	1.3	0.4	SU	1434	1.3	0.4
SA	2127	4.9	1.5	DI	2112	4.9	1.5
2	0412	1.3	0.4	17	0359	1.0	0.3
	1004	3.6	1.1		0939	3.6	1.1
SU	1547	1.6	0.5	MO	1521	1.3	0.4
DI	2200	4.6	1.4	LU	2154	4.9	1.5
3	0452	1.6	0.5	18	0448	1.3	0.4
	1041	3.6	1.1		1028	3.6	1.1
MO	1625	2.0	0.6	TU	1618	1.6	0.5
LU	2234	4.3	1.3	MA	2239	4.6	1.4
4	0537	2.0	0.6	19	0542	1.3	0.4
	1119	3.3	1.0		1120	3.6	1.1
TU	1710	2.0	0.6	WE	1724	1.6	0.5
MA	2310	4.3	1.3	ME	2329	4.3	1.3
5	0630	2.0	0.6	20	0640	1.6	0.5
	1206	3.3	1.0		1218	3.6	1.1
WE	1804	2.3	0.7	TH	1832	2.0	0.6
ME	2355	3.9	1.2	JE			
6	0733	2.3	0.7	21	0031	3.9	1.2
	1322	3.0	0.9		0740	1.6	0.5
TH	1909	2.3	0.7	FR	1327	3.6	1.1
JE				VE	1943	2.0	0.6
7	0059	3.6	1.1	22	0156	3.6	1.1
	0838	2.3	0.7		0838	1.6	0.5
FR	1507	3.3	1.0	SA	1441	3.6	1.1
VE	2025	2.3	0.7	SA	2059	2.0	0.6
8	0238	3.6	1.1	23	0324	3.6	1.1
	0931	2.0	0.6		0933	1.3	0.4
SA	1608	3.3	1.0	SU	1546	3.9	1.2
SA	2150	2.0	0.6	DI	2218	1.6	0.5
9	0406	3.6	1.1	24	0432	3.6	1.1
	1014	2.0	0.6		1026	1.3	0.4
SU	1648	3.6	1.1	MO	1642	3.9	1.2
DI	2259	1.6	0.5	LU	2326	1.3	0.4
10	0458	3.6	1.1	25	0528	3.6	1.1
	1051	1.6	0.5		1117	1.3	0.4
MO	1723	3.6	1.1	TU	1733	4.3	1.3
LU	2350	1.3	0.4	MA			
11	0538	3.6	1.1	26	0021	1.0	0.3
	1127	1.6	0.5		0618	3.6	1.1
TU	1756	3.9	1.2	WE	1206	1.3	0.4
MA				ME	1821	4.6	1.4
12	0031	1.0	0.3	27	0110	1.0	0.3
	0615	3.6	1.1		0704	3.6	1.1
WE	1202	1.3	0.4	TH	1251	1.3	0.4
ME	1831	4.3	1.3	JE	1908	4.6	1.4
13	0110	1.0	0.3	28	0154	1.0	0.3
	0651	3.6	1.1		0749	3.6	1.1
TH	1237	1.3	0.4	FR	1334	1.3	0.4
JE	1909	4.6	1.4	VE	1951	4.9	1.5
14	0149	0.7	0.2	29	0236	1.0	0.3
	0728	3.6	1.1		0831	3.6	1.1
FR	1314	1.3	0.4	SA	1414	1.3	0.4
VE	1949	4.6	1.4	SA	2031	4.9	1.5
15	0230	0.7	0.2	30	0315	1.0	0.3
	0808	3.6	1.1		0912	3.6	1.1
SA	1352	1.3	0.4	SU	1452	1.6	0.5
SA	2030	4.9	1.5	DI	2108	4.9	1.5
				31	0353	1.3	0.4
					0949	3.6	1.1
				MO	1529	1.6	0.5
				LU	2140	4.6	1.4

June-juin

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0429	1.6	0.5	16	0435	1.0	0.3
	1025	3.6	1.1		1026	3.9	1.2
TU	1606	2.0	0.6	WE	1625	1.3	0.4
MA	2211	4.6	1.4	ME	2235	4.6	1.4
2	0506	2.0	0.6	17	0525	1.3	0.4
	1101	3.6	1.1		1115	3.9	1.2
WE	1646	2.0	0.6	TH	1723	1.6	0.5
ME	2244	4.3	1.3	JE	2323	4.3	1.3
3	0547	2.0	0.6	18	0617	1.3	0.4
	1140	3.3	1.0		1205	3.9	1.2
TH	1732	2.0	0.6	FR	1822	1.6	0.5
JE	2322	3.9	1.2	VE			
4	0633	2.0	0.6	19	0017	3.9	1.2
	1228	3.3	1.0		0709	1.3	0.4
FR	1826	2.3	0.7	SA	1259	3.9	1.2
VE				SA	1924	1.6	0.5
5	0010	3.6	1.1	20	0122	3.6	1.1
	0723	2.0	0.6		0801	1.6	0.5
SA	1328	3.3	1.0	SU	1400	3.9	1.2
SA	1930	2.3	0.7	DI	2035	2.0	0.6
6	0115	3.6	1.1	21	0240	3.3	1.0
	0811	2.0	0.6		0853	1.6	0.5
SU	1437	3.3	1.0	MO	1505	3.9	1.2
DI	2046	2.0	0.6	LU	2155	1.6	0.5
7	0237	3.3	1.0	22	0359	3.3	1.0
	0858	2.0	0.6		0946	1.6	0.5
MO	1536	3.6	1.1	TU	1607	3.9	1.2
LU	2205	2.0	0.6	MA	2310	1.6	0.5
8	0354	3.3	1.0	23	0507	3.3	1.0
	0944	2.0	0.6		1042	1.6	0.5
TU	1626	3.6	1.1	WE	1707	4.3	1.3
MA	2311	1.6	0.5	ME			
9	0452	3.3	1.0	24	0010	1.3	0.4
	1030	1.6	0.5		0603	3.3	1.0
WE	1713	3.9	1.2	TH	1139	1.6	0.5
ME				JE	1803	4.3	1.3
10	0003	1.3	0.4	25	0100	1.3	0.4
	0540	3.3	1.0		0653	3.3	1.0
TH	1117	1.6	0.5	FR	1232	1.6	0.5
JE	1759	4.3	1.3	VE	1854	4.6	1.4
11	0048	1.0	0.3	26	0144	1.0	0.3
	0624	3.3	1.0		0737	3.6	1.1
FR	1204	1.3	0.4	SA	1319	1.3	0.4
VE	1846	4.6	1.4	SA	1939	4.6	1.4
12	0132	1.0	0.3	27	0223	1.3	0.4
	0709	3.6	1.1		0819	3.6	1.1
SA	1253	1.3	0.4	SU	1401	1.3	0.4
SA	1932	4.9	1.5	DI	2019	4.6	1.4
13	0216	1.0	0.3	28	0259	1.3	0.4
	0756	3.6	1.1		0858	3.6	1.1
SU	1342	1.3	0.4	MO	1439	1.3	0.4
DI	2018	4.9	1.5	LU	2052	4.6	1.4
14	0301	1.0	0.3	29	0332	1.3	0.4
	0846	3.9	1.2		0934	3.6	1.1
MO	1433	1.3	0.4	TU	1515	1.6	0.5
LU	2103	4.9	1.5	MA	2121	4.6	1.4
15	0347	1.0	0.3	30	0402	1.6	0.5
	0936	3.9	1.2		1007	3.6	1.1
TU	1527	1.3	0.4	WE	1548	1.6	0.5
MA	2149	4.9	1.5	ME	2149	4.6	1.4



ST JOHN'S NST Z+3.5

2010

TIDE TABLES

July-juillet

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0431	1.6	0.5	16	0501	1.0	0.3
	1037	3.6	1.1		1058	4.3	1.3
TH	1622	1.6	0.5	FR	1712	1.3	0.4
JE	2218	4.3	1.3	VE	2309	4.6	1.4
2	0501	1.6	0.5	17	0548	1.3	0.4
	1108	3.6	1.1		1142	4.3	1.3
FR	1700	2.0	0.6	SA	1804	1.6	0.5
VE	2252	4.3	1.3	SA	2355	3.9	1.2
3	0536	1.6	0.5	18	0635	1.3	0.4
	1141	3.6	1.1		1227	4.3	1.3
SA	1745	2.0	0.6	SU	1901	1.6	0.5
SA	2332	3.9	1.2	DI			
4	0616	2.0	0.6	19	0046	3.6	1.1
	1221	3.6	1.1		0722	1.6	0.5
SU	1841	2.0	0.6	MO	1317	3.9	1.2
DI				LU	2009	2.0	0.6
5	0021	3.6	1.1	20	0153	3.3	1.0
	0701	2.0	0.6		0812	1.6	0.5
MO	1312	3.6	1.1	TU	1418	3.9	1.2
LU	1952	2.0	0.6	MA	2133	2.0	0.6
6	0125	3.3	1.0	21	0329	3.0	0.9
	0750	2.0	0.6		0908	2.0	0.6
TU	1417	3.6	1.1	WE	1534	3.9	1.2
MA	2115	2.0	0.6	ME	2259	2.0	0.6
7	0243	3.0	0.9	22	0457	3.0	0.9
	0842	2.0	0.6		1014	2.0	0.6
WE	1529	3.6	1.1	TH	1652	3.9	1.2
ME	2234	2.0	0.6	JE			
8	0403	3.0	0.9	23	0004	1.6	0.5
	0939	2.0	0.6		0557	3.0	0.9
TH	1636	3.9	1.2	FR	1124	2.0	0.6
JE	2337	1.6	0.5	VE	1757	4.3	1.3
9	0509	3.0	0.9	24	0053	1.3	0.4
	1041	1.6	0.5		0644	3.3	1.0
FR	1736	4.3	1.3	SA	1224	1.6	0.5
VE				SA	1848	4.3	1.3
10	0028	1.3	0.4	25	0133	1.3	0.4
	0604	3.3	1.0		0726	3.6	1.1
SA	1144	1.6	0.5	SU	1311	1.6	0.5
SA	1831	4.6	1.4	DI	1930	4.6	1.4
11	0115	1.0	0.3	26	0208	1.3	0.4
	0656	3.6	1.1		0805	3.6	1.1
SU	1243	1.3	0.4	MO	1351	1.3	0.4
DI	1921	4.9	1.5	LU	2005	4.6	1.4
12	0200	1.0	0.3	27	0238	1.3	0.4
	0748	3.9	1.2		0840	3.9	1.2
MO	1339	1.3	0.4	TU	1427	1.3	0.4
LU	2009	5.2	1.6	MA	2034	4.6	1.4
13	0245	0.7	0.2	28	0304	1.3	0.4
	0839	3.9	1.2		0912	3.9	1.2
TU	1433	1.0	0.3	WE	1459	1.3	0.4
MA	2055	5.2	1.6	ME	2059	4.6	1.4
14	0330	0.7	0.2	29	0328	1.3	0.4
	0927	4.3	1.3		0941	3.9	1.2
WE	1526	1.0	0.3	TH	1529	1.3	0.4
ME	2140	4.9	1.5	JE	2124	4.6	1.4
15	0415	1.0	0.3	30	0351	1.3	0.4
	1014	4.3	1.3		1006	3.9	1.2
TH	1619	1.3	0.4	FR	1559	1.6	0.5
JE	2225	4.9	1.5	VE	2152	4.3	1.3
				31	0415	1.6	0.5
					1032	3.9	1.2
				SA	1633	1.6	0.5
				SA	2223	4.3	1.3

August-août

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0441	1.6	0.5	16	0556	1.6	0.5
	1059	3.9	1.2		1152	4.3	1.3
SU	1712	1.6	0.5	MO	1837	1.6	0.5
DI	2259	3.9	1.2	LU			
2	0511	1.6	0.5	17	0014	3.3	1.0
	1132	3.9	1.2		0641	1.6	0.5
MO	1802	2.0	0.6	TU	1234	3.9	1.2
LU	2340	3.6	1.1	MA	1944	2.0	0.6
3	0549	2.0	0.6	18	0111	3.0	0.9
	1213	3.6	1.1		0731	2.0	0.6
TU	1911	2.0	0.6	WE	1331	3.9	1.2
MA				ME	2112	2.0	0.6
4	0031	3.3	1.0	19	0305	3.0	0.9
	0641	2.0	0.6		0834	2.3	0.7
WE	1313	3.6	1.1	TH	1503	3.6	1.1
ME	2036	2.0	0.6	JE	2249	2.0	0.6
5	0143	3.0	0.9	20	0453	3.0	0.9
	0746	2.0	0.6		0955	2.3	0.7
TH	1437	3.6	1.1	FR	1648	3.9	1.2
JE	2202	2.0	0.6	VE	2355	2.0	0.6
6	0320	3.0	0.9	21	0548	3.3	1.0
	0900	2.0	0.6		1118	2.0	0.6
FR	1609	3.9	1.2	SA	1753	3.9	1.2
VE	2311	1.6	0.5	SA			
7	0448	3.0	0.9	22	0038	1.6	0.5
	1020	2.0	0.6		0629	3.3	1.0
SA	1722	4.3	1.3	SU	1216	1.6	0.5
SA				DI	1837	4.3	1.3
8	0006	1.3	0.4	23	0113	1.3	0.4
	0551	3.3	1.0		0706	3.6	1.1
SU	1136	1.6	0.5	MO	1300	1.3	0.4
DI	1820	4.6	1.4	LU	1913	4.6	1.4
9	0054	1.0	0.3	24	0142	1.3	0.4
	0644	3.6	1.1		0741	3.9	1.2
MO	1240	1.3	0.4	TU	1337	1.3	0.4
LU	1910	4.9	1.5	MA	1943	4.6	1.4
10	0139	0.7	0.2	25	0206	1.3	0.4
	0735	3.9	1.2		0813	3.9	1.2
TU	1336	1.0	0.3	WE	1410	1.3	0.4
MA	1957	5.2	1.6	ME	2008	4.6	1.4
11	0223	0.7	0.2	26	0228	1.3	0.4
	0823	4.3	1.3		0842	3.9	1.2
WE	1428	1.0	0.3	TH	1440	1.0	0.3
ME	2042	5.2	1.6	JE	2033	4.6	1.4
12	0306	0.7	0.2	27	0249	1.3	0.4
	0910	4.6	1.4		0907	4.3	1.3
TH	1518	0.7	0.2	FR	1509	1.3	0.4
JE	2126	4.9	1.5	VE	2058	4.3	1.3
13	0349	0.7	0.2	28	0310	1.3	0.4
	0953	4.6	1.4		0932	4.3	1.3
FR	1606	1.0	0.3	SA	1539	1.3	0.4
VE	2208	4.6	1.4	SA	2127	4.3	1.3
14	0432	1.0	0.3	29	0332	1.3	0.4
	1034	4.6	1.4		0957	4.3	1.3
SA	1654	1.0	0.3	SU	1612	1.3	0.4
SA	2250	4.3	1.3	DI	2158	3.9	1.2
15	0514	1.3	0.4	30	0354	1.6	0.5
	1113	4.6	1.4		1025	4.3	1.3
SU	1744	1.3	0.4	MO	1650	1.6	0.5
DI	2330	3.9	1.2	LU	2233	3.9	1.2
				31	0418	1.6	0.5
					1056	3.9	1.2
				TU	1740	1.6	0.5
				MA	2310	3.6	1.1

September-septembre

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0447	2.0	0.6	16	0042	3.0	0.9
	1135	3.9	1.2		0656	2.3	0.7
WE	1848	2.0	0.6	TH	1249	3.9	1.2
ME	2357	3.3	1.0	JE	2046	2.3	0.7
2	0538	2.0	0.6	17	0242	3.0	0.9
	1229	3.9	1.2		0806	2.3	0.7
TH	2010	2.0	0.6	FR	1428	3.6	1.1
JE				VE	2222	2.3	0.7
3	0107	3.0	0.9	18	0433	3.0	0.9
	0709	2.0	0.6		0936	2.3	0.7
FR	1357	3.6	1.1	SA	1633	3.6	1.1
VE	2133	2.0	0.6	SA	2325	2.0	0.6
4	0255	3.0	0.9	19	0523	3.3	1.0
	0842	2.0	0.6		1102	2.0	0.6
SA	1549	3.9	1.2	SU	1732	3.9	1.2
SA	2241	1.6	0.5	DI			
5	0433	3.3	1.0	20	0006	1.6	0.5
	1013	2.0	0.6		0601	3.6	1.1
SU	1709	4.3	1.3	MO	1159	1.6	0.5
DI	2337	1.3	0.4	LU	1812	3.9	1.2
6	0535	3.6	1.1	21	0037	1.6	0.5
	1132	1.6	0.5		0636	3.6	1.1
MO	1806	4.6	1.4	TU	1241	1.3	0.4
LU				MA	1844	4.3	1.3
7	0026	1.0	0.3	22	0102	1.3	0.4
	0626	3.9	1.2		0708	3.9	1.2
TU	1234	1.3	0.4	WE	1316	1.3	0.4
MA	1854	4.9	1.5	ME	1912	4.3	1.3
8	0112	0.7	0.2	23	0124	1.3	0.4
	0714	4.3	1.3		0738	3.9	1.2
WE	1327	1.0	0.3	TH	1348	1.0	0.3
ME	1940	4.9	1.5	JE	1938	4.3	1.3
9	0156	0.7	0.2	24	0145	1.0	0.3
	0801	4.6	1.4		0805	4.3	1.3
TH	1416	0.7	0.2	FR	1418	1.0	0.3
JE	2024	4.9	1.5	VE	2005	4.3	1.3
10	0238	0.7	0.2	25	0207	1.0	0.3
	0845	4.9	1.5		0831	4.3	1.3
FR	1503	0.7	0.2	SA	1449	1.0	0.3
VE	2106	4.9	1.5	SA	2033	4.3	1.3
11	0319	0.7	0.2	26	0231	1.3	0.4
	0927	4.9	1.5		0858	4.3	1.3
SA	1550	0.7	0.2	SU	1522	1.0	0.3
SA	2148	4.6	1.4	DI	2105	3.9	1.2
12	0359	1.0	0.3	27	0255	1.3	0.4
	1006	4.9	1.5		0928	4.3	1.3
SU	1636	1.0	0.3	MO	1558	1.3	0.4
DI	2229	3.9	1.2	LU	2138	3.9	1.2
13	0438	1.3	0.4	28	0319	1.3	0.4
	1042	4.6	1.4		0959	4.3	1.3
MO	1723	1.3	0.4	TU	1640	1.3	0.4
LU	2308	3.6	1.1	MA	2214	3.6	1.1
14	0518	1.6	0.5	29	0346	1.6	0.5
	1118	4.3	1.3		1033	4.3	1.3
TU	1814	1.6	0.5	WE	1731	1.6	0.5
MA	2349	3.3	1.0	ME	2255	3.6	1.1
15	0602	2.0	0.6	30	0421	2.0	0.6
	1157	4.3	1.3		1113	4.3	1.3
WE	1919	2.0	0.6	TH	1835	2.0	0.6
ME				JE	2346	3.3	1.0

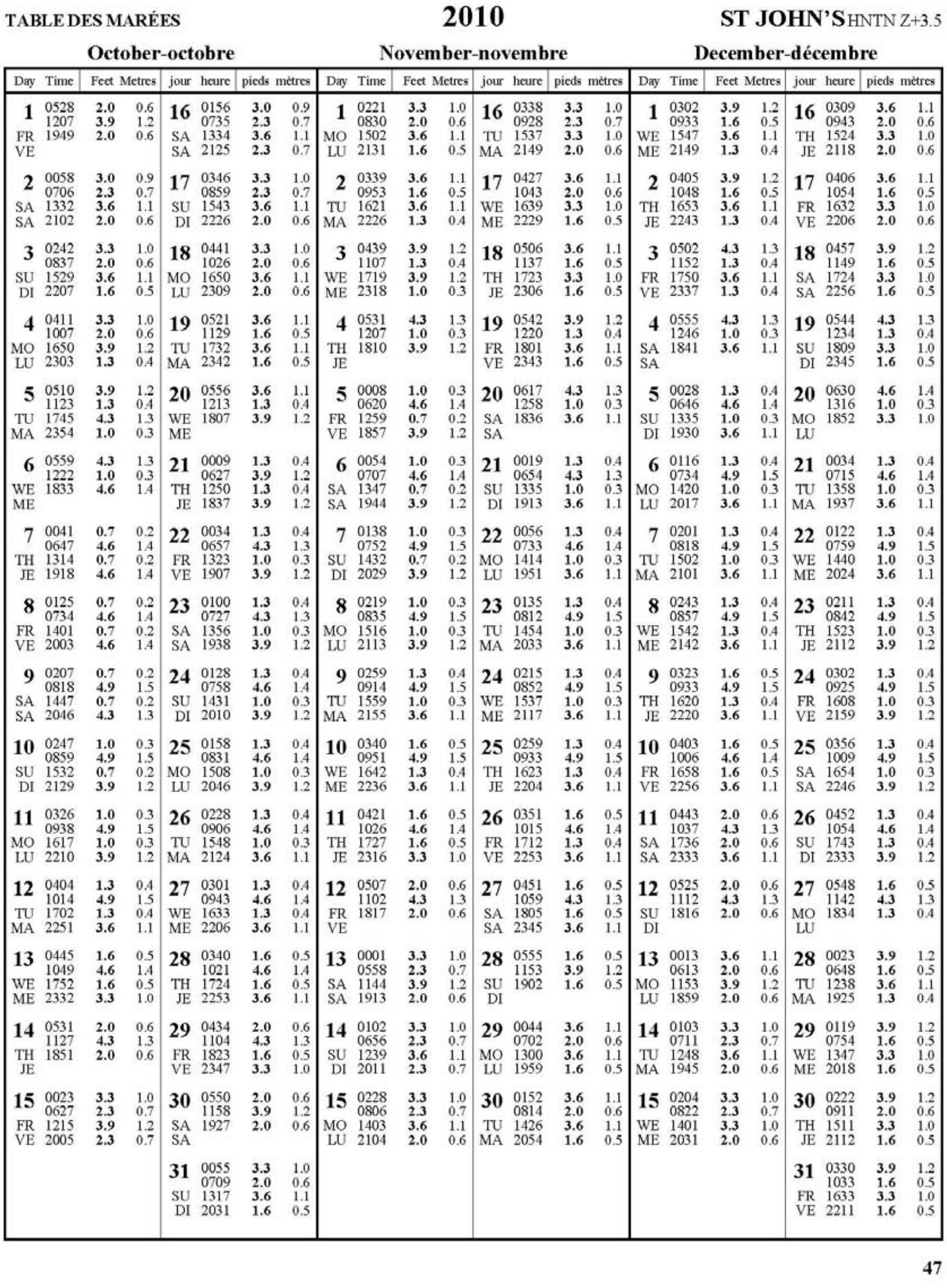


TABLE DES MARÉES

2010

ST JOHN'S HNTN Z+3.5

October-octobre

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0528	2.0	0.6	16	0156	3.0	0.9
	1207	3.9	1.2		0735	2.3	0.7
FR	1949	2.0	0.6	SA	1334	3.6	1.1
VE				SA	2125	2.3	0.7
2	0058	3.0	0.9	17	0346	3.3	1.0
	0706	2.3	0.7		0859	2.3	0.7
SA	1332	3.6	1.1	SU	1543	3.6	1.1
SA	2102	2.0	0.6	DI	2226	2.0	0.6
3	0242	3.3	1.0	18	0441	3.3	1.0
	0837	2.0	0.6		1026	2.0	0.6
SU	1529	3.6	1.1	MO	1650	3.6	1.1
DI	2207	1.6	0.5	LU	2309	2.0	0.6
4	0411	3.3	1.0	19	0521	3.6	1.1
	1007	2.0	0.6		1129	1.6	0.5
MO	1650	3.9	1.2	TU	1732	3.6	1.1
LU	2303	1.3	0.4	MA	2342	1.6	0.5
5	0510	3.9	1.2	20	0556	3.6	1.1
	1123	1.3	0.4		1213	1.3	0.4
TU	1745	4.3	1.3	WE	1807	3.9	1.2
MA	2354	1.0	0.3	ME			
6	0559	4.3	1.3	21	0009	1.3	0.4
	1222	1.0	0.3		0627	3.9	1.2
WE	1833	4.6	1.4	TH	1250	1.3	0.4
ME				JE	1837	3.9	1.2
7	0041	0.7	0.2	22	0034	1.3	0.4
	0647	4.6	1.4		0657	4.3	1.3
TH	1314	0.7	0.2	FR	1323	1.0	0.3
JE	1918	4.6	1.4	VE	1907	3.9	1.2
8	0125	0.7	0.2	23	0100	1.3	0.4
	0734	4.6	1.4		0727	4.3	1.3
FR	1401	0.7	0.2	SA	1356	1.0	0.3
VE	2003	4.6	1.4	SA	1938	3.9	1.2
9	0207	0.7	0.2	24	0128	1.3	0.4
	0818	4.9	1.5		0758	4.6	1.4
SA	1447	0.7	0.2	SU	1431	1.0	0.3
SA	2046	4.3	1.3	DI	2010	3.9	1.2
10	0247	1.0	0.3	25	0158	1.3	0.4
	0859	4.9	1.5		0831	4.6	1.4
SU	1532	0.7	0.2	MO	1508	1.0	0.3
DI	2129	3.9	1.2	LU	2046	3.9	1.2
11	0326	1.0	0.3	26	0228	1.3	0.4
	0938	4.9	1.5		0906	4.6	1.4
MO	1617	1.0	0.3	TU	1548	1.0	0.3
LU	2210	3.9	1.2	MA	2124	3.6	1.1
12	0404	1.3	0.4	27	0301	1.3	0.4
	1014	4.9	1.5		0943	4.6	1.4
TU	1702	1.3	0.4	WE	1633	1.3	0.4
MA	2251	3.6	1.1	ME	2206	3.6	1.1
13	0445	1.6	0.5	28	0340	1.6	0.5
	1049	4.6	1.4		1021	4.6	1.4
WE	1752	1.6	0.5	TH	1724	1.6	0.5
ME	2332	3.3	1.0	JE	2253	3.6	1.1
14	0531	2.0	0.6	29	0434	2.0	0.6
	1127	4.3	1.3		1104	4.3	1.3
TH	1851	2.0	0.6	FR	1823	1.6	0.5
JE				VE	2347	3.3	1.0
15	0023	3.3	1.0	30	0550	2.0	0.6
	0627	2.3	0.7		1158	3.9	1.2
FR	1215	3.9	1.2	SA	1927	2.0	0.6
VE	2005	2.3	0.7	SA			
				31	0055	3.3	1.0
					0709	2.0	0.6
				SU	1317	3.6	1.1
				DI	2031	1.6	0.5

November-novembre

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0221	3.3	1.0	16	0338	3.3	1.0
	0830	2.0	0.6		0928	2.3	0.7
MO	1502	3.6	1.1	TU	1537	3.3	1.0
LU	2131	1.6	0.5	MA	2149	2.0	0.6
2	0339	3.6	1.1	17	0427	3.6	1.1
	0953	1.6	0.5		1043	2.0	0.6
TU	1621	3.6	1.1	WE	1639	3.3	1.0
MA	2226	1.3	0.4	ME	2229	1.6	0.5
3	0439	3.9	1.2	18	0506	3.6	1.1
	1107	1.3	0.4		1137	1.6	0.5
WE	1719	3.9	1.2	TH	1723	3.3	1.0
ME	2318	1.0	0.3	JE	2306	1.6	0.5
4	0531	4.3	1.3	19	0542	3.9	1.2
	1207	1.0	0.3		1220	1.3	0.4
TH	1810	3.9	1.2	FR	1801	3.6	1.1
JE				VE	2343	1.6	0.5
5	0008	1.0	0.3	20	0617	4.3	1.3
	0620	4.6	1.4		1258	1.0	0.3
FR	1259	0.7	0.2	SA	1836	3.6	1.1
VE	1857	3.9	1.2	SA			
6	0054	1.0	0.3	21	0019	1.3	0.4
	0707	4.6	1.4		0654	4.3	1.3
SA	1347	0.7	0.2	SU	1335	1.0	0.3
SA	1944	3.9	1.2	DI	1913	3.6	1.1
7	0138	1.0	0.3	22	0056	1.3	0.4
	0752	4.9	1.5		0733	4.6	1.4
SU	1432	0.7	0.2	MO	1414	1.0	0.3
DI	2029	3.9	1.2	LU	1951	3.6	1.1
8	0219	1.0	0.3	23	0135	1.3	0.4
	0835	4.9	1.5		0812	4.9	1.5
MO	1516	1.0	0.3	TU	1454	1.0	0.3
LU	2113	3.9	1.2	MA	2033	3.6	1.1
9	0259	1.3	0.4	24	0215	1.3	0.4
	0914	4.9	1.5		0852	4.9	1.5
TU	1559	1.0	0.3	WE	1537	1.0	0.3
MA	2155	3.6	1.1	ME	2117	3.6	1.1
10	0340	1.6	0.5	25	0259	1.3	0.4
	0951	4.9	1.5		0933	4.9	1.5
WE	1642	1.3	0.4	TH	1623	1.3	0.4
ME	2236	3.6	1.1	JE	2204	3.6	1.1
11	0421	1.6	0.5	26	0351	1.6	0.5
	1026	4.6	1.4		1015	4.6	1.4
TH	1727	1.6	0.5	FR	1712	1.3	0.4
JE	2316	3.3	1.0	VE	2253	3.6	1.1
12	0507	2.0	0.6	27	0451	1.6	0.5
	1102	4.3	1.3		1059	4.3	1.3
FR	1817	2.0	0.6	SA	1805	1.6	0.5
VE				SA	2345	3.6	1.1
13	0001	3.3	1.0	28	0555	1.6	0.5
	0558	2.3	0.7		1153	3.9	1.2
SA	1144	3.9	1.2	SU	1902	1.6	0.5
SA	1913	2.0	0.6	DI			
14	0102	3.3	1.0	29	0044	3.6	1.1
	0656	2.3	0.7		0702	2.0	0.6
SU	1239	3.6	1.1	MO	1300	3.6	1.1
DI	2011	2.3	0.7	LU	1959	1.6	0.5
15	0228	3.3	1.0	30	0152	3.6	1.1
	0806	2.3	0.7		0814	2.0	0.6
MO	1403	3.6	1.1	TU	1426	3.6	1.1
LU	2104	2.0	0.6	MA	2054	1.6	0.5

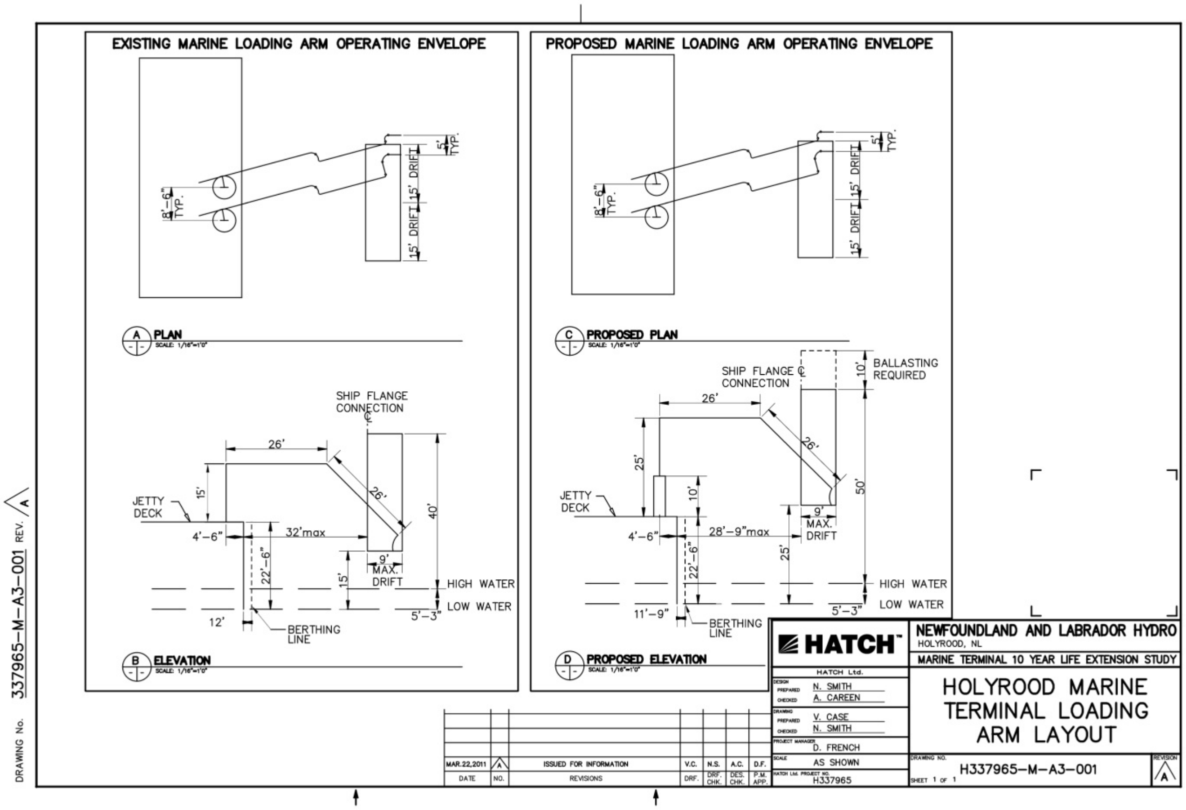
December-décembre

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0302	3.9	1.2	16	0309	3.6	1.1
	0933	1.6	0.5		0943	2.0	0.6
WE	1547	3.6	1.1	TH	1524	3.3	1.0
ME	2149	1.3	0.4	JE	2118	2.0	0.6
2	0405	3.9	1.2	17	0406	3.6	1.1
	1048	1.6	0.5		1054	1.6	0.5
TH	1653	3.6	1.1	FR	1632	3.3	1.0
JE	2243	1.3	0.4	VE	2206	2.0	0.6
3	0502	4.3	1.3	18	0457	3.9	1.2
	1152	1.3	0.4		1149	1.6	0.5
FR	1750	3.6	1.1	SA	1724	3.3	1.0
VE	2337	1.3	0.4	SA	2256	1.6	0.5
4	0555	4.3	1.3	19	0544	4.3	1.3
	1246	1.0	0.3		1234	1.3	0.4
SA	1841	3.6	1.1	SU	1809	3.3	1.0
SA				DI	2345	1.6	0.5
5	0028	1.3	0.4	20	0630	4.6	1.4
	0646	4.6	1.4		1316	1.0	0.3
SU	1335	1.0	0.3	MO	1852	3.3	1.0
DI	1930	3.6	1.1	LU			
6	0116	1.3	0.4	21	0034	1.3	0.4
	0734	4.9	1.5		0715	4.6	1.4
MO	1420	1.0	0.3	TU	1358	1.0	0.3
LU	2017	3.6	1.1	MA	1937	3.6	1.1
7	0201	1.3	0.4	22	0122	1.3	0.4
	0818	4.9	1.5		0759	4.9	1.5
TU	1502	1.0	0.3	WE	1440	1.0	0.3
MA	2101	3.6	1.1	ME	2024	3.6	1.1
8	0243	1.3	0.4	23	0211	1.3	0.4
	0857	4.9	1.5		0842	4.9	1.5
WE	1542	1.3	0.4	TH	1523	1.0	0.3
ME	2142	3.6	1.1	JE	2112	3.9	1.2
9	0323	1.6	0.5	24	0302	1.3	0.4
	0933	4.9	1.5		0925	4.9	1.5
TH	1620	1.3	0.4	FR	1608	1.0	0.3
JE	2220	3.6	1.1	VE	2159	3.9	1.2
10	0403	1.6	0.5	25	0356	1.3	0.4
	1006	4.6	1.4		1009	4.9	1.5
FR	1658	1.6	0.5	SA	1654	1.0	0.3
VE	2256	3.6	1.1	SA	2246	3.9	1.2
11	0443	2.0	0.6	26	0452	1.3	0.4
	1037	4.3	1.3		1054	4.6	1.4
SA	1736	2.0	0.6	SU	1743	1.3	0.4
SA	2333	3.6	1.1	DI	2333	3.9	1.2
12	0525	2.0	0.6	27	0548	1.6	0.5
	1112	4.3	1.3		1142	4.3	1.3
SU	1816	2.0	0.6	MO	1834	1.3	0.4
DI				LU			
13	0013	3.6	1.1	28	0023	3.9	1.2
	0613	2.0	0.6		0648	1.6	0.5
MO	1153	3.9	1.2	TU	1238	3.6	1.1
LU	1859	2.0	0.6	MA	1925	1.3	0.4
14	0103	3.3	1.0	29	0119	3.9	1.2
	0711	2.3	0.7		0754	1.6	0.5
TU	1248	3.6	1.1	WE	1347	3.3	1.0
MA	1945	2.0	0.6	ME	2018	1.6	0.5
15	0204	3.3	1.0	30	0222	3.9	1.2
	0822	2.3	0.7		0911	2.0	0.6
WE	1401	3.3	1.0	TH	1511	3.3	1.0
ME	2031	2.0	0.6	JE	2112	1.6	0.5
				31	0330	3.9	1.2
					1033	1.6	0.5
				FR	1633	3.3	1.0
				VE	2211	1.6	0.5

Appendix E

Holyrood Marine Terminal Loading Arm Layout

H337965-M-A3-001


EXISTING MARINE LOADING ARM OPERATING ENVELOPE
8'-6" TYP.
5' TYP.
15' DRIFT
15' DRIFT
A PLAN
SCALE: 1/16"=1'0"
SHIP FLANGE CONNECTION ℄
26'
26'
15'
40'
JETTY DECK
4'-6"
32'max
22'-6"
15'
9' MAX. DRIFT
HIGH WATER
LOW WATER
5'-3"
12'
BERTHING LINE
B ELEVATION
SCALE: 1/16"=1'0"
PROPOSED MARINE LOADING ARM OPERATING ENVELOPE
8'-6" TYP.
5' TYP.
15' DRIFT
15' DRIFT
C PROPOSED PLAN
SCALE: 1/16"=1'0"
SHIP FLANGE ℄ CONNECTION
10'
BALLASTING REQUIRED
26'
26'
25'
10'
50'
JETTY DECK
4'-6"
28'-9"max
9' MAX. DRIFT
22'-6"
25'
HIGH WATER
LOW WATER
5'-3"
11'-9"
BERTHING LINE
D PROPOSED ELEVATION
SCALE: 1/16"=1'0"
PLOT SCALE 1=1
MAR.22,2011
A
ISSUED FOR INFORMATION
V.C.
N.S.
A.C.
D.F.
DATE
NO.
REVISIONS
DRF.
DRF. CHK.
DES. CHK.
P.M. APP.
HATCH
HATCH Ltd.
DESIGN
PREPARED N. SMITH
CHECKED A. CAREEN
DRAWING
PREPARED V. CASE
CHECKED N. SMITH
PROJECT MANAGER D. FRENCH
SCALE AS SHOWN
HATCH Ltd. PROJECT NO. H337965
NEWFOUNDLAND AND LABRADOR HYDRO
HOLYROOD, NL
MARINE TERMINAL 10 YEAR LIFE EXTENSION STUDY
HOLYROOD MARINE TERMINAL LOADING ARM LAYOUT
DRAWING NO. H337965-M-A3-001
SHEET 1 OF 1
REVISION A
DRAWING No. 337965-M-A3-001 REV. A

Appendix F

Proposed Loading Arm Extension Sketch

HATCH™

CALCULATION SHEET

SHEET NO. 1 OF 1

DESCRIPTION 10 YEAR LIFE EXTENSION STUDY
HOLYROOD M.T.

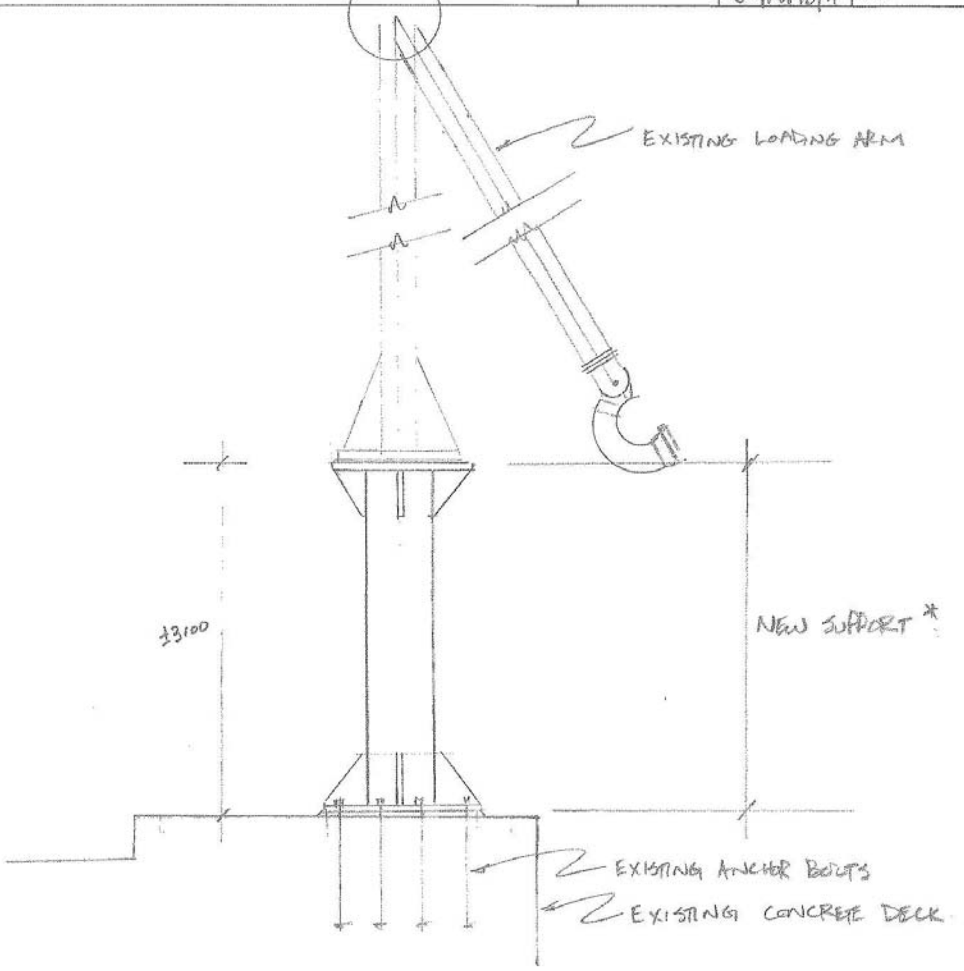
PROJECT NO H337965

MADE BY

DATE Mar16/11

CHECKED BY

DATE



LOADING ARM SUPPORT
1:50

Ⓐ

* 24" PIPE SHOWN. FINAL SIZE T.B.D.

Appendix G

Summary of Pile and Anode Inspection Report (Crotty Diving Services, October 2004)

In 2004, Crotty Diving Services performed a complete visual inspection of each pile and anode (including attachment brackets) on both the Jetty head and shore arm from seabed to splashzone and recorded the amount of deterioration on each.

The following tables summarize the results of the inspection for both the Jetty head anodes and the shore arm anodes and attempts to identify the current condition of each anode and estimate its remaining life.

Table 6-1: Jetty Head Anodes (213 in total)

Quantity of Anodes	Amount of Anode Remaining in 2004 (%)	Year of Anode Installation	Estimated Deterioration per year* (%)	Remaining Life* (from 2004)	Remaining Life* (from 2011)
8	80%	1994	2%	40 Years	33 Years
1	75%	1994	2.5%	30 Years	23 Years
110	70%	1994	3%	23 Years	16 Years
57	60%	1994	4%	15 Years	8 Years
32	50%	1994	5%	10 Years	3 Years
4	40%	1994	6%	6.7 Years	-0.3 Years
1	30%	1994	7%	4.3 Years	-2.7 Years

* Assuming that anode deterioration rate is linear.

Table 6-2: Shore Arm Anodes (19 in total)

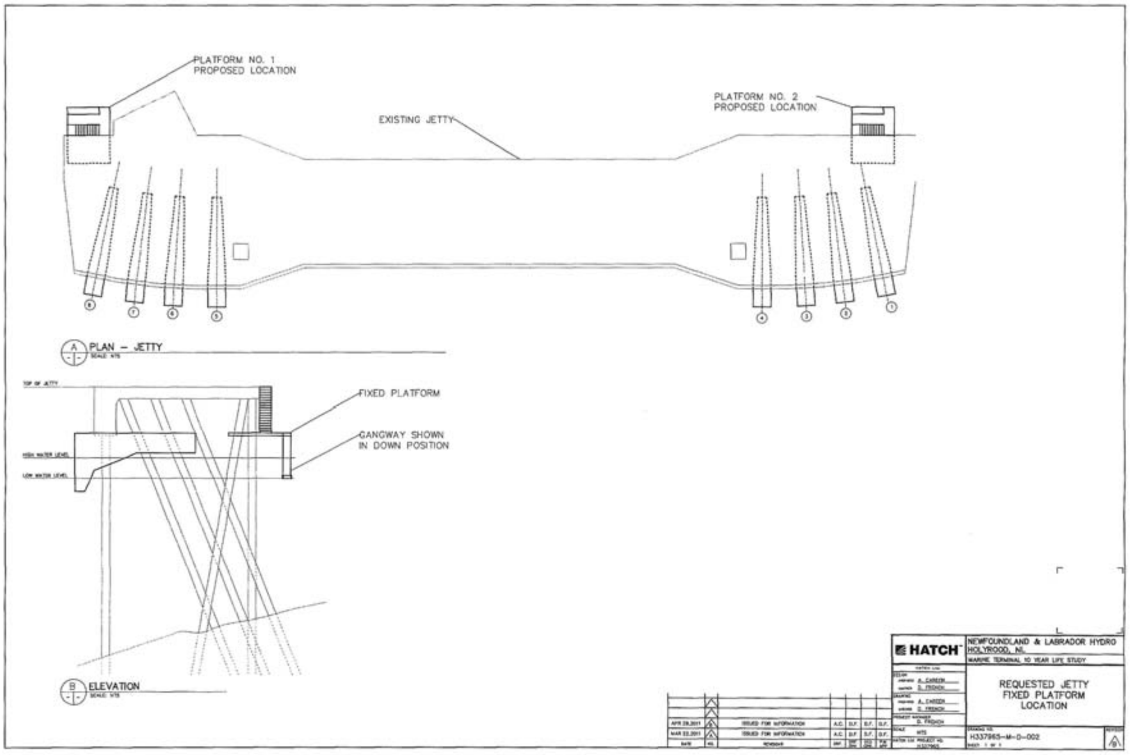
Quantity of Anodes	Amount of Anode Remaining in 2004 (%)	Year of Anode Installation	Estimated Deterioration per year* (%)	Remaining Life* (from 2004)	Remaining Life* (from 2011)
5	95%	2003	5%	19 Years	12 Years
3	90%	2003	10%	9 Years	2 Years
1	70%	1994	3%	23 years	16 Years
3	50%	1994	5%	10 Years	3 Years
2	40%	1994	6%	6.7 years	-0.3 Years
1	30%	1994	7%	4.3 years	-2.7 Years
1	10%	1994	9%	1.1 years	-5.9 Years
3	0%	1994	≥10%	0 Years	-10 Years

* Assuming that anode deterioration rate is linear.

Appendix H

Requested Jetty Platform Location Schematic

H337965-M-A1-002


PLATFORM NO. 1
PROPOSED LOCATION
EXISTING JETTY
PLATFORM NO. 2
PROPOSED LOCATION
8
7
6
5
4
3
2
1
A
PLAN – JETTY
SCALE: NTS
TOP OF JETTY
HIGH WATER LEVEL
LOW WATER LEVEL
FIXED PLATFORM
GANGWAY SHOWN
IN DOWN POSITION
B
ELEVATION
SCALE: NTS
APR 29,2011
B
ISSUED FOR INFORMATION
A.C.
D.F.
D.F.
D.F.
MAR 22,2011
A
ISSUED FOR INFORMATION
A.C.
D.F.
D.F.
D.F.
DATE
NO.
REVISIONS
HATCH
NEWFOUNDLAND & LABRADOR HYDRO
HOLYROOD, NL
MARINE TERMINAL 10 YEAR LIFE STUDY
A. CAREEN
D. FRENCH
A. CAREEN
D. FRENCH
PROJECT MANAGER
D. FRENCH
SCALE
NTS
PROJECT NO.
H337965
REQUESTED JETTY
FIXED PLATFORM
LOCATION
DRAWING NO.
H337965-M-D-002
SHEET 1 OF 1
B

Appendix I

Holyrood Terminal Station Marine Terminal Field Inspection Program

Underside of Concrete Deck and Spiral Steel Piles Inspection Program

Holyrood Terminal Station
Marine Terminal
Field Inspection Program
Underside of Concrete Deck
and
Spiral Steel Piles.

Inspection Program

Diving and boat operation is required to carry out the inspection.

Safety procedures shall be as required by Newfoundland and Labrador Hydro and applicable standards CAN/CSA-275.2-04, Occupational Safety Code for Diving Operations.

All underwater and above water inspection to be carried out during daylight hours and scheduled for predicted high and low tides.

<u>Pile Inspection</u>

The inspection steel of the piles includes the following:

No.1
Verification of drawings numbers and positioning with dimensions of positioning relative to a longitudinal and transverse axe or datum line or lows for the dock.

All piles an identification numbers according to drawing A1-238-05-4004-005 and AD 239-05-4004-25. – Pile Inspection report shall reference pile Numbers

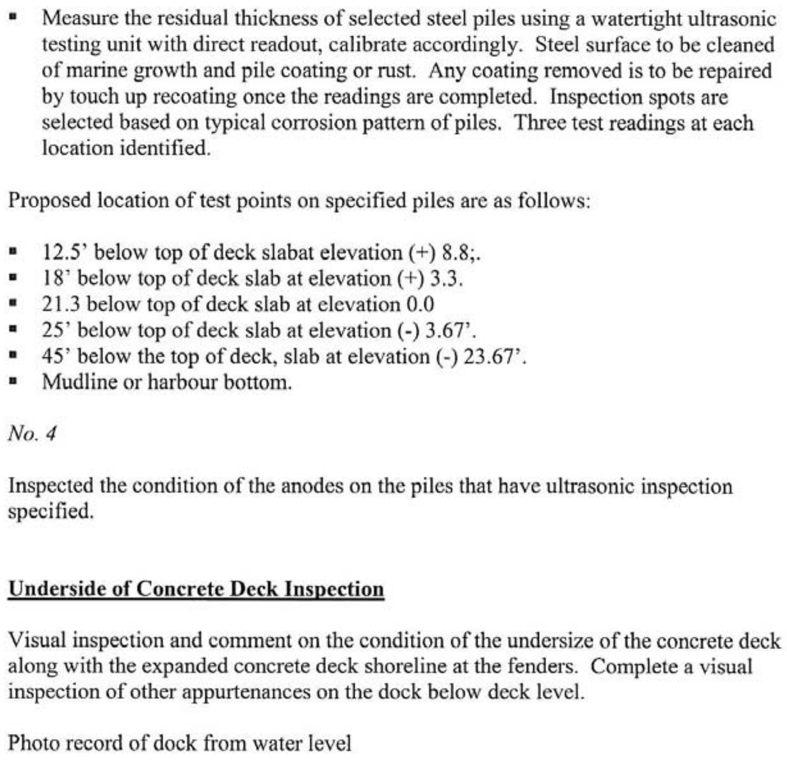
No. 2
Complete an above and below water level visual inspection of all steel piles.

For the visual inspection of the piles the total length of the pile can be divided into 4 sections.

- Underside of the concrete deck down to 3' above high water.
- Between 3' above and below high water level.
- Between 3' above and below low water level.
- Between 3' below low water and harbour bottom.

No. 3
Complete an ultrasonic steel thickness measurement on representative piles at dock – 14 piles .

Ultrasonic inspection of steel piles shall include;



- Measure the residual thickness of selected steel piles using a watertight ultrasonic testing unit with direct readout, calibrate accordingly. Steel surface to be cleaned of marine growth and pile coating or rust. Any coating removed is to be repaired by touch up recoating once the readings are completed. Inspection spots are selected based on typical corrosion pattern of piles. Three test readings at each location identified.

Proposed location of test points on specified piles are as follows:

- 12.5’ below top of deck slabat elevation (+) 8.8;.
- 18’ below top of deck slab at elevation (+) 3.3.
- 21.3 below top of deck slab at elevation 0.0
- 25’ below top of deck slab at elevation (-) 3.67’.
- 45’ below the top of deck, slab at elevation (-) 23.67’.
- Mudline or harbour bottom.

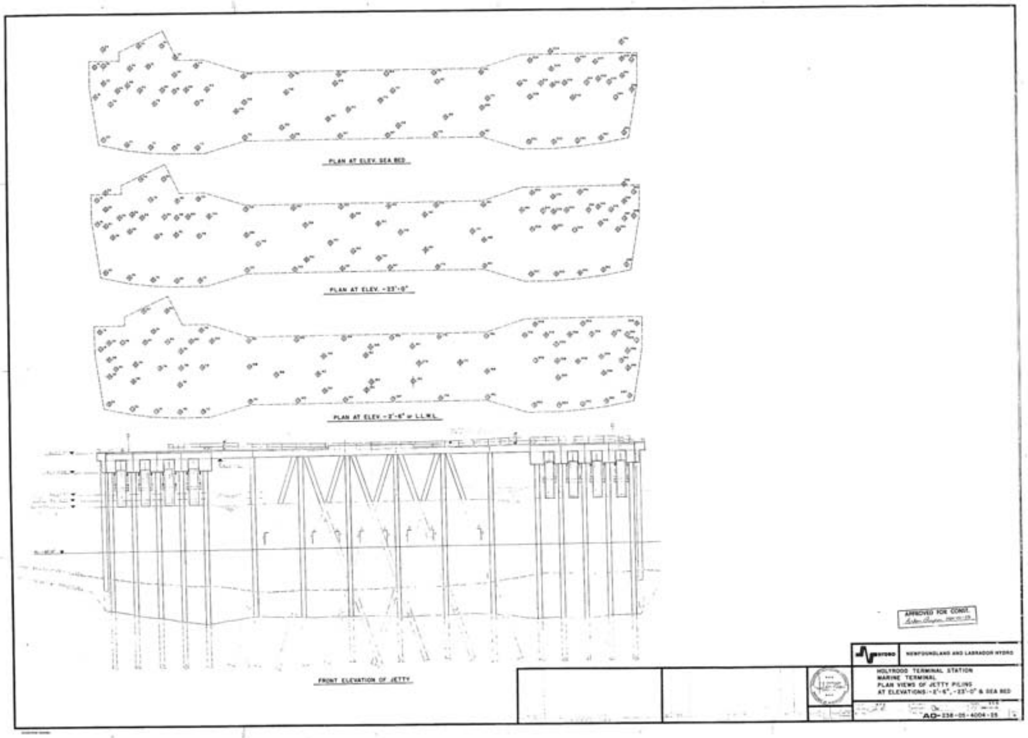
No. 4

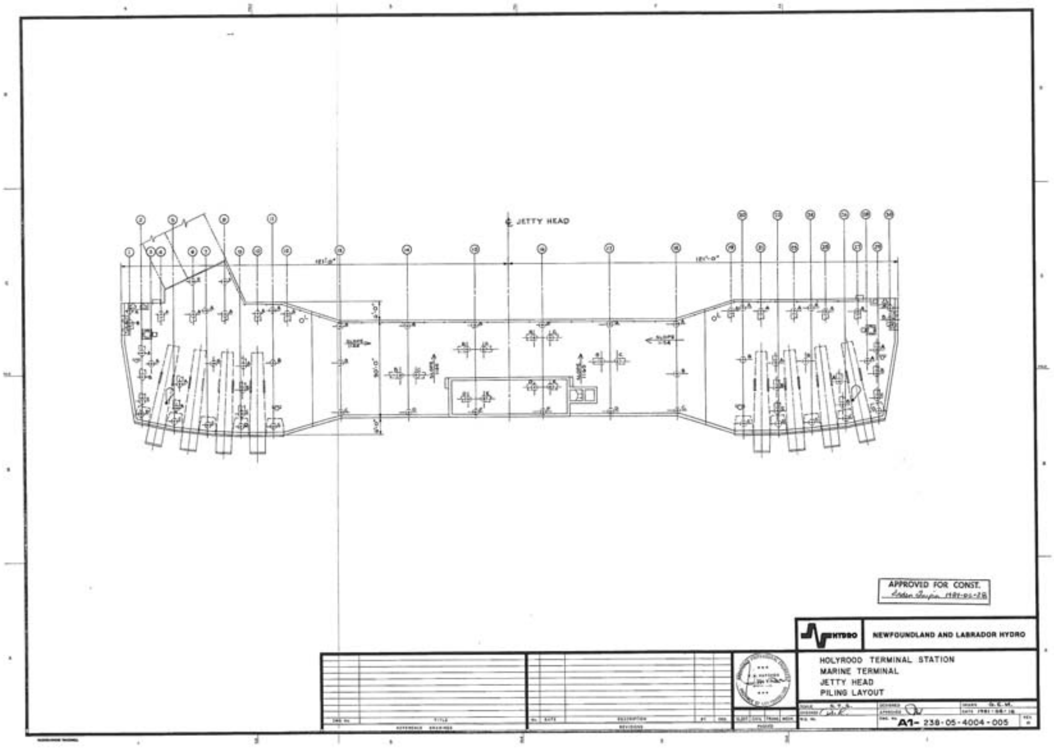
Inspected the condition of the anodes on the piles that have ultrasonic inspection specified.

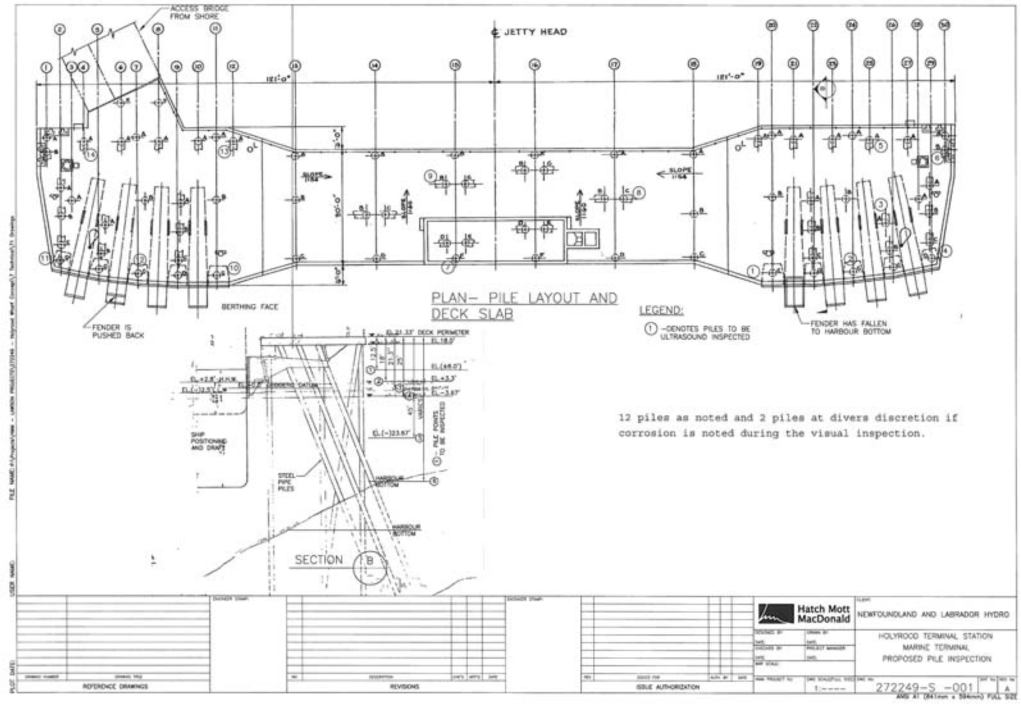
Underside of Concrete Deck Inspection

Visual inspection and comment on the condition of the undersize of the concrete deck along with the expanded concrete deck shoreline at the fenders. Complete a visual inspection of other appurtenances on the dock below deck level.

Photo record of dock from water level


PLAN AT ELEV. SEA BED
PLAN AT ELEV. -23'-0"
PLAN AT ELEV. -2'-6" or L.L.W.L.
FRONT ELEVATION OF JETTY
APPROVED FOR CONST.
HYDRO
NEWFOUNDLAND AND LABRADOR HYDRO
HOLYROOD TERMINAL STATION
MARINE TERMINAL
PLAN VIEWS OF JETTY PILING
AT ELEVATIONS -2'-6", -23'-0" & SEA BED
AD-238-05-4004-25

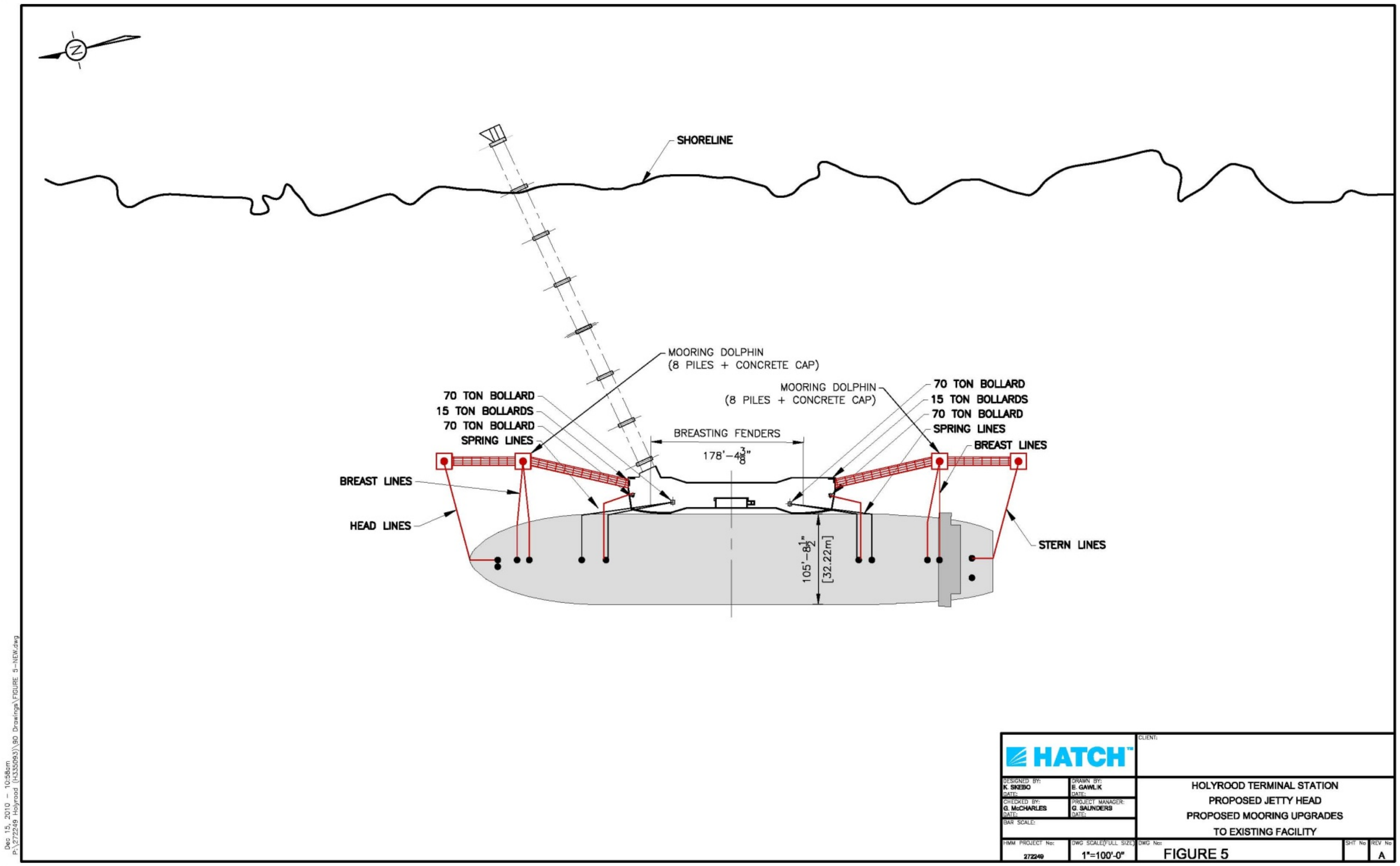

JETTY HEAD
121'-0"
121'-0"
SLOPE
SLOPE
APPROVED FOR CONST.
HYDRO
NEWFOUNDLAND AND LABRADOR HYDRO
HOLYROOD TERMINAL STATION
MARINE TERMINAL
JETTY HEAD
PILING LAYOUT
N.T.S.
G.C.M.
1981-08-18
A1- 238-05-4004-005



12 piles as noted and 2 piles at divers discretion if corrosion is noted during the visual inspection.

Appendix J

Holyrood Terminal Station Proposed Jetty Head Proposed Mooring Upgrades to Existing Facility



HOLYROOD TERMINAL STATION
PROPOSED JETTY HEAD
PROPOSED MOORING UPGRADES
TO EXISTING FACILITY

FIGURE 5

Appendix K

Laser Vessel Docking System

STRAINSTALL UK LIMITED

DockAlert

Laser Vessel Docking System

Document Ref: #8306

Strainstall UK Limited
9/10 Mariners Way
Cowes
Isle Of Wight
PO31 8PD
U K

Tel: +44 (0)1983 203600
Fax: +44 (0)1983 291335
Email: sales@strainstall.co.uk
Web: www.strainstall.com

STRAINSTALL UK LIMITED.
DockAlert – LASER VESSEL DOCKING SYSTEM
Technical Description

INDEX

STRAINSTALL UK LIMITED.
DockAlert – LASER VESSEL DOCKING SYSTEM
Technical Description

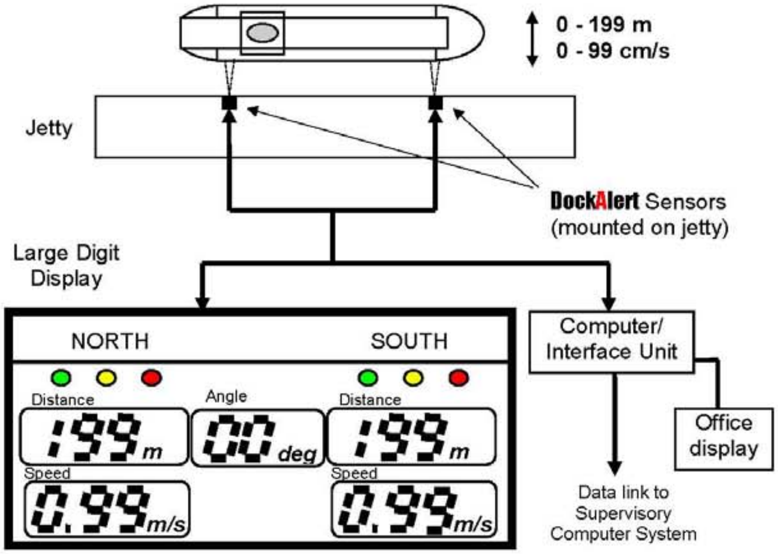
1. SYSTEM DESCRIPTION

The Strainstall **DockAlert** system is designed to give Harbour Authorities and Jetty Operators a clear and accurate reading of the speed and distance of a vessel as it approaches its berth, together with indication and alarm status of drift-off from the jetty once berthed.

DockAlert is a Dual Sensor system installed on the jetty, which transmits laser beams towards an incoming vessel, receiving reflections back from the Bow and Stern. The signals enable digital display of the vessel's approaching speed (Zero to ±99cm/s) and distance (-1 to 199m) from the berth.

A wide range of outputs is provided to maximise the system's flexibility - the **DockAlert** may be used in any configuration, from a simple high-visibility jetty display to a comprehensive data logging system integral with existing terminal control networks.

Optionally a small portable display (similar to a pager) can be provided. This is linked via radio to the main **DockAlert** system and provides a remote (e.g. on ship) display of the vessel's approach speed and distance. This unit may be supplied in an intrinsically safe version, enabling its use in a hazardous area.



Key features of **DockAlert** include:

- Real-time display of approach speed and distance during berthing and drift-off when berthed.
- High accuracy, increasing during critical approach.
- Simple above-surface installation.
- Operation unaffected by weather conditions.
- Reliable low maintenance design.
- Explosion proof construction. EEx'd' II BT5, IP65.
- Small portable unit option for on ship display.

2. SYSTEM SPECIFICATION

System	Laser transmission, 1.5 n sec. width pulse
Peak Power	High peak power Sensor (100W), Pulsed 10^5 times per sec
Safety	Eye safety, FDA Class 1 Laser.
Certification	Explosion proof construction to EEx'd' II BT5
Sealing	IP65
Distance Range	0 -199m
Accuracy	Better than 1cm
Minimum increment	1.0m (distances >10m) 0.1m (distances <10m)
Measuring Interval	1s to 9s
Speed Range	±99cm/s (Approach/leaving)
Resolution	1cm/s
Angle range	±15°
Resolution	1°
Sensor size max. (mm)	W300×H450×D700 mm (one sensor each end of berth)
Operating temperature	-10 to 50°C
Data output	Analogue and digital selectable
Displays	a) VDU graphic display for Control Room b) Large Digit Display for jetty c) Optional 'carry-on' portable display

The precision of the system increases with decreasing target distance, providing the highest accuracy when it is most needed.

The system measures speed and distance simultaneously, with no delays or interpolation errors.

Displays, outputs and peripherals can be configured to suit Customer requirements. Alarms can be 'zoned' so that a speed warning will be triggered by lower speeds at closer ranges.

Because the system is mounted above the waterline, it requires little maintenance and can be easily calibrated. The sensor unit is relatively small and can be mounted directly on a berth or fender dolphin..

DockAlert is unaffected by environmental conditions, including fog, rain and snow. It is packaged in a rugged weatherproof housing, and has no moving parts.

3. SUPPLY SCOPE

No.	Item	Q'ty	Remarks
1.	Laser Sensor	2	Explosion-proof (EEx'd' II BT5)
2.	Interface Unit	1 set	Non explosion-proof 800 x 800 x 2100mm panel
3.	Cable for Power Supply	1	3 core cable (10m length)
4.	Large Digit Display	1	Explosion-proof (Ex 'p')
5.	Accessories	1	
6.	Optional Portable Display (including base station transmitter antennae, software etc.)	1	Display may be EEx'ia' certified.

4. BRIEF DESCRIPTION OF EACH COMPONENT

4.1. LASER SENSOR

- Radiates ultra sharp laser pulse (1.5ns) with high peak power (100W), and receives reflection pulse easily from ship. Eye Safe, FDA Class 1 Laser.
- Self-supporting type and explosion proof construction. (EEx'd').
- Installed on the jetty for BOW and STERN, respectively.
- Easy maintenance as installed on dolphin platform. (above sea).

4.2. INTERFACE UNIT

- Enclosed in 800 x 800 x 2100mm panel and non-hazardous area use construction.
- Installed in the control room.
- Consist of Display Unit (VDU), Control Unit, Computer with keyboard and Power Unit.
- Process the input signals from LASER SENSOR and output the processed data.
- Measured data is saved in HD or FD. (3½")
- Optional Ethernet output for LAN connection.
- Optional serial and relay outputs for connection to site DCS etc.

4.3. LARGE DIGIT DISPLAY

- Installed on the jetty where captain can observe from ship's bridge.
- Self-supporting type, weather-proof and air pressurised hazardous protection.
- Display the distance BOW and STERN, ship approaching speed respectively.
- LED lamp digit display which can control light intensity.
- LED lamp alters the colour for three approaching speed levels.
  RED in dangerous speed.
  AMBER in cautionary speed.
  GREEN in safety speed.

4.4. PORTABLE DISPLAY

- Small and lightweight (similar to a pager).
- Provides numerical display of approach speed and distance.
- Provides internal alarm to warn of danger levels.
- Multiple displays may be used with a single base station transmitter.
- Intrinsically Safe (EEx'ia') version available for use in hazardous areas.

4.5. CABLES

4.5.1. Purchaser Supply

- 3 pair twist cable individual screen 1.5mm^2, (use for Laser Sensor).
- 6 pair twist cable individual screen 1.5mm^2, (use for Large Digit Display).
- The recommended cable specification shall be provided at the detailed Contract planning stage.

4.5.2. Strainstall Supply

- 3 core cable, (used for power supply to Interface Unit).

5. DETAILED SPECIFICATION

5.1. GENERAL

Measuring distance	-1 to 199m
Measuring speed	0 to ±99cm/s (+:Approaching, -: Leaving)
Tilt of ship to the berthing line	within ±15°. Against berthing line
Increment of measurement (resolution of digit)	Distance : 1m at distance more than 10m 0.1m at distance less 9.9m
Speed:	1cm/s
Angle:	1°
Power consumption	AC 230V ±10% 50Hz 300VA (excluding LIGHT BOARD DISPLAY)

5.2. LASER SENSOR

5.2.1. Construction

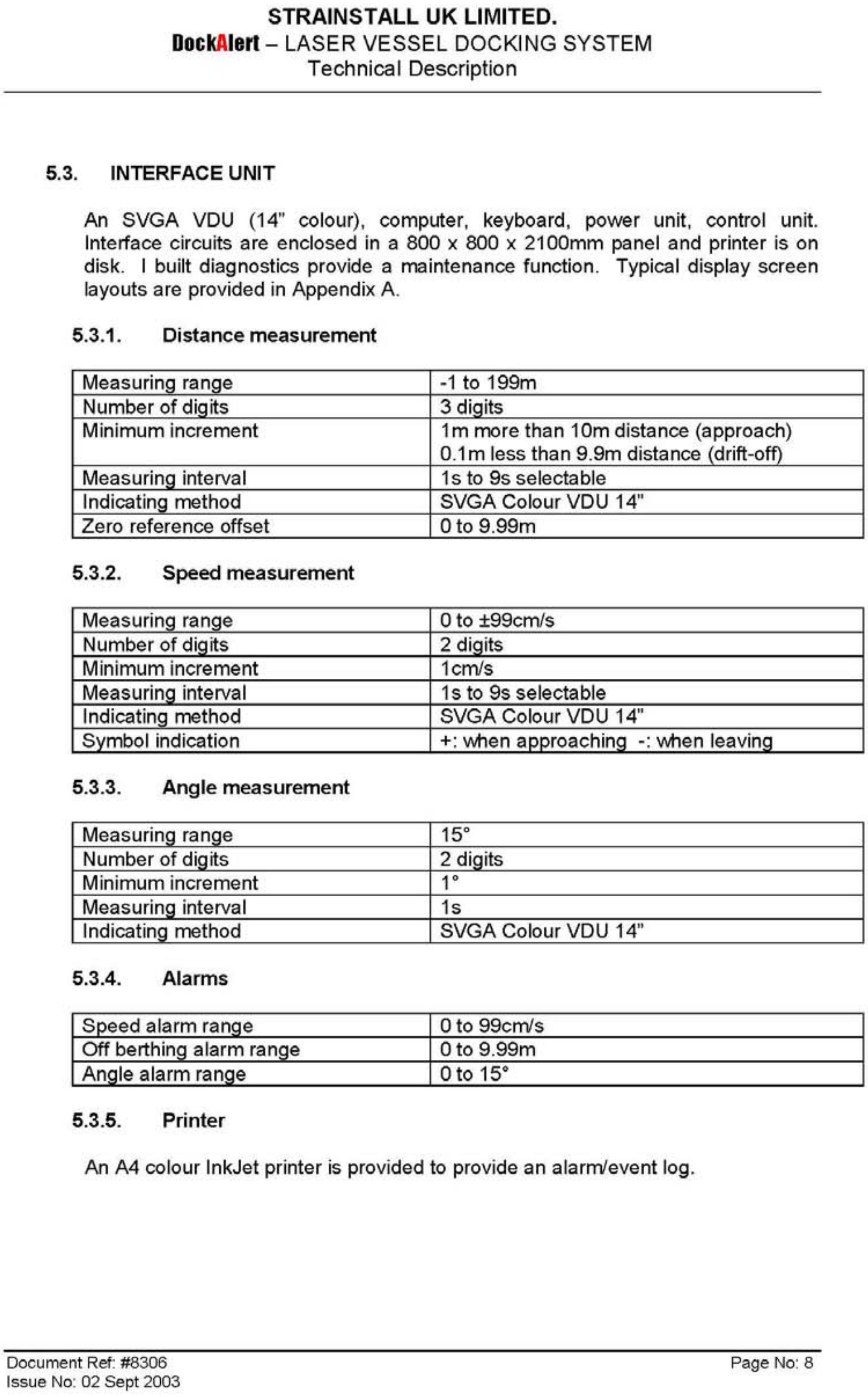
Protection	EEx'd' II BT5 JIS : Explosion proof, IP65
Materials	Anti corrosive aluminium & SUS
Painting (Colour)	Epoxy (Manufacturer standard)
Dimension	W250 × H403 × D650mm
Weight	~ 30Kg

5.2.2. Laser Light

Wave length	~ 850nm
Peak power	100W peak
Pulse width	1.5ns
Pulse repeating	100,000 times/s
Eye safe class	FDA Class 1
Detective distance	More than 200m
Beam angle	±0.13°
Distance accuracy	Less 1cm

5.2.3. Operating Conditions

Ambient temperature	-10 to 50°C
Storage temperature	-10 to 70°C
Ambient humidity	10 to 95% RH (non condensation)



5.3. INTERFACE UNIT

An SVGA VDU (14" colour), computer, keyboard, power unit, control unit. Interface circuits are enclosed in a 800 x 800 x 2100mm panel and printer is on disk. I built diagnostics provide a maintenance function. Typical display screen layouts are provided in Appendix A.

5.3.1. Distance measurement

Measuring range	-1 to 199m
Number of digits	3 digits
Minimum increment	1m more than 10m distance (approach) 0.1m less than 9.9m distance (drift-off)
Measuring interval	1s to 9s selectable
Indicating method	SVGA Colour VDU 14"
Zero reference offset	0 to 9.99m

5.3.2. Speed measurement

Measuring range	0 to ±99cm/s
Number of digits	2 digits
Minimum increment	1cm/s
Measuring interval	1s to 9s selectable
Indicating method	SVGA Colour VDU 14"
Symbol indication	+: when approaching -: when leaving

5.3.3. Angle measurement

Measuring range	15°
Number of digits	2 digits
Minimum increment	1°
Measuring interval	1s
Indicating method	SVGA Colour VDU 14"

5.3.4. Alarms

Speed alarm range	0 to 99cm/s
Off berthing alarm range	0 to 9.99m
Angle alarm range	0 to 15°

5.3.5. Printer

An A4 colour InkJet printer is provided to provide an alarm/event log.

5.3.6. Operating Conditions

Ambient temperature	0 to 45°C (main computer unit)
Storage temperature	-5 to 60°C
Ambient humidity	10 to 80% RH (non condensation)

5.4. LARGE DIGIT DISPLAY

5.4.1. Construction

Protection	Inner pressurised hazardous protection (Ex 'p')
Materials	Stainless Steel plate
Finish	Natural, unpainted
Dimension	W2800 × H1800 × D500mm
Weight	~1040kg

5.4.2. Indication

Range (Distance)	0 to 199m
Range (Speed)	0 to ±99cm/s
Number of digits (Distance)	3 digits
Number of digits (Speed)	2 digits
Min. increment distance	1m at distance more than 10m 0.1m at distance less than 9.9m
Min. increment speed	1cm/s
Lamp	LED lamp controlled light intensity

5.4.3. General

Power consumption	AC 110V ±10%, 50Hz
Design wind velocity	Within 50m/s
Air consumption	250l/m minimum
Name plate	[BOW] [STERN]
Turn swivel	±45° remote controlled from MCR
Visible Range	200m in clear weather
Visible Range	±45° (horizontal) ±45° (vertical)

5.4.4. Operating Conditions

Ambient temperature	-10 to 50°C
Storage temperature	-10 to 70°C
Ambient humidity	10 to 85% RH (non condensation)

5.5. PORTABLE DISPLAY

5.5.1. Construction

Hazardous Area Certification	EEx 'ia' (option)
Dimensions	W57 × H82 × D17.5mm
Weight	~90g

5.5.2. Indication

Display Type	Supertwist LCD
Visible display screen	4 rows x 24 characters
Range (Distance)	0 to 199m
Range (Speed)	0 to ±99cm/s
Number of digits (Distance)	3 digits
Number of digits (Speed)	2 digits
Backlight	Electroluminescent backlight
Alarm	a) Internal vibrator motor, 80dB at 30cm b) Red LED indicator

5.5.3. Power Supply

Battery life	800 hours
Battery Type	Single AAA cell

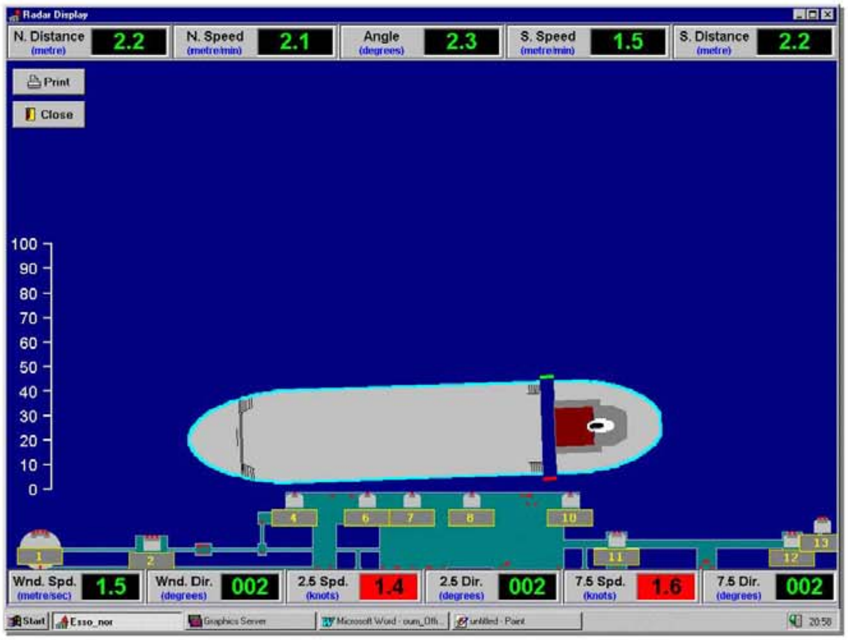
5.5.4. Operating Conditions

Ambient temperature	-10 to 50°C
Storage temperature	-10 to 70°C
Ambient humidity	10 to 85% RH (non condensation)

Note. The portable Display requires a base station transmitter. This is incorporated into the Interface Unit.

APPENDIX A

VDU Screen Displays


Radar Display

N. Distance (metre) 2.2
N. Speed (metre/min) 2.1
Angle (degrees) 2.3
S. Speed (metre/min) 1.5
S. Distance (metre) 2.2

Wnd. Spd. (metre/sec) 1.5
Wnd. Dir. (degrees) 002
2.5 Spd. (knots) 1.4
2.5 Dir. (degrees) 002
7.5 Spd. (knots) 1.6
7.5 Dir. (degrees) 002

Figure 1 – Vessel Approach Screen Graphic

High Speed and Float Away Alarms for Ships up to 200 metre

Select Ship Size : 3 : Ships up to 200 metre

Max. Reference Distance: 100 (m)

Max. Reference Speed: 50 (m/min)

Max. Collision Speed: 3 (m/min)

Approach Alarm: 75 (%)

☑ Enable HighSpeed Alarm

Float Away Alarm

Distance: 0.50 (m)

☑ Enable Float Away Alarm

Figure 2 – Alarm Setting VDU Screen

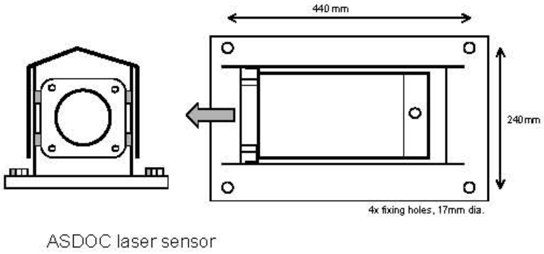


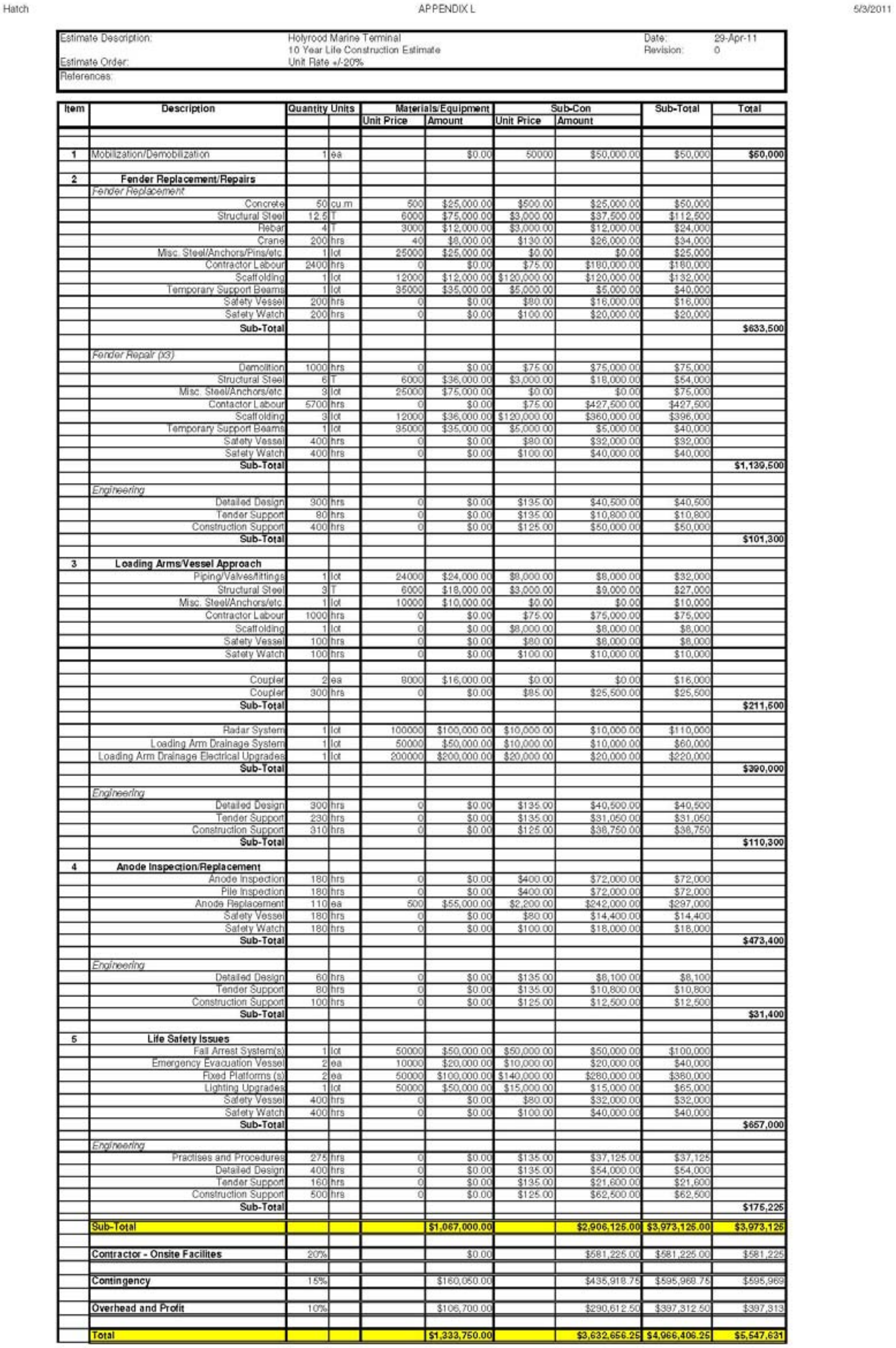
Figure 3 – Laser Sensor Details

HATCH™

Appendix L

Construction Cost Estimate

WorkingTogether SAFELY



Hatch APPENDIX L 5/3/2011

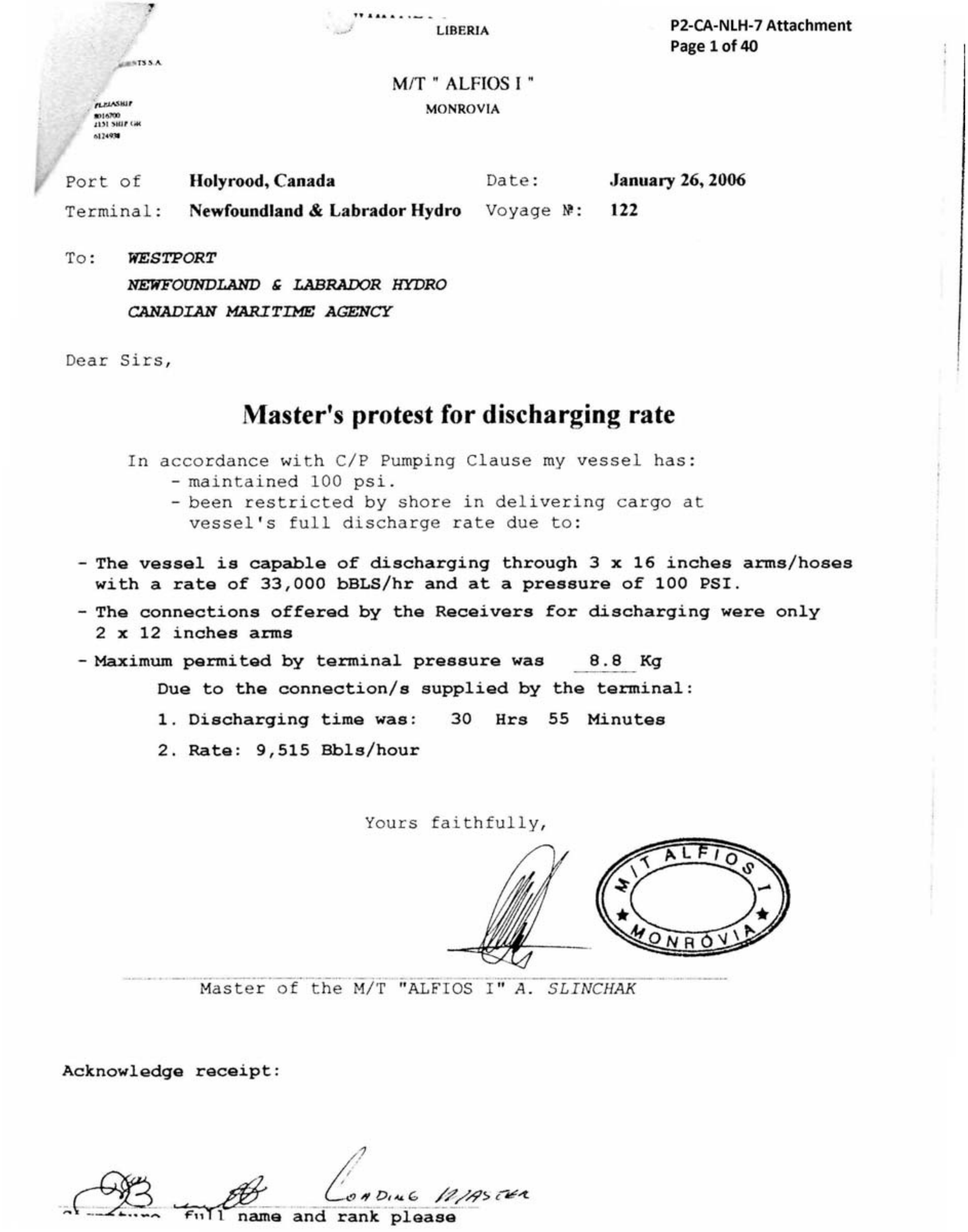
Estimate Description: Holyrood Marine Terminal
10 Year Life Construction Estimate
Estimate Order: Unit Rate +/-20%
Date: 29-Apr-11
Revision: 0
References:

Item	Description	Quantity	Units	Materials/Equipment		Sub-Con		Sub-Total	Total
				Unit Price	Amount	Unit Price	Amount		
1	Mobilization/Demobilization	1	ea		$0.00	50000	$50,000.00	$50,000	**$50,000**
2	**Fender Replacement/Repairs**								
	Fender Replacement								
	Concrete	50	cu.m	500	$25,000.00	$500.00	$25,000.00	$50,000	
	Structural Steel	12.5	T	6000	$75,000.00	$3,000.00	$37,500.00	$112,500	
	Rebar	4	T	3000	$12,000.00	$3,000.00	$12,000.00	$24,000	
	Crane	200	hrs	40	$8,000.00	$130.00	$26,000.00	$34,000	
	Misc. Steel/Anchors/Pins/etc.	1	lot	25000	$25,000.00	$0.00	$0.00	$25,000	
	Contractor Labour	2400	hrs	0	$0.00	$75.00	$180,000.00	$180,000	
	Scaffolding	1	lot	12000	$12,000.00	$120,000.00	$120,000.00	$132,000	
	Temporary Support Beams	1	lot	35000	$35,000.00	$5,000.00	$5,000.00	$40,000	
	Safety Vessel	200	hrs	0	$0.00	$80.00	$16,000.00	$16,000	
	Safety Watch	200	hrs	0	$0.00	$100.00	$20,000.00	$20,000	
	Sub-Total								**$633,500**
	Fender Repair (x3)								
	Demolition	1000	hrs	0	$0.00	$75.00	$75,000.00	$75,000	
	Structural Steel	6	T	6000	$36,000.00	$3,000.00	$18,000.00	$54,000	
	Misc. Steel/Anchors/etc.	3	lot	25000	$75,000.00	$0.00	$0.00	$75,000	
	Contactor Labour	5700	hrs	0	$0.00	$75.00	$427,500.00	$427,500	
	Scaffolding	3	lot	12000	$36,000.00	$120,000.00	$360,000.00	$396,000	
	Temporary Support Beams	1	lot	35000	$35,000.00	$5,000.00	$5,000.00	$40,000	
	Safety Vessel	400	hrs	0	$0.00	$80.00	$32,000.00	$32,000	
	Safety Watch	400	hrs	0	$0.00	$100.00	$40,000.00	$40,000	
	Sub-Total								**$1,139,500**
	Engineering								
	Detailed Design	300	hrs	0	$0.00	$135.00	$40,500.00	$40,500	
	Tender Support	80	hrs	0	$0.00	$135.00	$10,800.00	$10,800	
	Construction Support	400	hrs	0	$0.00	$125.00	$50,000.00	$50,000	
	Sub-Total								**$101,300**
3	**Loading Arms/Vessel Approach**								
	Piping/Valves/fittings	1	lot	24000	$24,000.00	$8,000.00	$8,000.00	$32,000	
	Structural Steel	3	T	6000	$18,000.00	$3,000.00	$9,000.00	$27,000	
	Misc. Steel/Anchors/etc.	1	lot	10000	$10,000.00	$0.00	$0.00	$10,000	
	Contractor Labour	1000	hrs	0	$0.00	$75.00	$75,000.00	$75,000	
	Scaffolding	1	lot	0	$0.00	$8,000.00	$8,000.00	$8,000	
	Safety Vessel	100	hrs	0	$0.00	$80.00	$8,000.00	$8,000	
	Safety Watch	100	hrs	0	$0.00	$100.00	$10,000.00	$10,000	
	Coupler	2	ea	8000	$16,000.00	$0.00	$0.00	$16,000	
	Coupler	300	hrs	0	$0.00	$85.00	$25,500.00	$25,500	
	Sub-Total								**$211,500**
	Radar System	1	lot	100000	$100,000.00	$10,000.00	$10,000.00	$110,000	
	Loading Arm Drainage System	1	lot	50000	$50,000.00	$10,000.00	$10,000.00	$60,000	
	Loading Arm Drainage Electrical Upgrades	1	lot	200000	$200,000.00	$20,000.00	$20,000.00	$220,000	
	Sub-Total								**$390,000**
	Engineering								
	Detailed Design	300	hrs	0	$0.00	$135.00	$40,500.00	$40,500	
	Tender Support	230	hrs	0	$0.00	$135.00	$31,050.00	$31,050	
	Construction Support	310	hrs	0	$0.00	$125.00	$38,750.00	$38,750	
	Sub-Total								**$110,300**
4	**Anode Inspection/Replacement**								
	Anode Inspection	180	hrs	0	$0.00	$400.00	$72,000.00	$72,000	
	Pile Inspection	180	hrs	0	$0.00	$400.00	$72,000.00	$72,000	
	Anode Replacement	110	ea	500	$55,000.00	$2,200.00	$242,000.00	$297,000	
	Safety Vessel	180	hrs	0	$0.00	$80.00	$14,400.00	$14,400	
	Safety Watch	180	hrs	0	$0.00	$100.00	$18,000.00	$18,000	
	Sub-Total								**$473,400**
	Engineering								
	Detailed Design	60	hrs	0	$0.00	$135.00	$8,100.00	$8,100	
	Tender Support	80	hrs	0	$0.00	$135.00	$10,800.00	$10,800	
	Construction Support	100	hrs	0	$0.00	$125.00	$12,500.00	$12,500	
	Sub-Total								**$31,400**
5	**Life Safety Issues**								
	Fall Arrest System(s)	1	lot	50000	$50,000.00	$50,000.00	$50,000.00	$100,000	
	Emergency Evacuation Vessel	2	ea	10000	$20,000.00	$10,000.00	$20,000.00	$40,000	
	Fixed Platforms (s)	2	ea	50000	$100,000.00	$140,000.00	$280,000.00	$380,000	
	Lighting Upgrades	1	lot	50000	$50,000.00	$15,000.00	$15,000.00	$65,000	
	Safety Vessel	400	hrs	0	$0.00	$80.00	$32,000.00	$32,000	
	Safety Watch	400	hrs	0	$0.00	$100.00	$40,000.00	$40,000	
	Sub-Total								**$657,000**
	Engineering								
	Practises and Procedures	275	hrs	0	$0.00	$135.00	$37,125.00	$37,125	
	Detailed Design	400	hrs	0	$0.00	$135.00	$54,000.00	$54,000	
	Tender Support	160	hrs	0	$0.00	$135.00	$21,600.00	$21,600	
	Construction Support	500	hrs	0	$0.00	$125.00	$62,500.00	$62,500	
	Sub-Total								**$175,225**
	Sub-Total				**$1,067,000.00**		**$2,906,125.00**	**$3,973,125.00**	**$3,973,125**
	Contractor - Onsite Facilites	20%			$0.00		$581,225.00	$581,225.00	$581,225
	Contingency	15%			$160,050.00		$435,918.75	$595,968.75	$595,969
	Overhead and Profit	10%			$106,700.00		$290,612.50	$397,312.50	$397,313
	Total				**$1,333,750.00**		**$3,632,656.25**	**$4,966,406.25**	**$5,547,631**

Suite E200, Bally Rou Place, 280 Torbay Rd.
St. John's, Newfoundland, Canada A1A 3W8
Tel (709) 754 6933 • Fax (709) 754 2717

APPENDIX C

Letters of Protest (2006 – 2011)



P2-CA-NLH-7 Attachment
Page 1 of 40

LIBERIA

M/T " ALFIOS I "
MONROVIA

Port of **Holyrood, Canada** Date: **January 26, 2006**
Terminal: **Newfoundland & Labrador Hydro** Voyage №: **122**

To: ***WESTPORT***
NEWFOUNDLAND & LABRADOR HYDRO
CANADIAN MARITIME AGENCY

Dear Sirs,

Master's protest for discharging rate

In accordance with C/P Pumping Clause my vessel has:
- maintained 100 psi.
- been restricted by shore in delivering cargo at vessel's full discharge rate due to:

- **The vessel is capable of discharging through 3 x 16 inches arms/hoses with a rate of 33,000 bBLS/hr and at a pressure of 100 PSI.**
- **The connections offered by the Receivers for discharging were only 2 x 12 inches arms**
- **Maximum permited by terminal pressure was 8.8 Kg**

Due to the connection/s supplied by the terminal:

1. **Discharging time was: 30 Hrs 55 Minutes**
2. **Rate: 9,515 Bbls/hour**

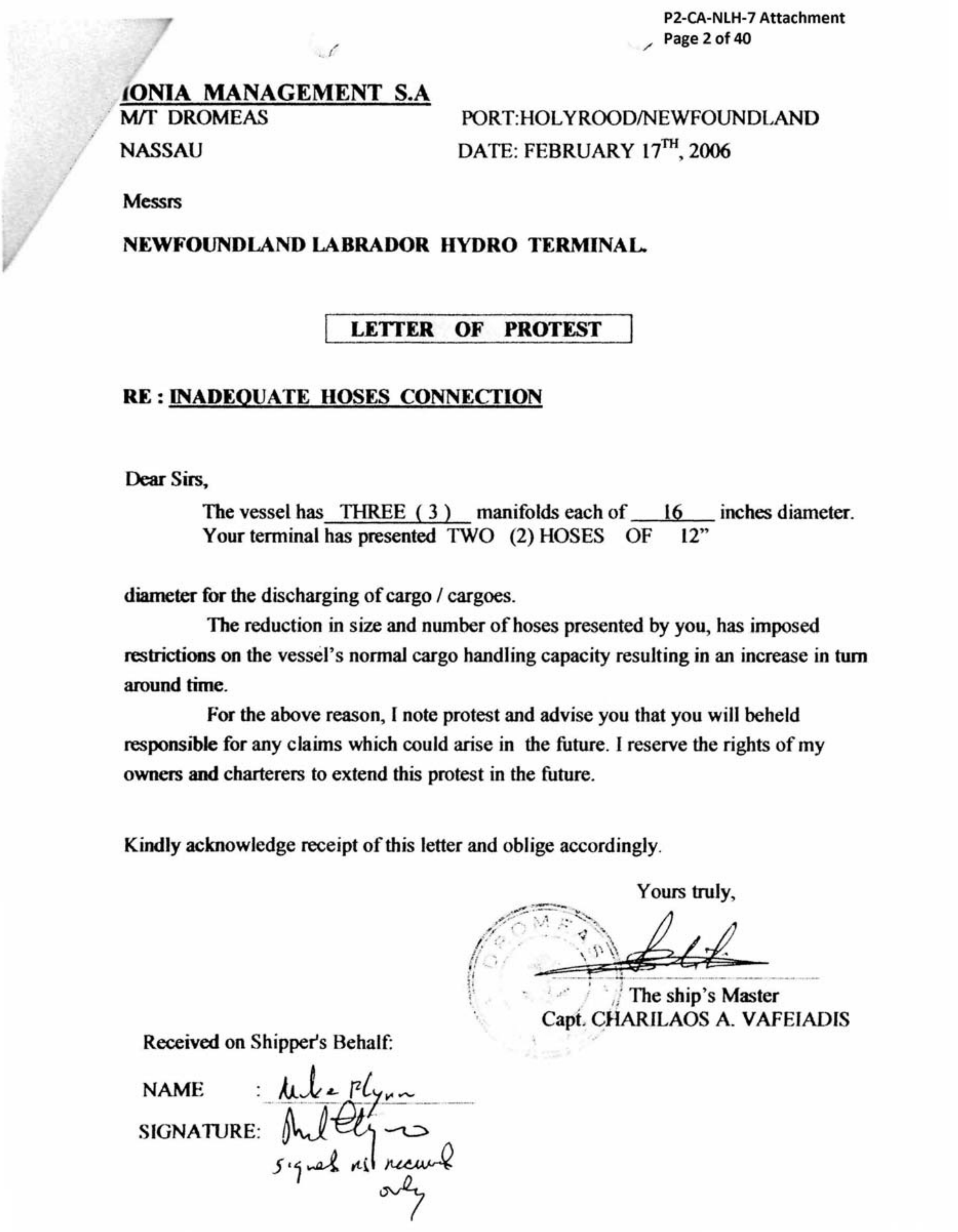
Yours faithfully,

Master of the M/T "ALFIOS I" *A. SLINCHAK*

Acknowledge receipt:

Loading Master

full name and rank please



IONIA MANAGEMENT S.A
M/T DROMEAS
NASSAU

PORT:HOLYROOD/NEWFOUNDLAND
DATE: FEBRUARY 17TH, 2006

Messrs

NEWFOUNDLAND LABRADOR HYDRO TERMINAL.

LETTER OF PROTEST

RE : INADEQUATE HOSES CONNECTION

Dear Sirs,

The vessel has THREE (3) manifolds each of 16 inches diameter.
Your terminal has presented TWO (2) HOSES OF 12"

diameter for the discharging of cargo / cargoes.

The reduction in size and number of hoses presented by you, has imposed restrictions on the vessel's normal cargo handling capacity resulting in an increase in turn around time.

For the above reason, I note protest and advise you that you will beheld responsible for any claims which could arise in the future. I reserve the rights of my owners and charterers to extend this protest in the future.

Kindly acknowledge receipt of this letter and oblige accordingly.

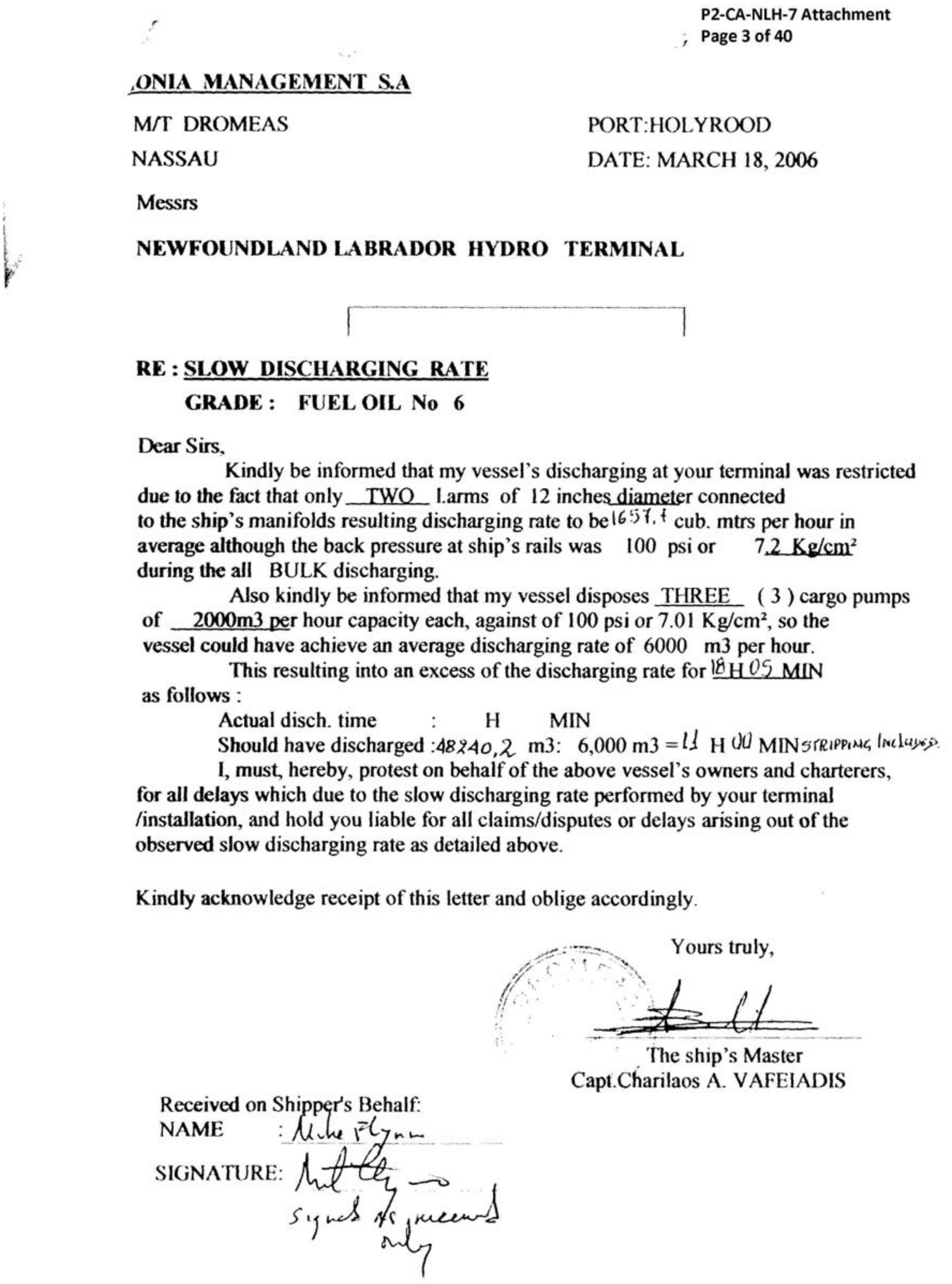
Yours truly,

The ship's Master
Capt. CHARILAOS A. VAFEIADIS

Received on Shipper's Behalf:

NAME : Mike Flynn

SIGNATURE: Mike Flynn
signed as receipt only



ONIA MANAGEMENT S.A

M/T DROMEAS
NASSAU

PORT:HOLYROOD
DATE: MARCH 18, 2006

Messrs

NEWFOUNDLAND LABRADOR HYDRO TERMINAL

RE : SLOW DISCHARGING RATE
GRADE : FUEL OIL No 6

Dear Sirs,

Kindly be informed that my vessel's discharging at your terminal was restricted due to the fact that only TWO l.arms of 12 inches diameter connected to the ship's manifolds resulting discharging rate to be 1657.4 cub. mtrs per hour in average although the back pressure at ship's rails was 100 psi or 7.2 Kg/cm² during the all BULK discharging.

Also kindly be informed that my vessel disposes THREE (3) cargo pumps of 2000m3 per hour capacity each, against of 100 psi or 7.01 Kg/cm², so the vessel could have achieve an average discharging rate of 6000 m3 per hour.

This resulting into an excess of the discharging rate for 18 H 05 MIN as follows :

Actual disch. time : H MIN
Should have discharged :48240,2 m3: 6,000 m3 = 11 H 00 MIN STRIPPING Included.

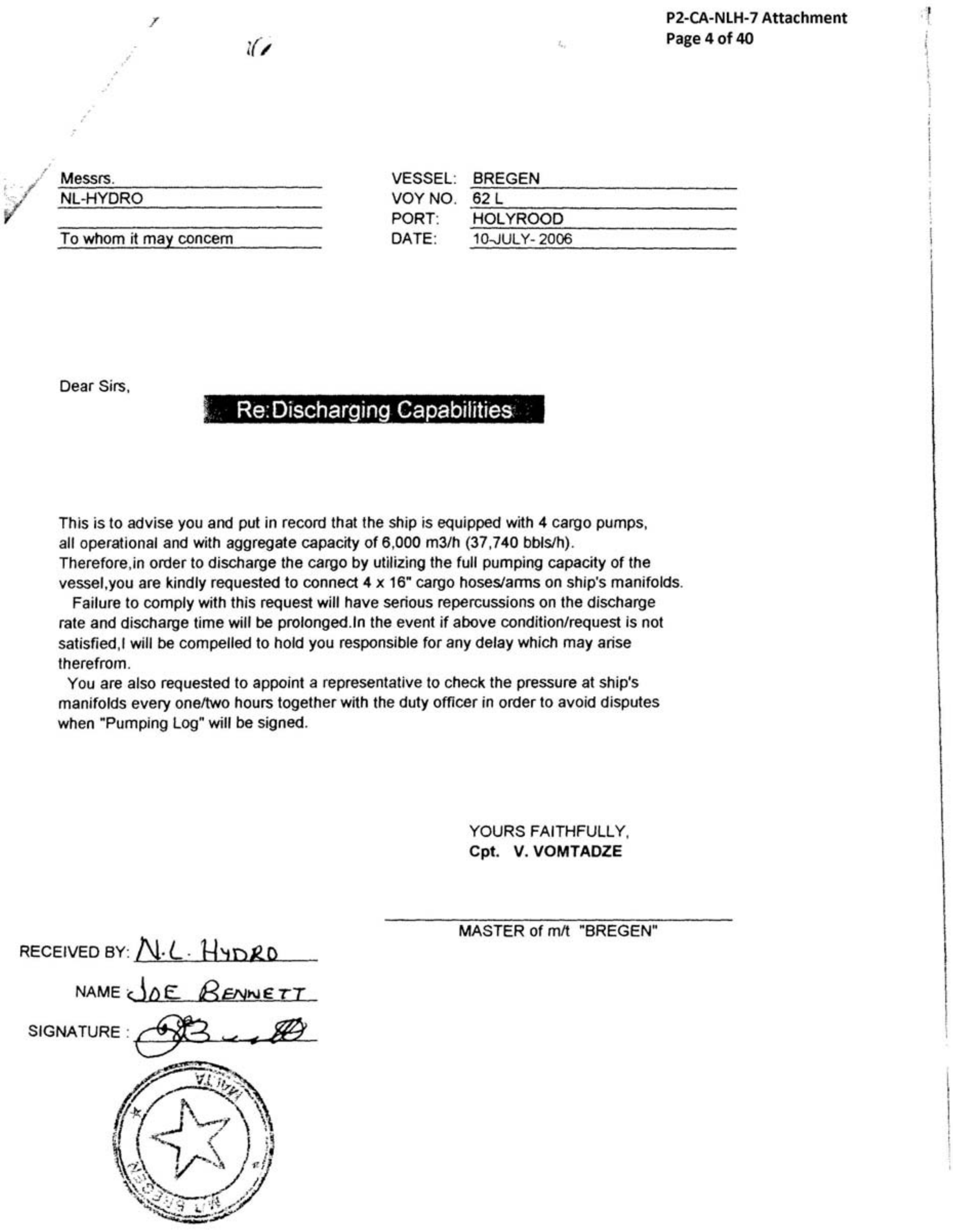
I, must, hereby, protest on behalf of the above vessel's owners and charterers, for all delays which due to the slow discharging rate performed by your terminal /installation, and hold you liable for all claims/disputes or delays arising out of the observed slow discharging rate as detailed above.

Kindly acknowledge receipt of this letter and oblige accordingly.

Yours truly,

The ship's Master
Capt.Charilaos A. VAFEIADIS

Received on Shipper's Behalf:
NAME : Mike Flynn
SIGNATURE:
Signed as received only



Messrs.
NL-HYDRO

To whom it may concern

VESSEL: BREGEN
VOY NO. 62 L
PORT: HOLYROOD
DATE: 10-JULY- 2006

Dear Sirs,

Re:Discharging Capabilities

This is to advise you and put in record that the ship is equipped with 4 cargo pumps, all operational and with aggregate capacity of 6,000 m3/h (37,740 bbls/h). Therefore,in order to discharge the cargo by utilizing the full pumping capacity of the vessel,you are kindly requested to connect 4 x 16" cargo hoses/arms on ship's manifolds.

Failure to comply with this request will have serious repercussions on the discharge rate and discharge time will be prolonged.In the event if above condition/request is not satisfied,I will be compelled to hold you responsible for any delay which may arise therefrom.

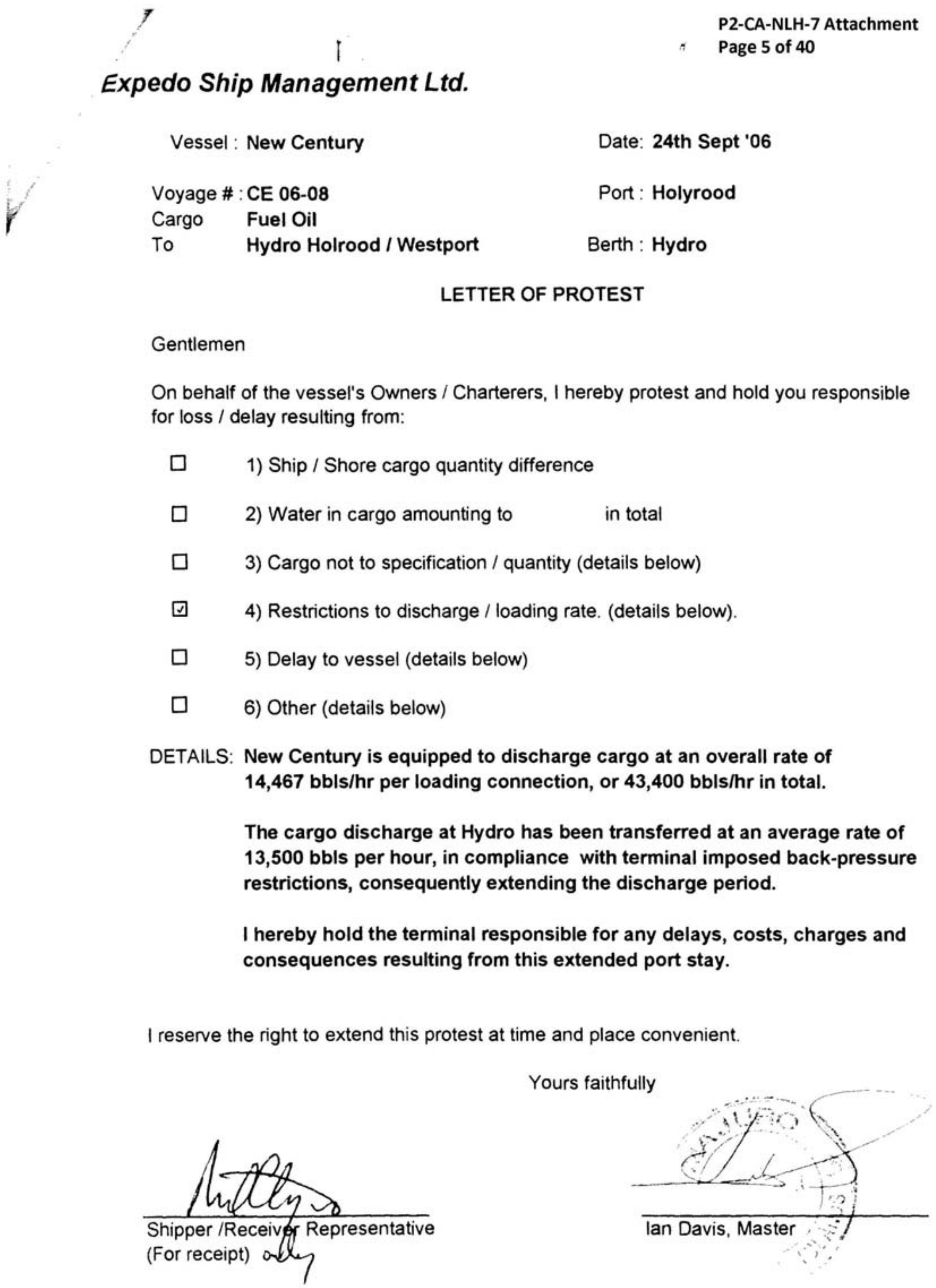
You are also requested to appoint a representative to check the pressure at ship's manifolds every one/two hours together with the duty officer in order to avoid disputes when "Pumping Log" will be signed.

YOURS FAITHFULLY,
Cpt. V. VOMTADZE

MASTER of m/t "BREGEN"

RECEIVED BY: N.L. HYDRO
NAME: JOE BENNETT
SIGNATURE :

M/T BREGEN



Expedo Ship Management Ltd.

Vessel : **New Century**
Date: **24th Sept '06**

Voyage # : **CE 06-08**
Port : **Holyrood**
Cargo **Fuel Oil**
To **Hydro Holrood / Westport**
Berth : **Hydro**

LETTER OF PROTEST

Gentlemen

On behalf of the vessel's Owners / Charterers, I hereby protest and hold you responsible for loss / delay resulting from:

☐ 1) Ship / Shore cargo quantity difference

☐ 2) Water in cargo amounting to in total

☐ 3) Cargo not to specification / quantity (details below)

☑ 4) Restrictions to discharge / loading rate. (details below).

☐ 5) Delay to vessel (details below)

☐ 6) Other (details below)

DETAILS: **New Century is equipped to discharge cargo at an overall rate of 14,467 bbls/hr per loading connection, or 43,400 bbls/hr in total.**

The cargo discharge at Hydro has been transferred at an average rate of 13,500 bbls per hour, in compliance with terminal imposed back-pressure restrictions, consequently extending the discharge period.

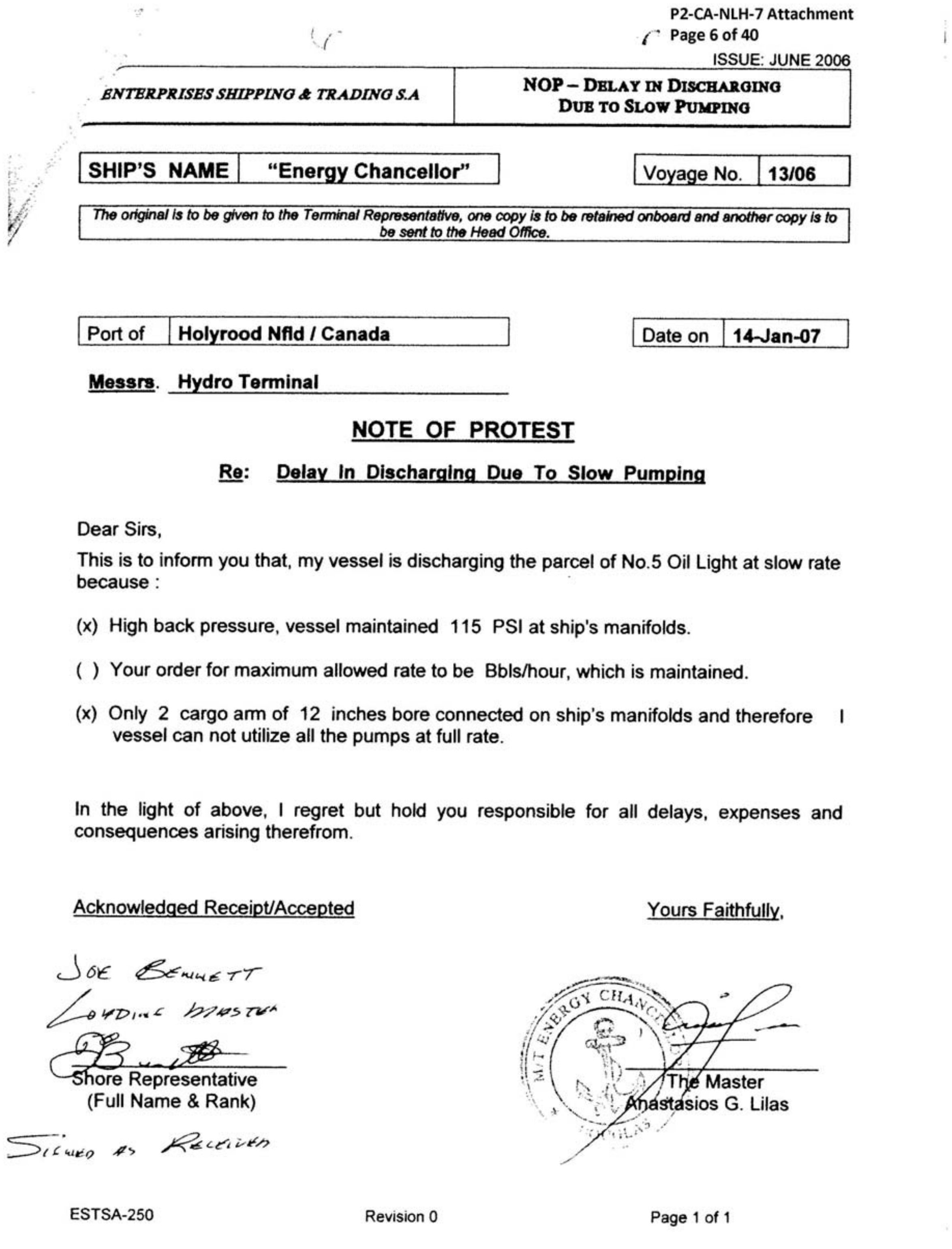
I hereby hold the terminal responsible for any delays, costs, charges and consequences resulting from this extended port stay.

I reserve the right to extend this protest at time and place convenient.

Yours faithfully

Shipper /Receiver Representative
(For receipt)

Ian Davis, Master



P2-CA-NLH-7 Attachment
Page 6 of 40

ISSUE: JUNE 2006

ENTERPRISES SHIPPING & TRADING S.A	**NOP – DELAY IN DISCHARGING DUE TO SLOW PUMPING**

SHIP'S NAME	**"Energy Chancellor"**

Voyage No.	**13/06**

The original is to be given to the Terminal Representative, one copy is to be retained onboard and another copy is to be sent to the Head Office.

Port of	**Holyrood Nfld / Canada**

Date on	**14-Jan-07**

Messrs. **Hydro Terminal**

NOTE OF PROTEST

Re: Delay In Discharging Due To Slow Pumping

Dear Sirs,

This is to inform you that, my vessel is discharging the parcel of No.5 Oil Light at slow rate because :

(x) High back pressure, vessel maintained 115 PSI at ship's manifolds.

( ) Your order for maximum allowed rate to be Bbls/hour, which is maintained.

(x) Only 2 cargo arm of 12 inches bore connected on ship's manifolds and therefore I vessel can not utilize all the pumps at full rate.

In the light of above, I regret but hold you responsible for all delays, expenses and consequences arising therefrom.

Acknowledged Receipt/Accepted

JOE BENNETT
LOADING MASTER

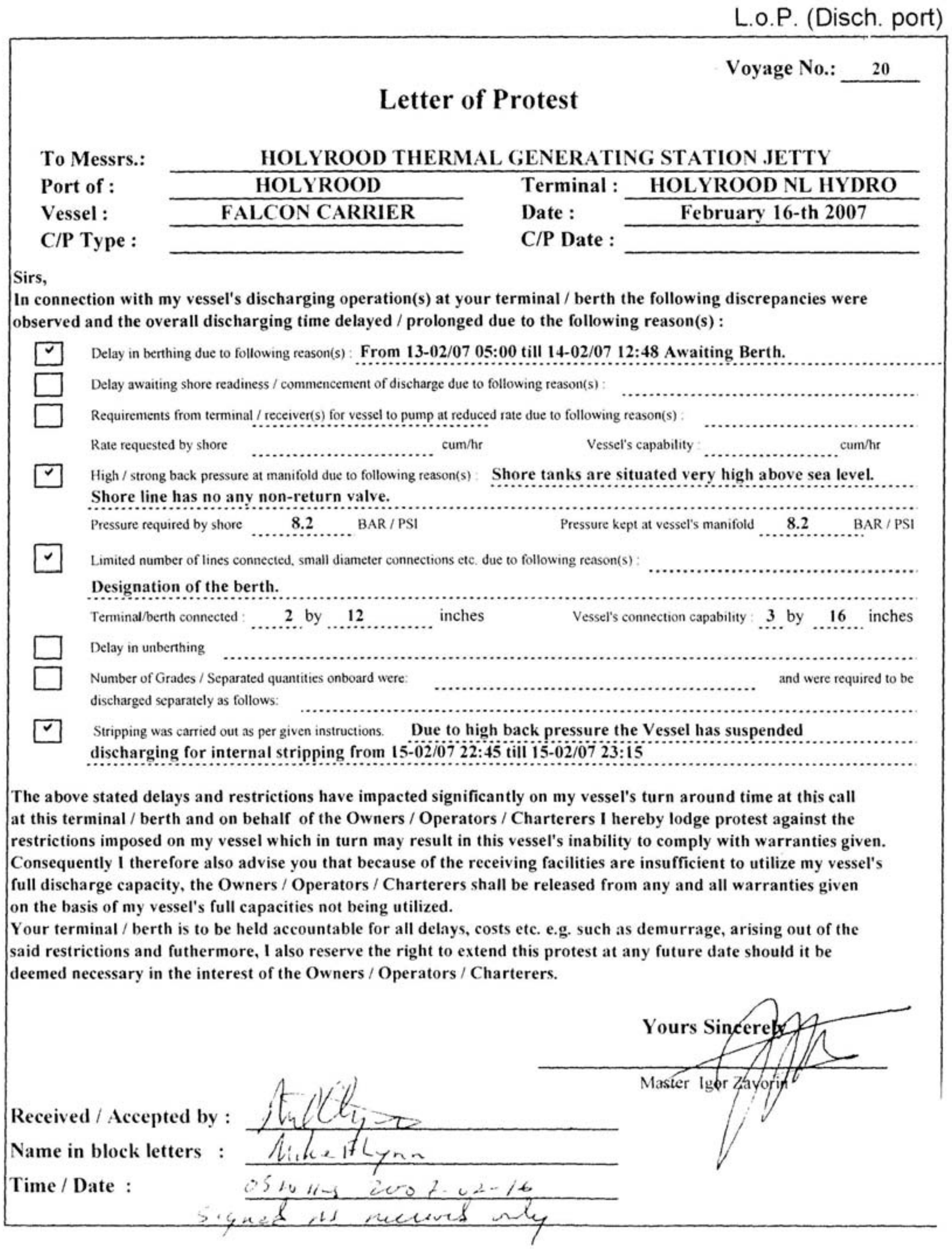
Shore Representative
(Full Name & Rank)

SIGNED AS RECEIVED

Yours Faithfully,

The Master
Anastasios G. Lilas

ESTSA-250 Revision 0 Page 1 of 1



L.o.P. (Disch. port)

Voyage No.: 20

Letter of Protest

To Messrs.: HOLYROOD THERMAL GENERATING STATION JETTY
Port of : HOLYROOD **Terminal :** HOLYROOD NL HYDRO
Vessel : FALCON CARRIER **Date :** February 16-th 2007
C/P Type : **C/P Date :**

Sirs,
In connection with my vessel's discharging operation(s) at your terminal / berth the following discrepancies were observed and the overall discharging time delayed / prolonged due to the following reason(s) :

☑ Delay in berthing due to following reason(s) : **From 13-02/07 05:00 till 14-02/07 12:48 Awaiting Berth.**

☐ Delay awaiting shore readiness / commencement of discharge due to following reason(s) :

☐ Requirements from terminal / receiver(s) for vessel to pump at reduced rate due to following reason(s) :
Rate requested by shore cum/hr Vessel's capability : cum/hr

☑ High / strong back pressure at manifold due to following reason(s) : **Shore tanks are situated very high above sea level. Shore line has no any non-return valve.**
Pressure required by shore 8.2 BAR / PSI Pressure kept at vessel's manifold 8.2 BAR / PSI

☑ Limited number of lines connected, small diameter connections etc. due to following reason(s) : **Designation of the berth.**
Terminal/berth connected : 2 by 12 inches Vessel's connection capability : 3 by 16 inches

☐ Delay in unberthing

☐ Number of Grades / Separated quantities onboard were: and were required to be discharged separately as follows:

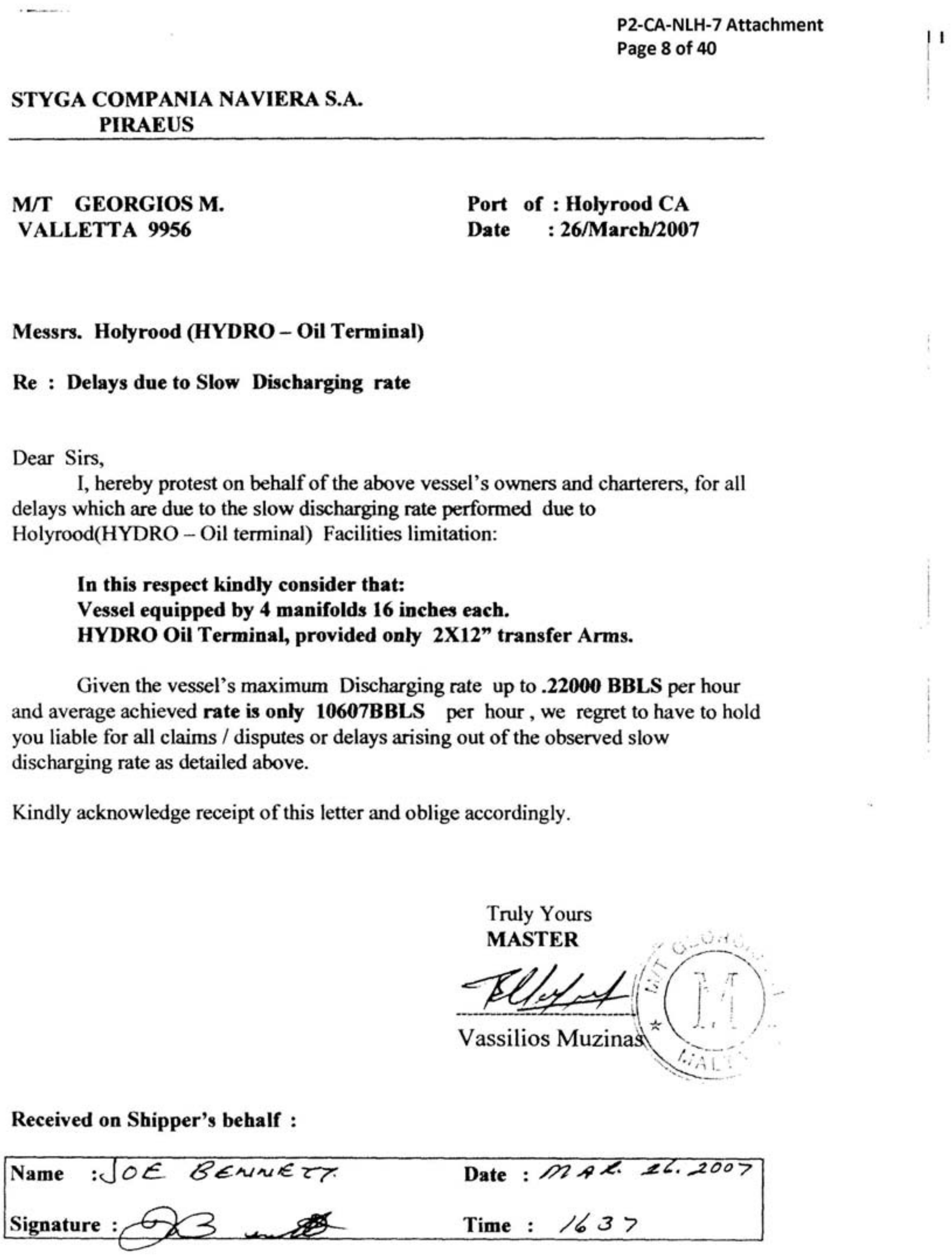
☑ Stripping was carried out as per given instructions. **Due to high back pressure the Vessel has suspended discharging for internal stripping from 15-02/07 22:45 till 15-02/07 23:15**

The above stated delays and restrictions have impacted significantly on my vessel's turn around time at this call at this terminal / berth and on behalf of the Owners / Operators / Charterers I hereby lodge protest against the restrictions imposed on my vessel which in turn may result in this vessel's inability to comply with warranties given. Consequently I therefore also advise you that because of the receiving facilities are insufficient to utilize my vessel's full discharge capacity, the Owners / Operators / Charterers shall be released from any and all warranties given on the basis of my vessel's full capacities not being utilized.
Your terminal / berth is to be held accountable for all delays, costs etc. e.g. such as demurrage, arising out of the said restrictions and futhermore, I also reserve the right to extend this protest at any future date should it be deemed necessary in the interest of the Owners / Operators / Charterers.

Yours Sincerely

Master Igor Zavorin

Received / Accepted by :
Name in block letters : Mike Flynn
Time / Date : 0510 hrs 2007-02-16
Signed as received only



STYGA COMPANIA NAVIERA S.A.
PIRAEUS

M/T GEORGIOS M.
VALLETTA 9956

Port of : Holyrood CA
Date : 26/March/2007

Messrs. Holyrood (HYDRO – Oil Terminal)

Re : Delays due to Slow Discharging rate

Dear Sirs,

I, hereby protest on behalf of the above vessel's owners and charterers, for all delays which are due to the slow discharging rate performed due to Holyrood(HYDRO – Oil terminal) Facilities limitation:

In this respect kindly consider that:
Vessel equipped by 4 manifolds 16 inches each.
HYDRO Oil Terminal, provided only 2X12" transfer Arms.

Given the vessel's maximum Discharging rate up to **.22000 BBLS** per hour and average achieved **rate is only 10607BBLS** per hour, we regret to have to hold you liable for all claims / disputes or delays arising out of the observed slow discharging rate as detailed above.

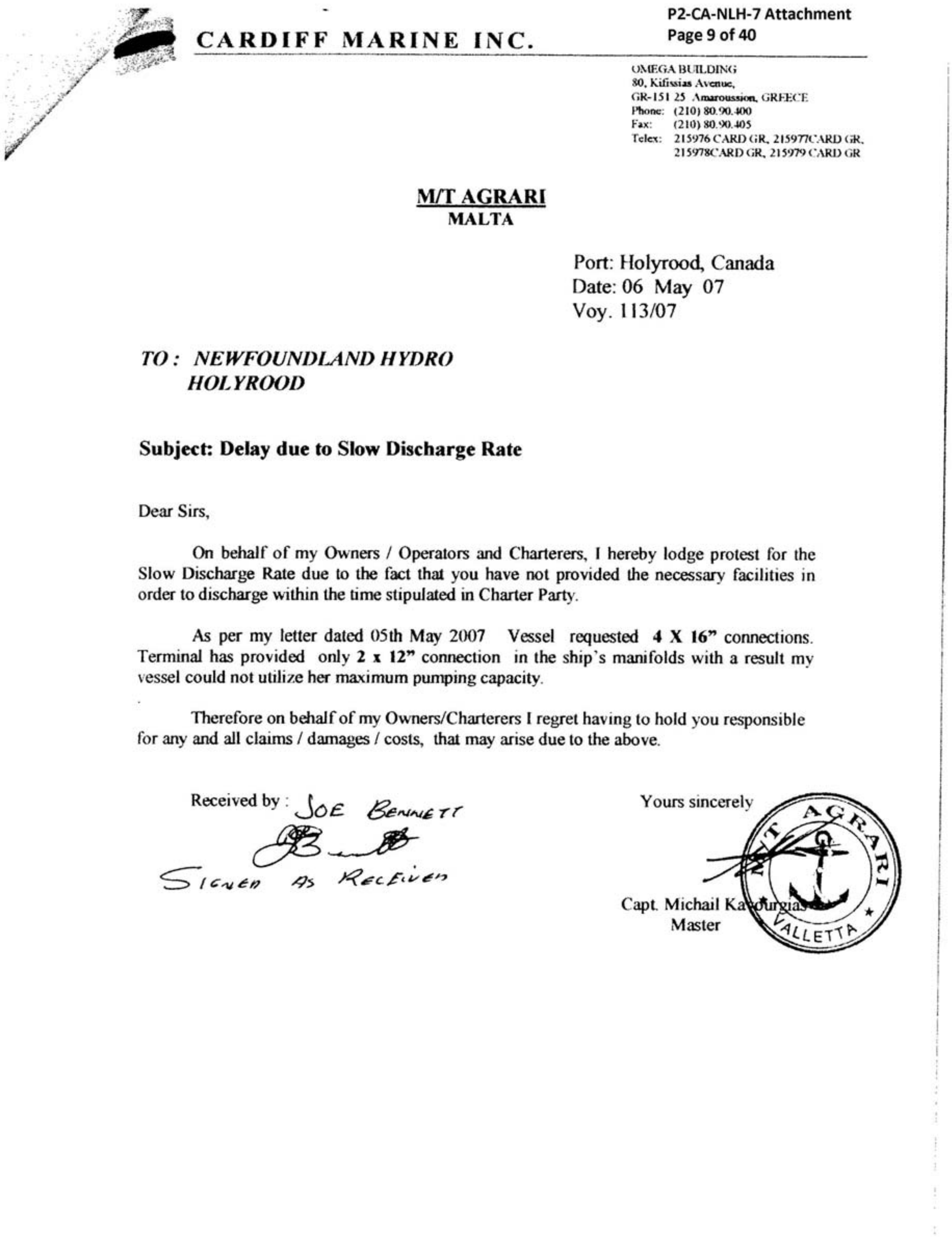
Kindly acknowledge receipt of this letter and oblige accordingly.

Truly Yours
MASTER

Vassilios Muzinas

Received on Shipper's behalf :

Name : JOE BENNETT
Date : MAR. 26. 2007
Signature :
Time : 1637



CARDIFF MARINE INC.

OMEGA BUILDING
80, Kifissias Avenue,
GR-151 25 Amaroussion, GREECE
Phone: (210) 80.90.400
Fax: (210) 80.90.405
Telex: 215976 CARD GR, 215977CARD GR,
215978CARD GR, 215979 CARD GR

M/T AGRARI
MALTA

Port: Holyrood, Canada
Date: 06 May 07
Voy. 113/07

TO : NEWFOUNDLAND HYDRO
HOLYROOD

Subject: Delay due to Slow Discharge Rate

Dear Sirs,

On behalf of my Owners / Operators and Charterers, I hereby lodge protest for the Slow Discharge Rate due to the fact that you have not provided the necessary facilities in order to discharge within the time stipulated in Charter Party.

As per my letter dated 05th May 2007 Vessel requested **4 X 16"** connections. Terminal has provided only **2 x 12"** connection in the ship's manifolds with a result my vessel could not utilize her maximum pumping capacity.

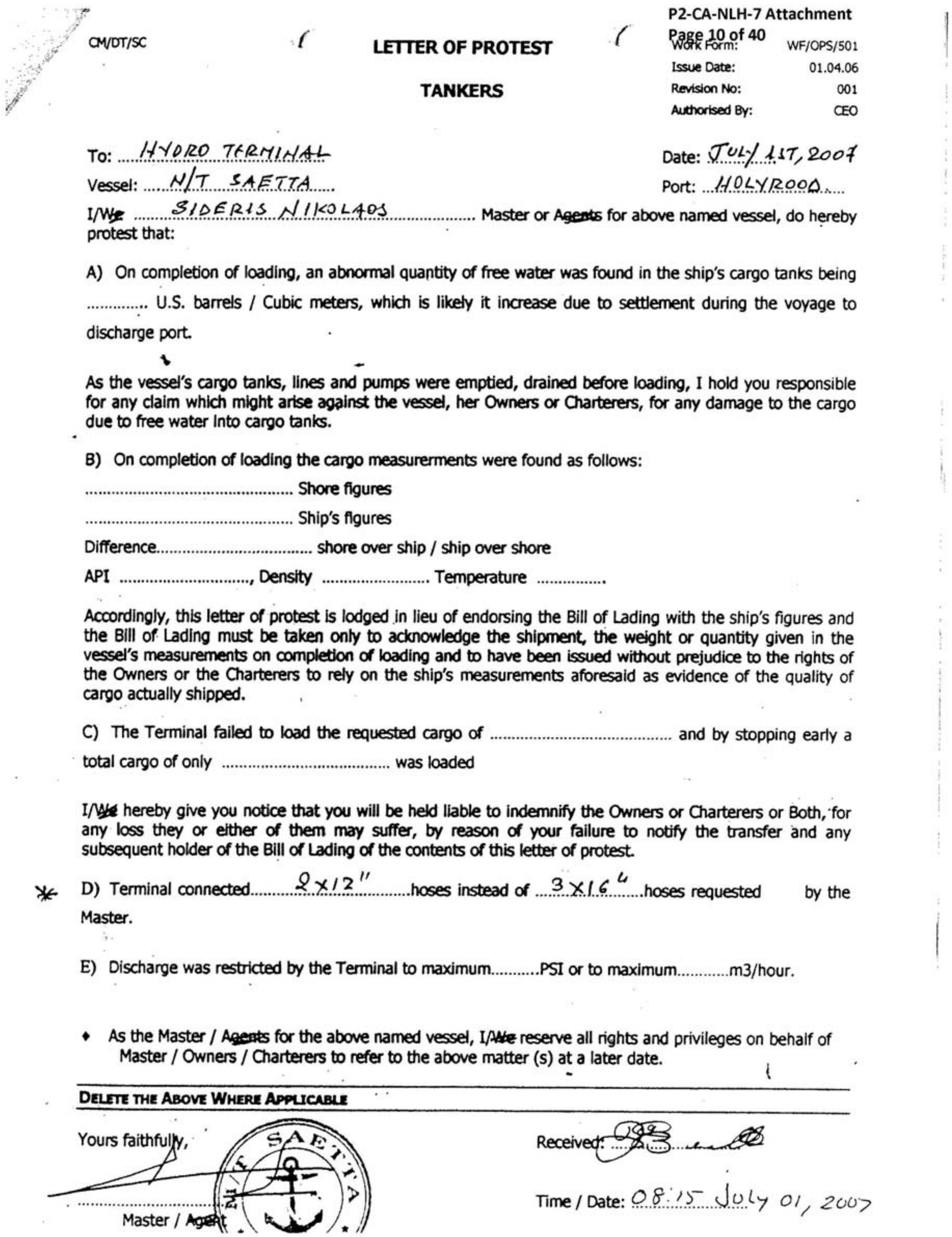
Therefore on behalf of my Owners/Charterers I regret having to hold you responsible for any and all claims / damages / costs, that may arise due to the above.

Received by : JOE BENNETT

SIGNED AS RECEIVED

Yours sincerely

Capt. Michail Kadurgias
Master



P2-CA-NLH-7 Attachment
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CM/DT/SC

LETTER OF PROTEST

TANKERS

Work Form: WF/OPS/501
Issue Date: 01.04.06
Revision No: 001
Authorised By: CEO

To: HYDRO TERMINAL
Date: JULY 1ST, 2007
Vessel: M/T SAETTA
Port: HOLYROOD
I/~~We~~ SIDERIS NIKOLAOS Master or ~~Agents~~ for above named vessel, do hereby protest that:

A) On completion of loading, an abnormal quantity of free water was found in the ship's cargo tanks being .... U.S. barrels / Cubic meters, which is likely it increase due to settlement during the voyage to discharge port.

As the vessel's cargo tanks, lines and pumps were emptied, drained before loading, I hold you responsible for any claim which might arise against the vessel, her Owners or Charterers, for any damage to the cargo due to free water into cargo tanks.

B) On completion of loading the cargo measurerments were found as follows:

.... Shore figures
.... Ship's figures
Difference.................................... shore over ship / ship over shore
API ...., Density .... Temperature ....

Accordingly, this letter of protest is lodged in lieu of endorsing the Bill of Lading with the ship's figures and the Bill of Lading must be taken only to acknowledge the shipment, the weight or quantity given in the vessel's measurements on completion of loading and to have been issued without prejudice to the rights of the Owners or the Charterers to rely on the ship's measurements aforesaid as evidence of the quality of cargo actually shipped.

C) The Terminal failed to load the requested cargo of .... and by stopping early a total cargo of only .... was loaded

I/~~We~~ hereby give you notice that you will be held liable to indemnify the Owners or Charterers or Both, for any loss they or either of them may suffer, by reason of your failure to notify the transfer and any subsequent holder of the Bill of Lading of the contents of this letter of protest.

✱ D) Terminal connected 2 x 12" hoses instead of 3 x 16" hoses requested by the Master.

E) Discharge was restricted by the Terminal to maximum...........PSI or to maximum............m3/hour.

- As the Master / ~~Agents~~ for the above named vessel, I/~~We~~ reserve all rights and privileges on behalf of Master / Owners / Charterers to refer to the above matter (s) at a later date.

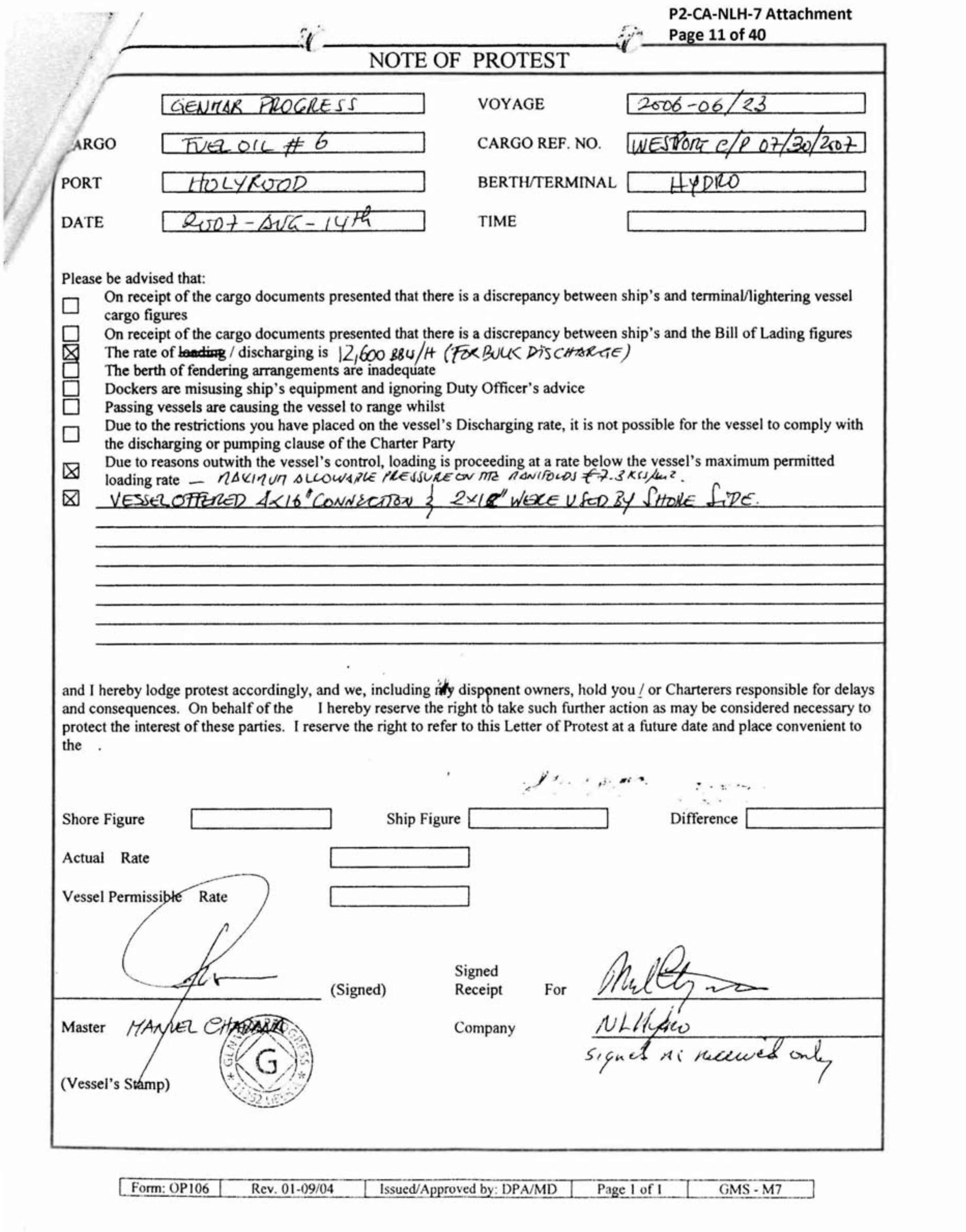
DELETE THE ABOVE WHERE APPLICABLE

Yours faithfully,

Received:

Master / ~~Agent~~

Time / Date: 08:15 July 01, 2007



P2-CA-NLH-7 Attachment
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NOTE OF PROTEST

GENMAR PROGRESS

VOYAGE 2006-06/23

ARGO FUEL OIL # 6

CARGO REF. NO. WESPORT C/P 07/30/2007

PORT HOLYROOD

BERTH/TERMINAL HYDRO

DATE 2007-AUG-14th

TIME

Please be advised that:

- ☐ On receipt of the cargo documents presented that there is a discrepancy between ship's and terminal/lightering vessel cargo figures
- ☐ On receipt of the cargo documents presented that there is a discrepancy between ship's and the Bill of Lading figures
- ☒ The rate of ~~loading~~ / discharging is 12,600 BBL/H (FOR BULK DISCHARGE)
- ☐ The berth of fendering arrangements are inadequate
- ☐ Dockers are misusing ship's equipment and ignoring Duty Officer's advice
- ☐ Passing vessels are causing the vessel to range whilst
- ☐ Due to the restrictions you have placed on the vessel's Discharging rate, it is not possible for the vessel to comply with the discharging or pumping clause of the Charter Party
- ☒ Due to reasons outwith the vessel's control, loading is proceeding at a rate below the vessel's maximum permitted loading rate — MAXIMUM ALLOWABLE PRESSURE ON THE MANIFOLDS ≤7.3 KGS/cm^2.
- ☒ VESSEL OFFERED 4×16" CONNECTION & 2×12" WERE USED BY SHORE SIDE.

and I hereby lodge protest accordingly, and we, including my disponent owners, hold you / or Charterers responsible for delays and consequences. On behalf of the I hereby reserve the right to take such further action as may be considered necessary to protect the interest of these parties. I reserve the right to refer to this Letter of Protest at a future date and place convenient to the .

Shore Figure Ship Figure Difference

Actual Rate

Vessel Permissible Rate

(Signed)

Signed Receipt For

Master MANUEL CH[illegible]

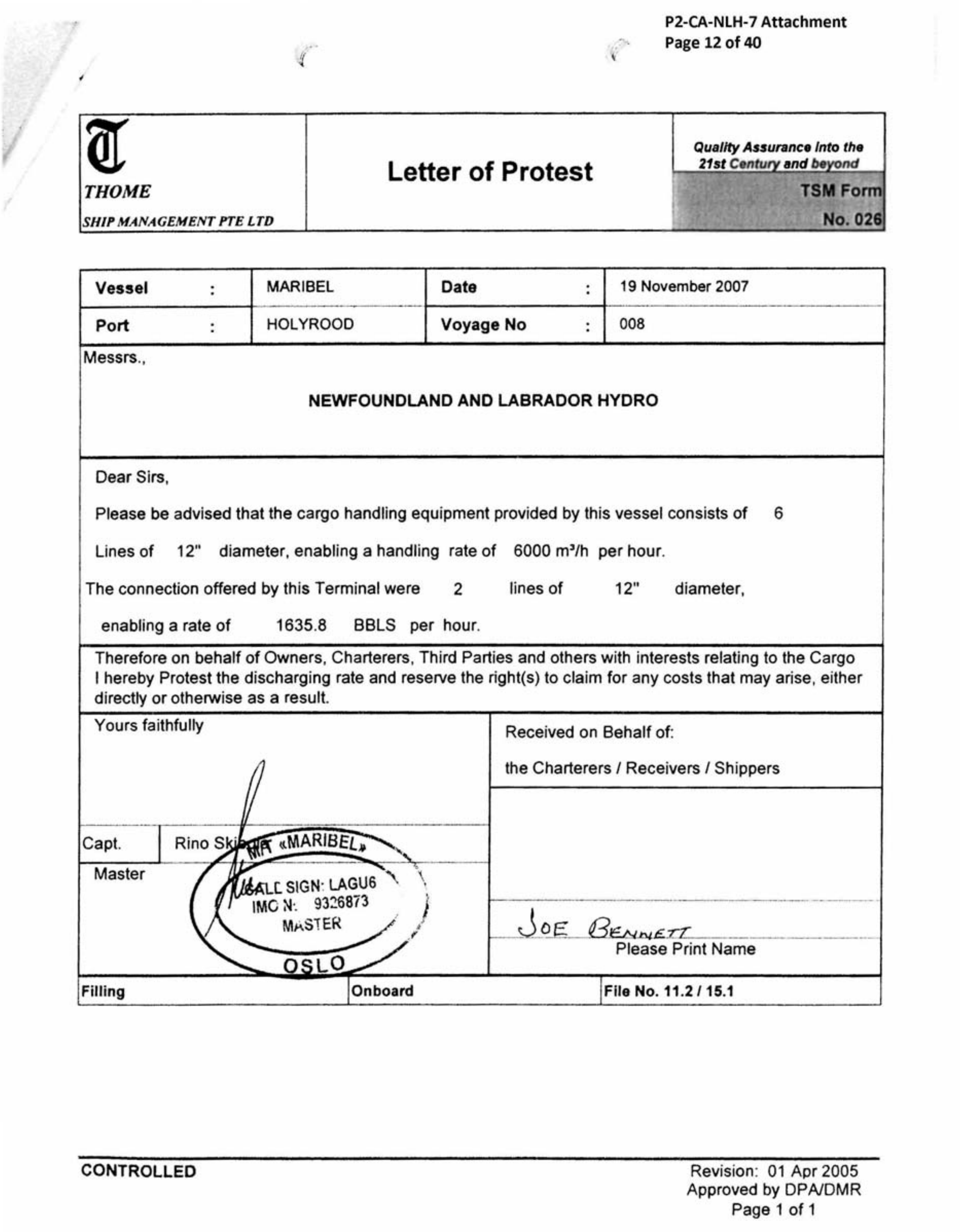
Company NLHydro

signed as received only

(Vessel's Stamp)

G

Form: OP106	Rev. 01-09/04	Issued/Approved by: DPA/MD	Page 1 of 1	GMS - M7



THOME
SHIP MANAGEMENT PTE LTD

Letter of Protest

Quality Assurance Into the 21st Century and beyond
TSM Form No. 026

Vessel :	MARIBEL	**Date :**	19 November 2007
Port :	HOLYROOD	**Voyage No :**	008

Messrs.,

NEWFOUNDLAND AND LABRADOR HYDRO

Dear Sirs,

Please be advised that the cargo handling equipment provided by this vessel consists of 6 Lines of 12" diameter, enabling a handling rate of 6000 m³/h per hour.

The connection offered by this Terminal were 2 lines of 12" diameter, enabling a rate of 1635.8 BBLS per hour.

Therefore on behalf of Owners, Charterers, Third Parties and others with interests relating to the Cargo I hereby Protest the discharging rate and reserve the right(s) to claim for any costs that may arise, either directly or otherwise as a result.

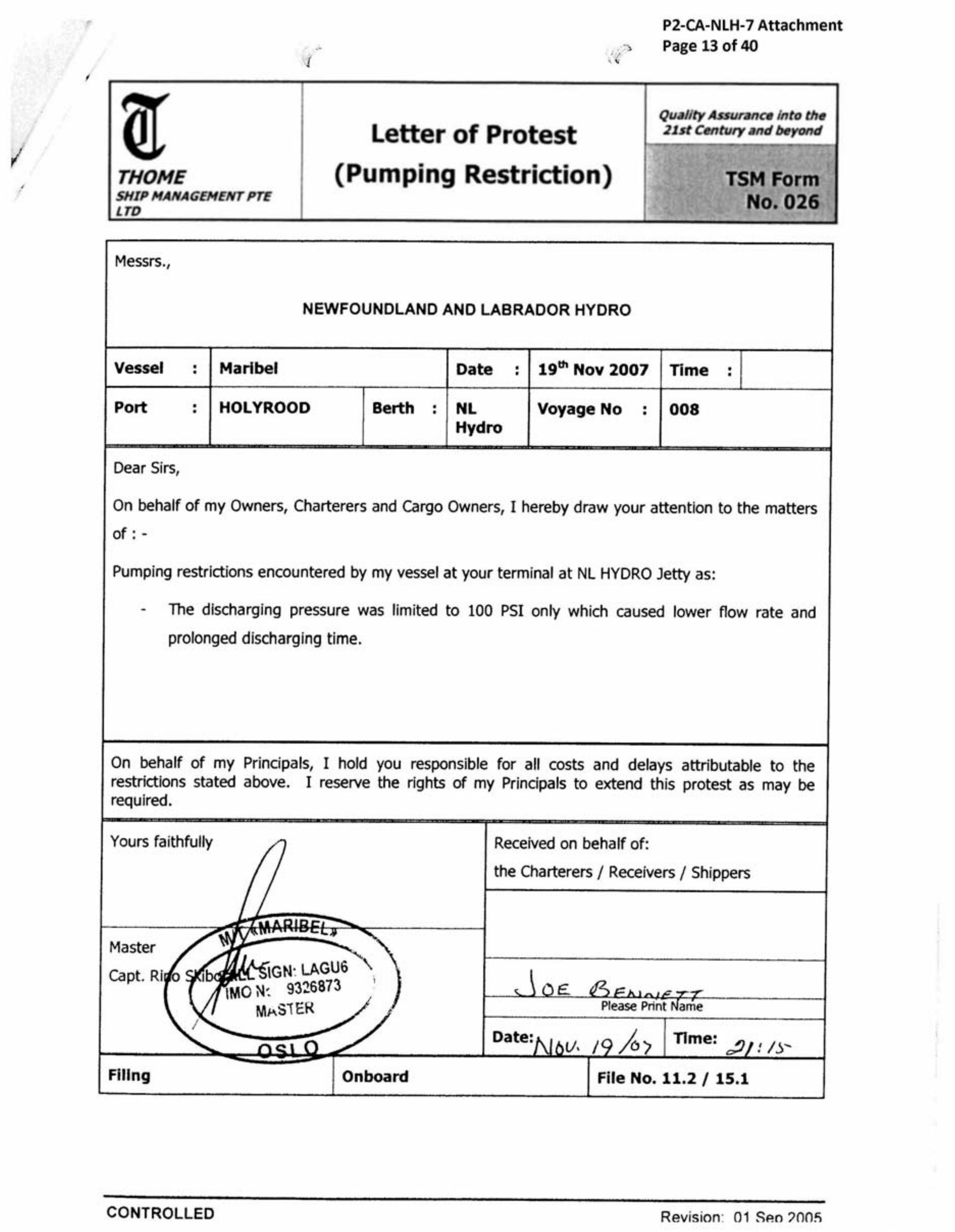
Yours faithfully	Received on Behalf of: the Charterers / Receivers / Shippers
Capt. Rino Sk	
Master	Joe Bennett Please Print Name

M/T «MARIBEL»
CALL SIGN: LAGU6
IMO N: 9326873
MASTER
OSLO

Filling	**Onboard**	**File No. 11.2 / 15.1**

CONTROLLED

Revision: 01 Apr 2005
Approved by DPA/DMR
Page 1 of 1



P2-CA-NLH-7 Attachment
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THOME
SHIP MANAGEMENT PTE LTD

Letter of Protest (Pumping Restriction)

Quality Assurance into the 21st Century and beyond

TSM Form No. 026

Messrs.,

NEWFOUNDLAND AND LABRADOR HYDRO

Vessel :	**Maribel**		**Date :**	**19th Nov 2007**	**Time :**		
Port :	**HOLYROOD**	**Berth :**	**NL Hydro**	**Voyage No :**	**008**		

Dear Sirs,

On behalf of my Owners, Charterers and Cargo Owners, I hereby draw your attention to the matters of : -

Pumping restrictions encountered by my vessel at your terminal at NL HYDRO Jetty as:

- The discharging pressure was limited to 100 PSI only which caused lower flow rate and prolonged discharging time.

On behalf of my Principals, I hold you responsible for all costs and delays attributable to the restrictions stated above. I reserve the rights of my Principals to extend this protest as may be required.

Yours faithfully

Master
Capt. Ri[illegible]o Skibo[illegible]

M/T «MARIBEL»
CALL SIGN: LAGU6
IMO N: 9326873
MASTER
OSLO

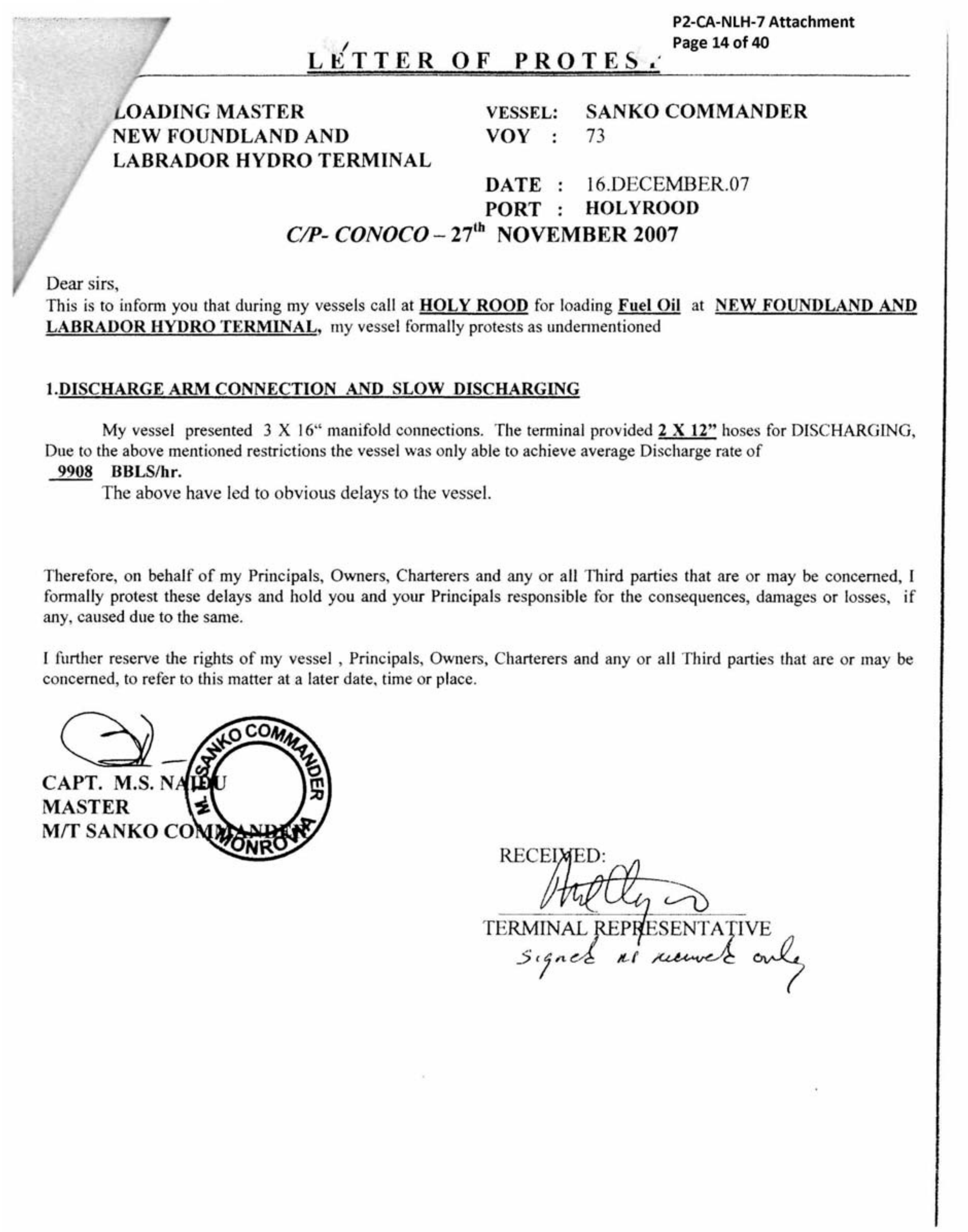
Received on behalf of:
the Charterers / Receivers / Shippers

JOE BENNETT
Please Print Name

Date: NOV. 19/07
Time: 21:15

Filing	**Onboard**	**File No. 11.2 / 15.1**

CONTROLLED
Revision: 01 Sep 2005



LETTER OF PROTES

LOADING MASTER
NEW FOUNDLAND AND
LABRADOR HYDRO TERMINAL

VESSEL: **SANKO COMMANDER**
VOY : 73

DATE : 16.DECEMBER.07
PORT : **HOLYROOD**

***C/P- CONOCO* – 27th NOVEMBER 2007**

Dear sirs,
This is to inform you that during my vessels call at **HOLY ROOD** for loading **Fuel Oil** at **NEW FOUNDLAND AND LABRADOR HYDRO TERMINAL,** my vessel formally protests as undermentioned

1.DISCHARGE ARM CONNECTION AND SLOW DISCHARGING

My vessel presented 3 X 16“ manifold connections. The terminal provided **2 X 12”** hoses for DISCHARGING, Due to the above mentioned restrictions the vessel was only able to achieve average Discharge rate of **9908** **BBLS/hr.**

The above have led to obvious delays to the vessel.

Therefore, on behalf of my Principals, Owners, Charterers and any or all Third parties that are or may be concerned, I formally protest these delays and hold you and your Principals responsible for the consequences, damages or losses, if any, caused due to the same.

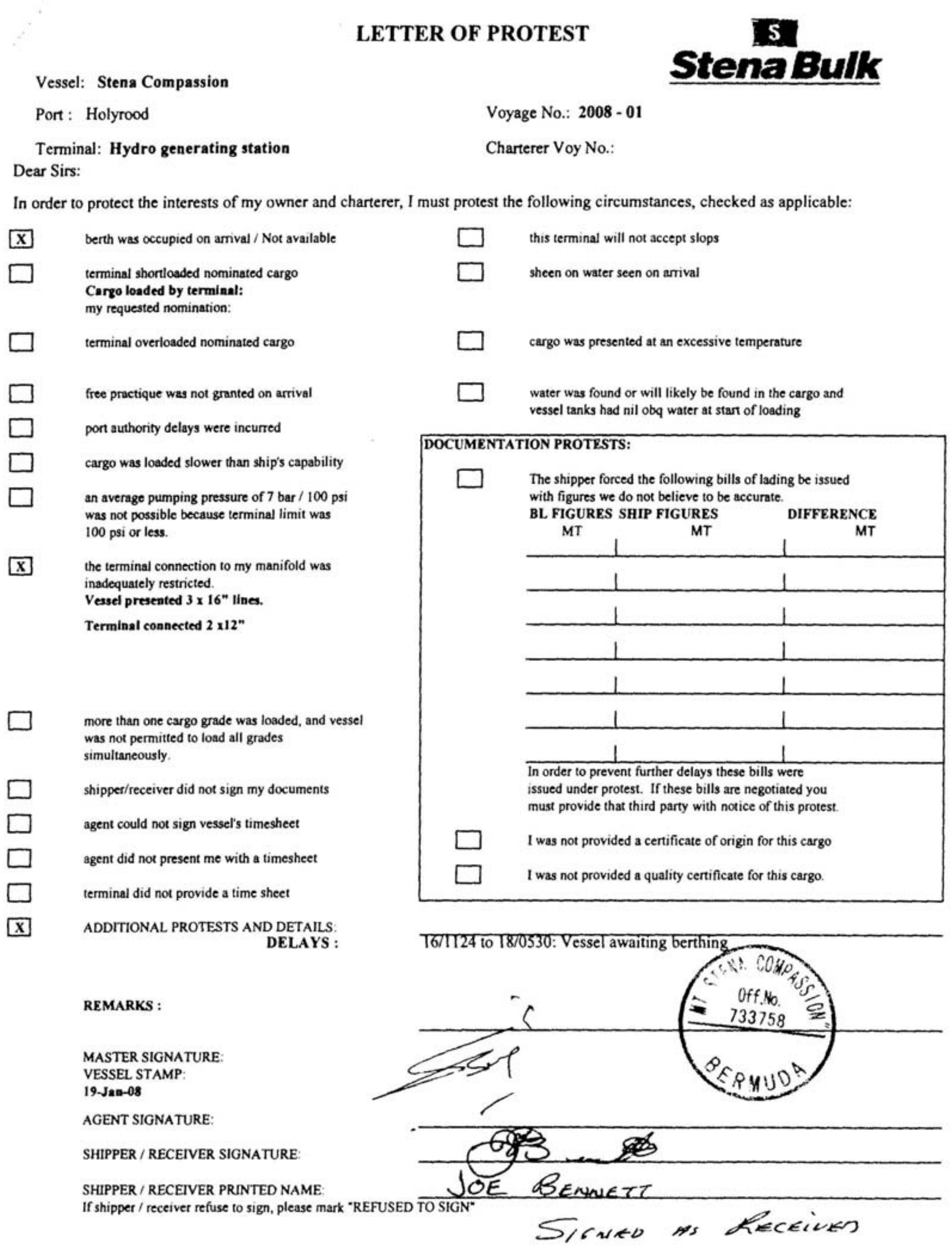
I further reserve the rights of my vessel , Principals, Owners, Charterers and any or all Third parties that are or may be concerned, to refer to this matter at a later date, time or place.

CAPT. M.S. NAIDU
MASTER
M/T SANKO COMMANDER

SANKO COMMANDER
M.T.
MONROVIA

RECEIVED:

TERMINAL REPRESENTATIVE
Signed as received only



LETTER OF PROTEST

Stena Bulk

Vessel: **Stena Compassion**
Port : Holyrood
Voyage No.: **2008 - 01**
Terminal: **Hydro generating station**
Charterer Voy No.:

Dear Sirs:

In order to protect the interests of my owner and charterer, I must protest the following circumstances, checked as applicable:

- ☒ berth was occupied on arrival / Not available
- ☐ terminal shortloaded nominated cargo
  Cargo loaded by terminal:
  my requested nomination:
- ☐ terminal overloaded nominated cargo
- ☐ free practique was not granted on arrival
- ☐ port authority delays were incurred
- ☐ cargo was loaded slower than ship's capability
- ☐ an average pumping pressure of 7 bar / 100 psi was not possible because terminal limit was 100 psi or less.
- ☒ the terminal connection to my manifold was inadequately restricted.
  Vessel presented 3 x 16" lines.
  Terminal connected 2 x12"
- ☐ more than one cargo grade was loaded, and vessel was not permitted to load all grades simultaneously.
- ☐ shipper/receiver did not sign my documents
- ☐ agent could not sign vessel's timesheet
- ☐ agent did not present me with a timesheet
- ☐ terminal did not provide a time sheet
- ☐ this terminal will not accept slops
- ☐ sheen on water seen on arrival
- ☐ cargo was presented at an excessive temperature
- ☐ water was found or will likely be found in the cargo and vessel tanks had nil obq water at start of loading

DOCUMENTATION PROTESTS:

☐ The shipper forced the following bills of lading be issued with figures we do not believe to be accurate.

BL FIGURES MT	SHIP FIGURES MT	DIFFERENCE MT

In order to prevent further delays these bills were issued under protest. If these bills are negotiated you must provide that third party with notice of this protest.

☐ I was not provided a certificate of origin for this cargo

☐ I was not provided a quality certificate for this cargo.

☒ ADDITIONAL PROTESTS AND DETAILS:
DELAYS : 16/1124 to 18/0530: Vessel awaiting berthing

REMARKS :

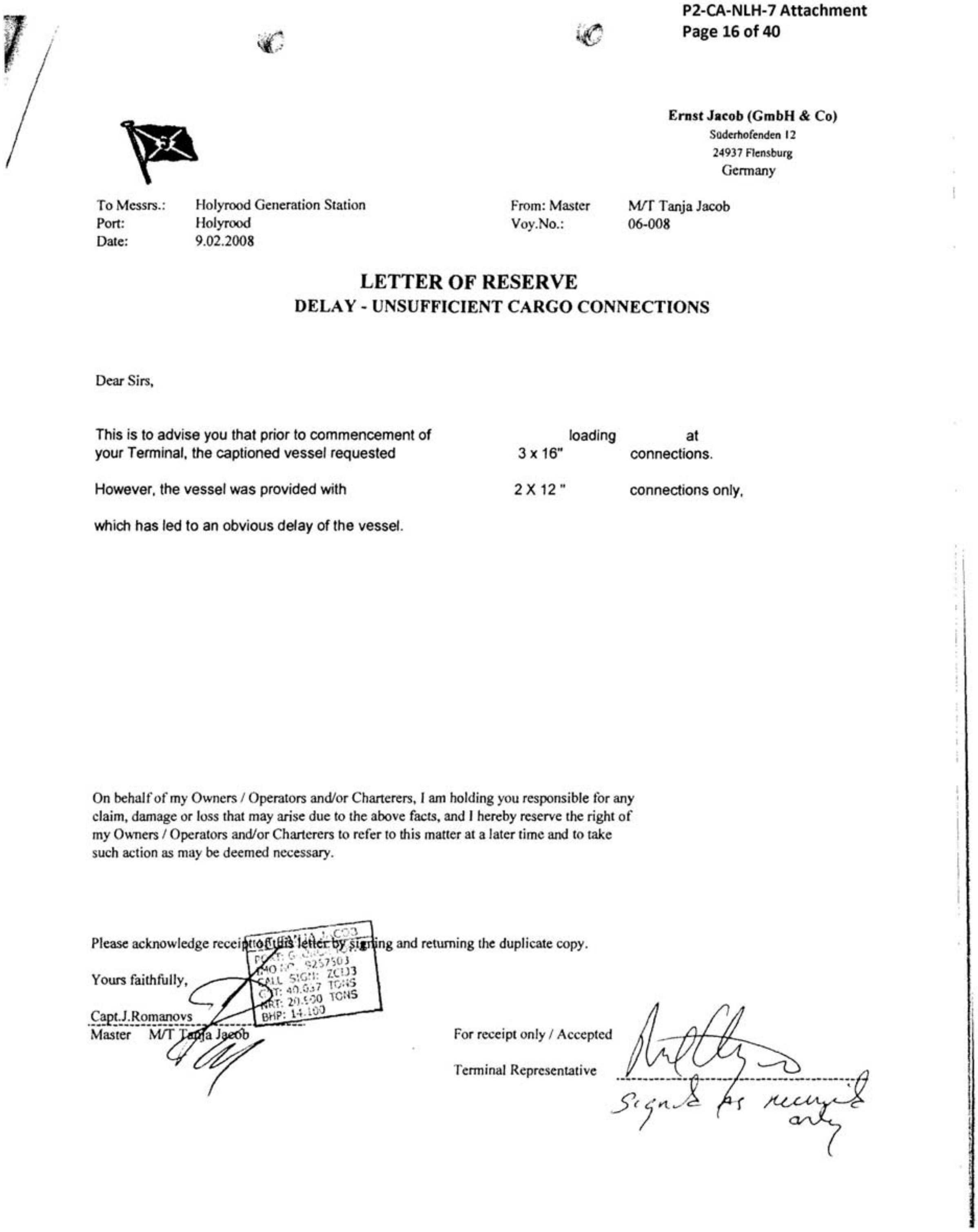
MASTER SIGNATURE:
VESSEL STAMP: Off.No. 733758
19-Jan-08

AGENT SIGNATURE:

SHIPPER / RECEIVER SIGNATURE:

SHIPPER / RECEIVER PRINTED NAME: JOE BENNETT
If shipper / receiver refuse to sign, please mark "REFUSED TO SIGN"

SIGNED AS RECEIVED



Ernst Jacob (GmbH & Co)
Süderhofenden 12
24937 Flensburg
Germany

To Messrs.: Holyrood Generation Station
Port: Holyrood
Date: 9.02.2008

From: Master M/T Tanja Jacob
Voy.No.: 06-008

LETTER OF RESERVE
DELAY - UNSUFFICIENT CARGO CONNECTIONS

Dear Sirs,

This is to advise you that prior to commencement of loading at your Terminal, the captioned vessel requested 3 x 16" connections.

However, the vessel was provided with 2 X 12 " connections only,

which has led to an obvious delay of the vessel.

On behalf of my Owners / Operators and/or Charterers, I am holding you responsible for any claim, damage or loss that may arise due to the above facts, and I hereby reserve the right of my Owners / Operators and/or Charterers to refer to this matter at a later time and to take such action as may be deemed necessary.

Please acknowledge receipt of this letter by signing and returning the duplicate copy.

TANJA JACOB
PORT: [illegible]
IMO NO: 9257503
CALL SIGN: ZCDJ3
GRT: 40.637 TONS
NRT: 20.900 TONS
BHP: 14.100

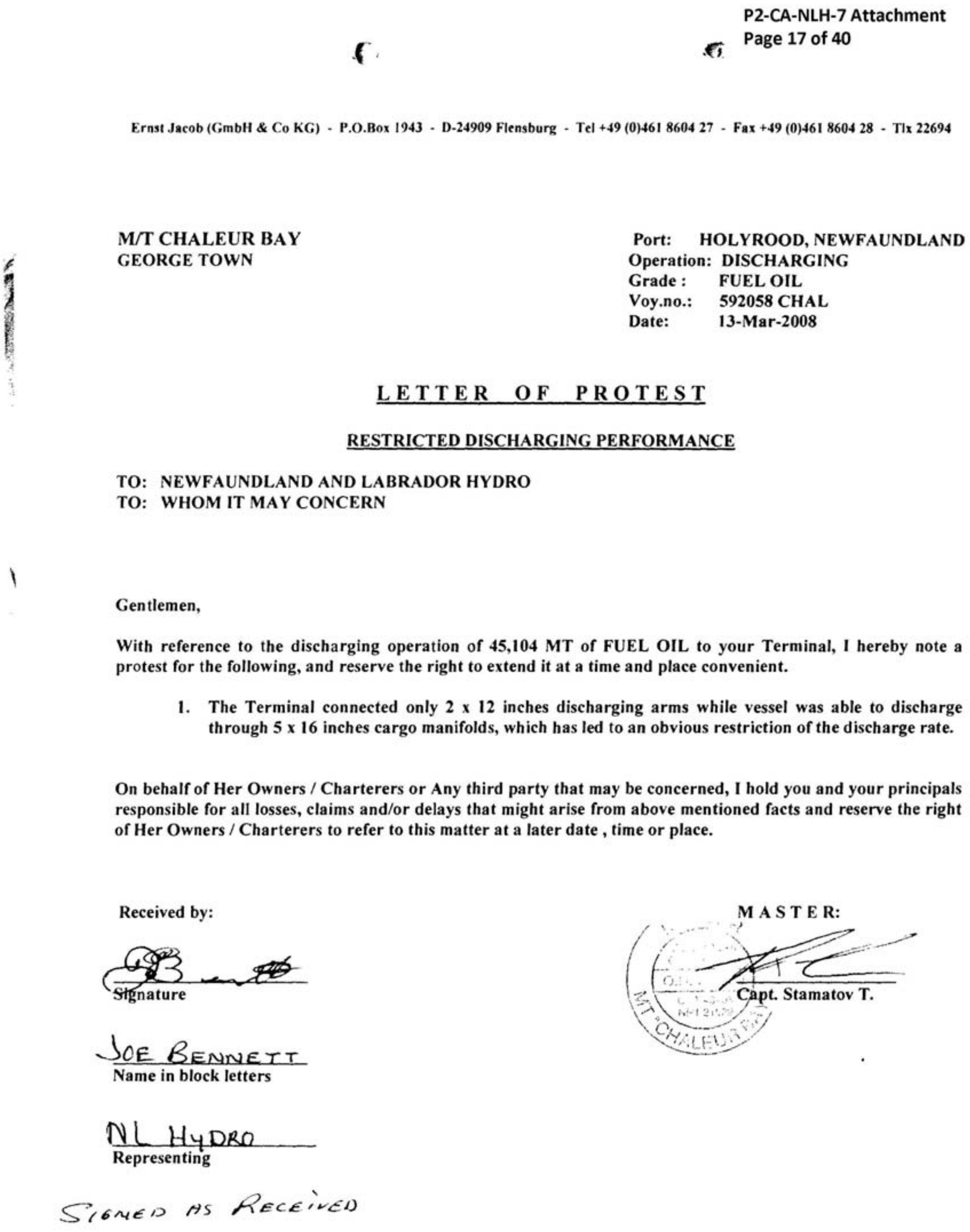
Yours faithfully,

Capt.J.Romanovs
Master M/T Tanja Jacob

For receipt only / Accepted

Terminal Representative

Signed as received only



Ernst Jacob (GmbH & Co KG) - P.O.Box 1943 - D-24909 Flensburg - Tel +49 (0)461 8604 27 - Fax +49 (0)461 8604 28 - Tlx 22694

M/T CHALEUR BAY
GEORGE TOWN

Port: HOLYROOD, NEWFAUNDLAND
Operation: DISCHARGING
Grade : FUEL OIL
Voy.no.: 592058 CHAL
Date: 13-Mar-2008

LETTER OF PROTEST

RESTRICTED DISCHARGING PERFORMANCE

TO: NEWFAUNDLAND AND LABRADOR HYDRO
TO: WHOM IT MAY CONCERN

Gentlemen,

With reference to the discharging operation of 45,104 MT of FUEL OIL to your Terminal, I hereby note a protest for the following, and reserve the right to extend it at a time and place convenient.

1. **The Terminal connected only 2 x 12 inches discharging arms while vessel was able to discharge through 5 x 16 inches cargo manifolds, which has led to an obvious restriction of the discharge rate.**

On behalf of Her Owners / Charterers or Any third party that may be concerned, I hold you and your principals responsible for all losses, claims and/or delays that might arise from above mentioned facts and reserve the right of Her Owners / Charterers to refer to this matter at a later date , time or place.

Received by:

Signature

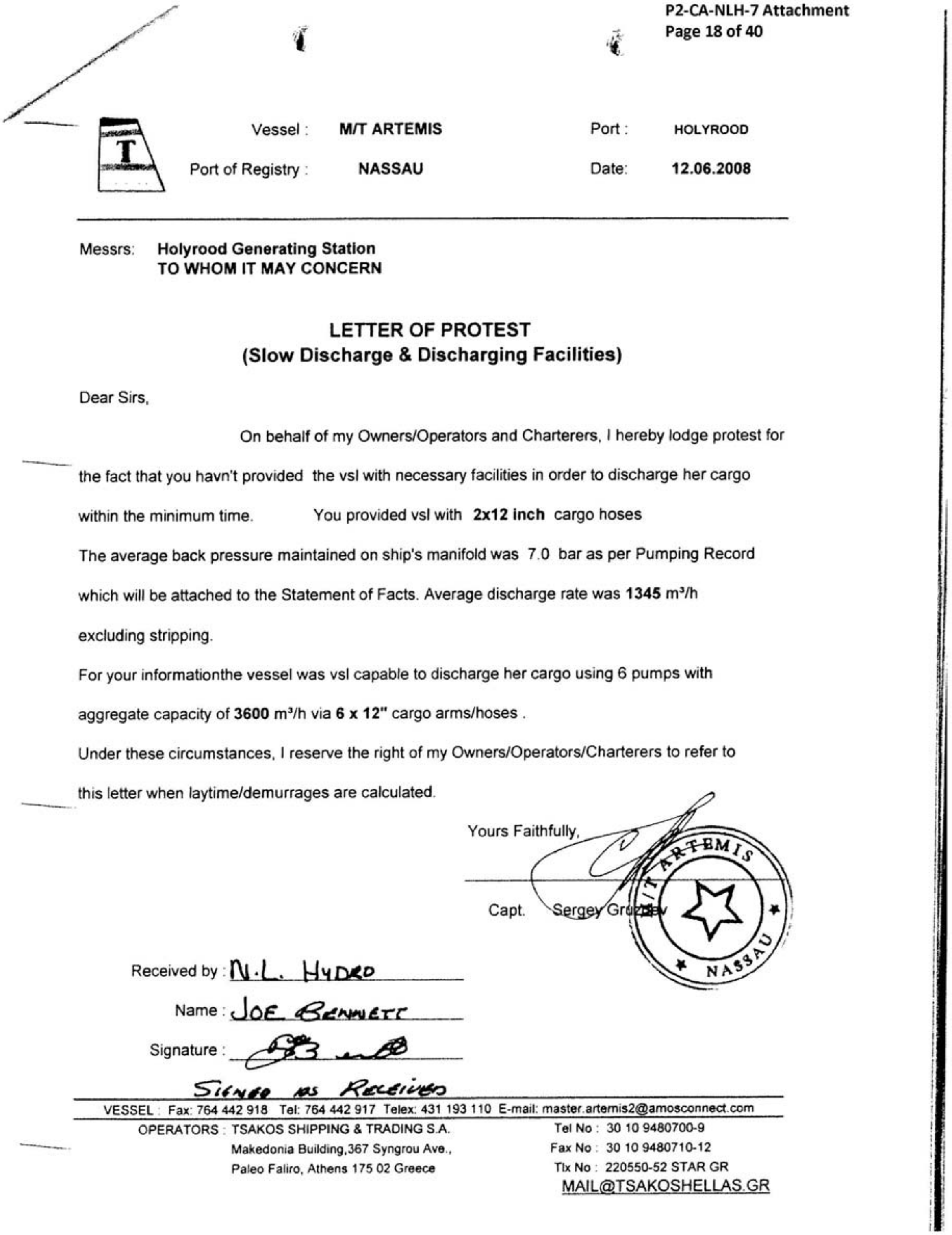
JOE BENNETT
Name in block letters

NL HYDRO
Representing

SIGNED AS RECEIVED

MASTER:

Capt. Stamatov T.



Vessel :	**M/T ARTEMIS**	Port :	**HOLYROOD**
Port of Registry :	**NASSAU**	Date:	**12.06.2008**

Messrs: **Holyrood Generating Station**
TO WHOM IT MAY CONCERN

LETTER OF PROTEST
(Slow Discharge & Discharging Facilities)

Dear Sirs,

On behalf of my Owners/Operators and Charterers, I hereby lodge protest for the fact that you havn't provided the vsl with necessary facilities in order to discharge her cargo within the minimum time. You provided vsl with **2x12 inch** cargo hoses

The average back pressure maintained on ship's manifold was 7.0 bar as per Pumping Record which will be attached to the Statement of Facts. Average discharge rate was **1345** m³/h excluding stripping.

For your informationthe vessel was vsl capable to discharge her cargo using 6 pumps with aggregate capacity of **3600** m³/h via **6 x 12"** cargo arms/hoses .

Under these circumstances, I reserve the right of my Owners/Operators/Charterers to refer to this letter when laytime/demurrages are calculated.

Yours Faithfully,

Capt. Sergey Gruzdev

Received by : N.L. HYDRO

Name : JOE BENNETT

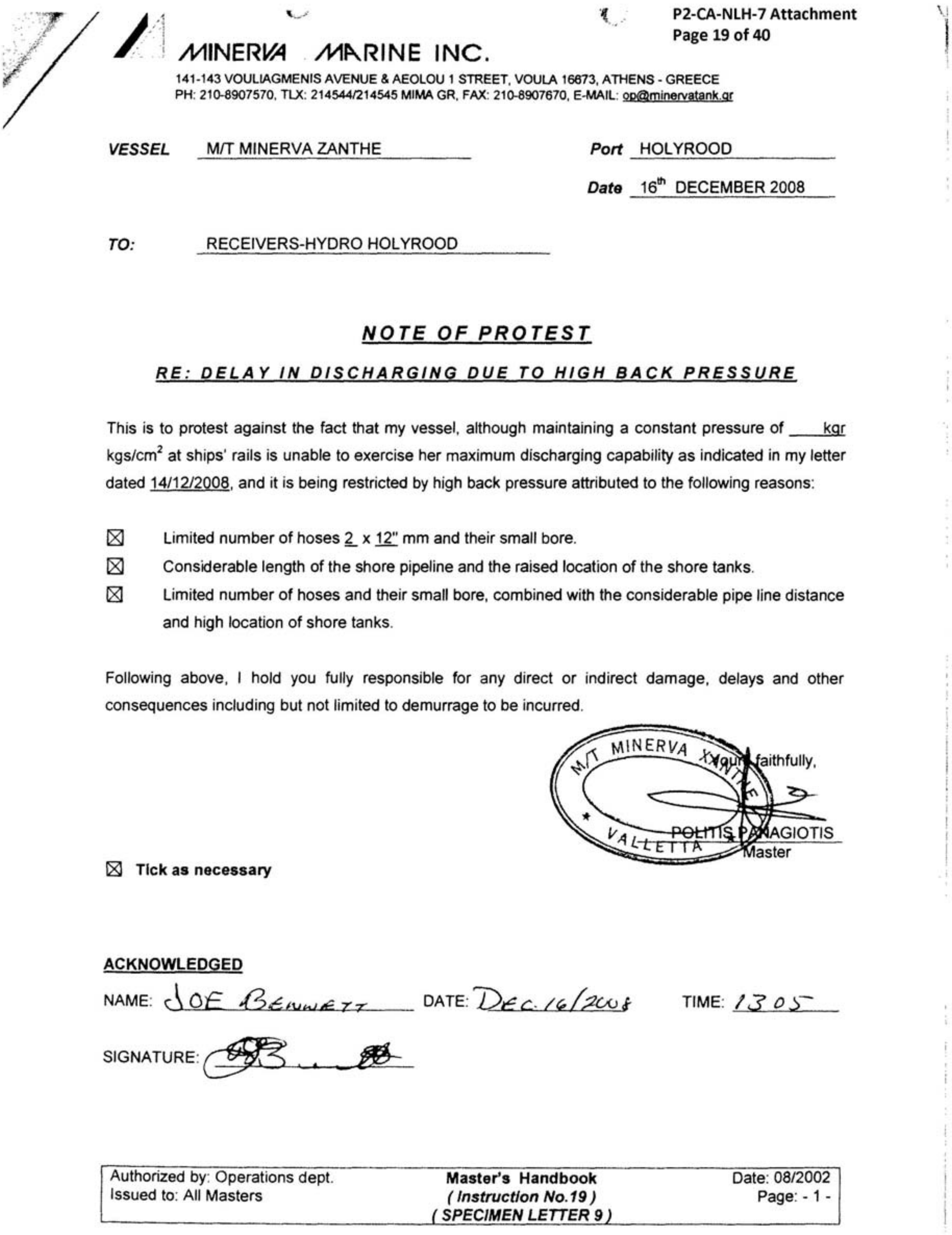
Signature :

SIGNED AS RECEIVED

VESSEL : Fax: 764 442 918 Tel: 764 442 917 Telex: 431 193 110 E-mail: master.artemis2@amosconnect.com

OPERATORS : TSAKOS SHIPPING & TRADING S.A.
Makedonia Building,367 Syngrou Ave.,
Paleo Faliro, Athens 175 02 Greece

Tel No : 30 10 9480700-9
Fax No : 30 10 9480710-12
Tlx No : 220550-52 STAR GR
MAIL@TSAKOSHELLAS.GR



MINERVA MARINE INC.
141-143 VOULIAGMENIS AVENUE & AEOLOU 1 STREET, VOULA 16673, ATHENS - GREECE
PH: 210-8907570, TLX: 214544/214545 MIMA GR, FAX: 210-8907670, E-MAIL: op@minervatank.gr

VESSEL M/T MINERVA ZANTHE

Port HOLYROOD

Date 16th DECEMBER 2008

TO: RECEIVERS-HYDRO HOLYROOD

NOTE OF PROTEST

RE: DELAY IN DISCHARGING DUE TO HIGH BACK PRESSURE

This is to protest against the fact that my vessel, although maintaining a constant pressure of ____ kgr kgs/cm^2 at ships' rails is unable to exercise her maximum discharging capability as indicated in my letter dated 14/12/2008, and it is being restricted by high back pressure attributed to the following reasons:

☒ Limited number of hoses 2 x 12" mm and their small bore.
☒ Considerable length of the shore pipeline and the raised location of the shore tanks.
☒ Limited number of hoses and their small bore, combined with the considerable pipe line distance and high location of shore tanks.

Following above, I hold you fully responsible for any direct or indirect damage, delays and other consequences including but not limited to demurrage to be incurred.

Yours faithfully,

POLITIS PANAGIOTIS
Master

☒ **Tick as necessary**

ACKNOWLEDGED

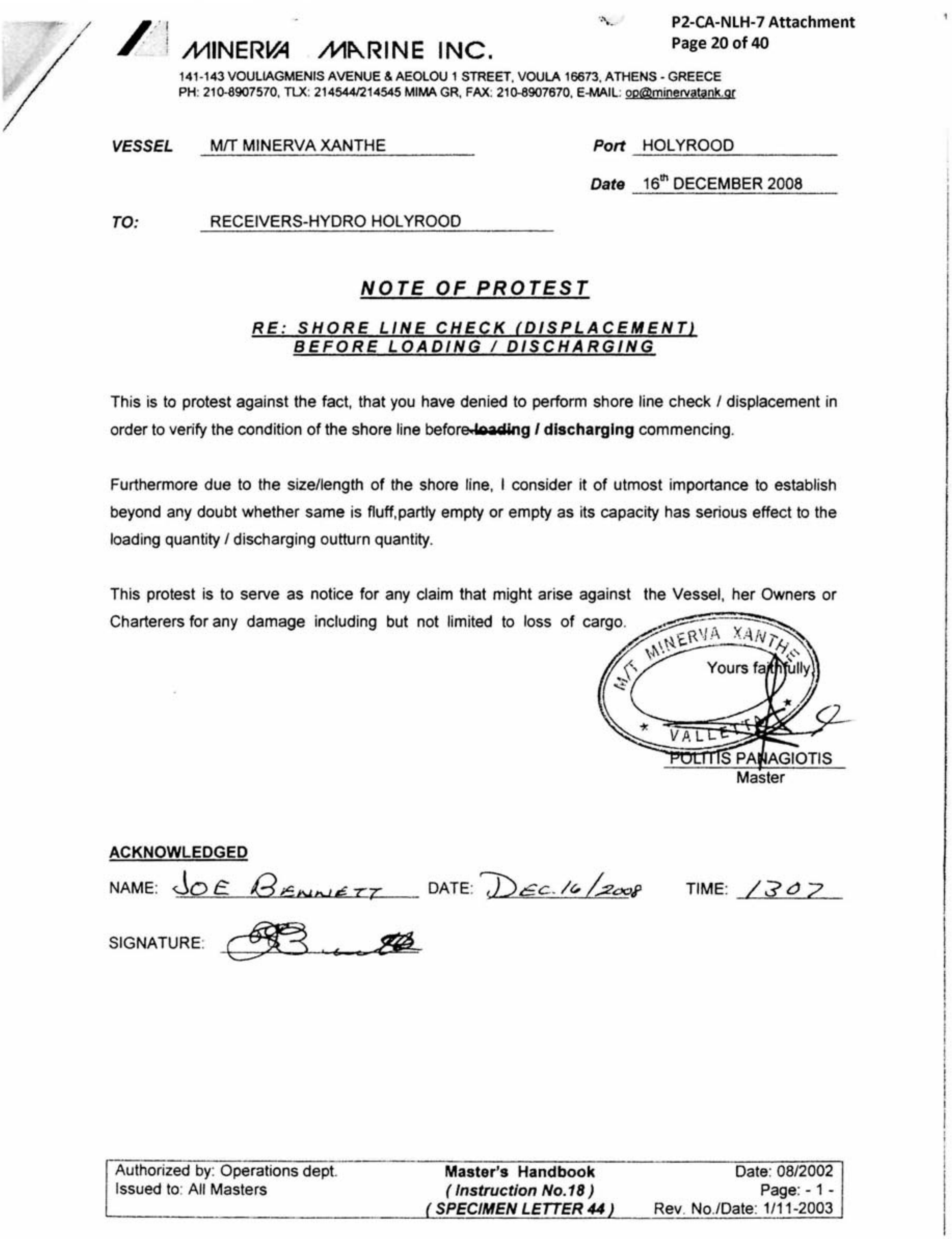
NAME: JOE BENNETT DATE: DEC. 16/2008 TIME: 1305

SIGNATURE:

Authorized by: Operations dept.
Issued to: All Masters

Master's Handbook
(Instruction No.19)
(SPECIMEN LETTER 9)

Date: 08/2002
Page: - 1 -



MINERVA MARINE INC.
141-143 VOULIAGMENIS AVENUE & AEOLOU 1 STREET, VOULA 16673, ATHENS - GREECE
PH: 210-8907570, TLX: 214544/214545 MIMA GR, FAX: 210-8907670, E-MAIL: op@minervatank.gr

VESSEL M/T MINERVA XANTHE

Port HOLYROOD

Date 16th DECEMBER 2008

TO: RECEIVERS-HYDRO HOLYROOD

NOTE OF PROTEST

RE: SHORE LINE CHECK (DISPLACEMENT) BEFORE LOADING / DISCHARGING

This is to protest against the fact, that you have denied to perform shore line check / displacement in order to verify the condition of the shore line before ~~**loading**~~ **/ discharging** commencing.

Furthermore due to the size/length of the shore line, I consider it of utmost importance to establish beyond any doubt whether same is fluff,partly empty or empty as its capacity has serious effect to the loading quantity / discharging outturn quantity.

This protest is to serve as notice for any claim that might arise against the Vessel, her Owners or Charterers for any damage including but not limited to loss of cargo.

Yours faithfully

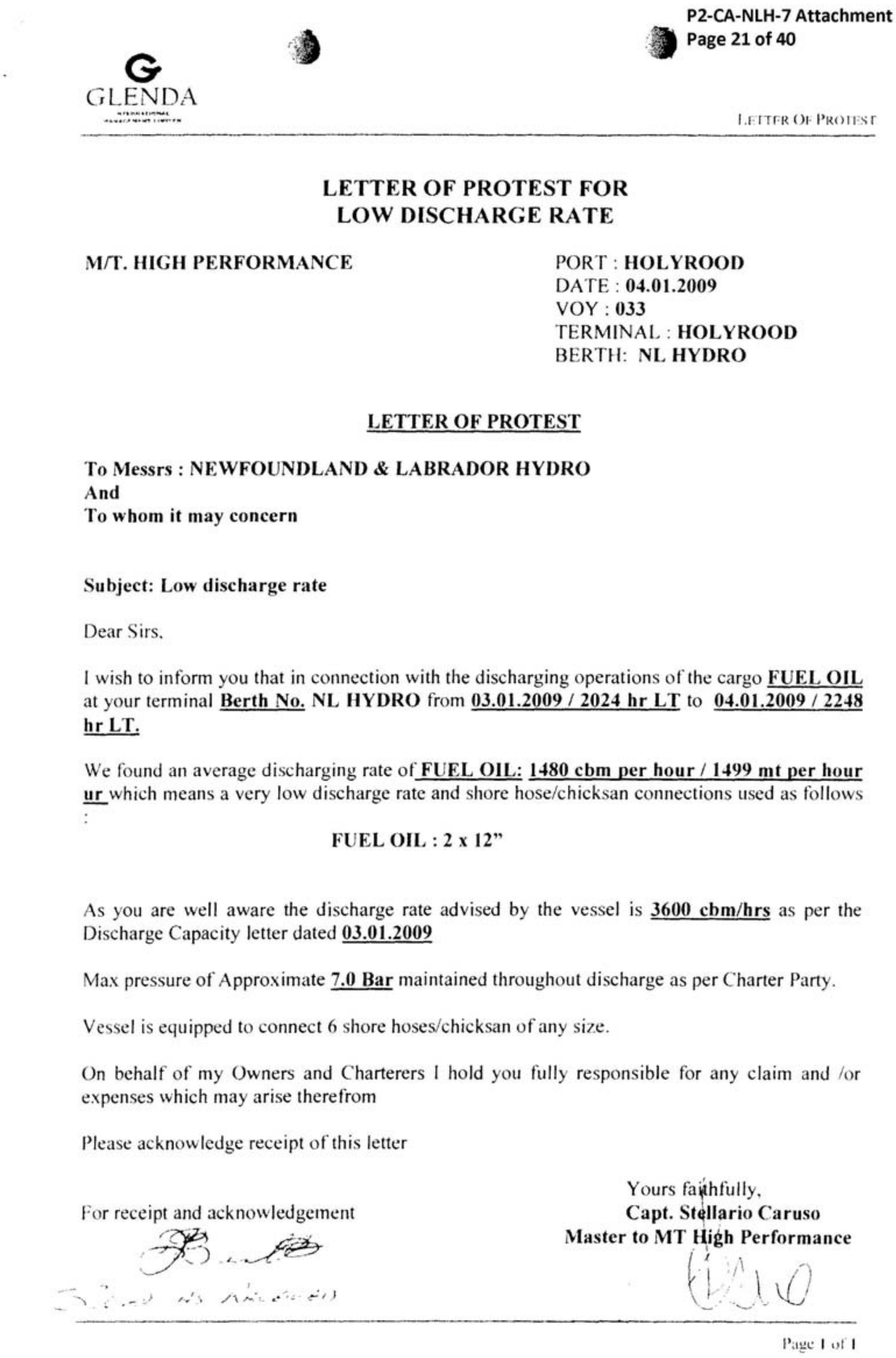
POLITIS PANAGIOTIS
Master

ACKNOWLEDGED

NAME: JOE BENNETT DATE: Dec. 16/2008 TIME: 1307

SIGNATURE:

Authorized by: Operations dept. Issued to: All Masters	**Master's Handbook** ***(Instruction No.18)*** ***(SPECIMEN LETTER 44)***	Date: 08/2002 Page: - 1 - Rev. No./Date: 1/11-2003



GLENDA
INTERNATIONAL MANAGEMENT LIMITED

LETTER OF PROTEST

LETTER OF PROTEST FOR LOW DISCHARGE RATE

M/T. HIGH PERFORMANCE

PORT : **HOLYROOD**
DATE : **04.01.2009**
VOY : **033**
TERMINAL : **HOLYROOD**
BERTH: **NL HYDRO**

LETTER OF PROTEST

To Messrs : NEWFOUNDLAND & LABRADOR HYDRO
And
To whom it may concern

Subject: Low discharge rate

Dear Sirs,

I wish to inform you that in connection with the discharging operations of the cargo **FUEL OIL** at your terminal **Berth No. NL HYDRO** from **03.01.2009 / 2024 hr LT** to **04.01.2009 / 2248 hr LT.**

We found an average discharging rate of **FUEL OIL: 1480 cbm per hour / 1499 mt per hour ur** which means a very low discharge rate and shore hose/chicksan connections used as follows :

FUEL OIL : 2 x 12"

As you are well aware the discharge rate advised by the vessel is **3600 cbm/hrs** as per the Discharge Capacity letter dated **03.01.2009**

Max pressure of Approximate **7.0 Bar** maintained throughout discharge as per Charter Party.

Vessel is equipped to connect 6 shore hoses/chicksan of any size.

On behalf of my Owners and Charterers I hold you fully responsible for any claim and /or expenses which may arise therefrom

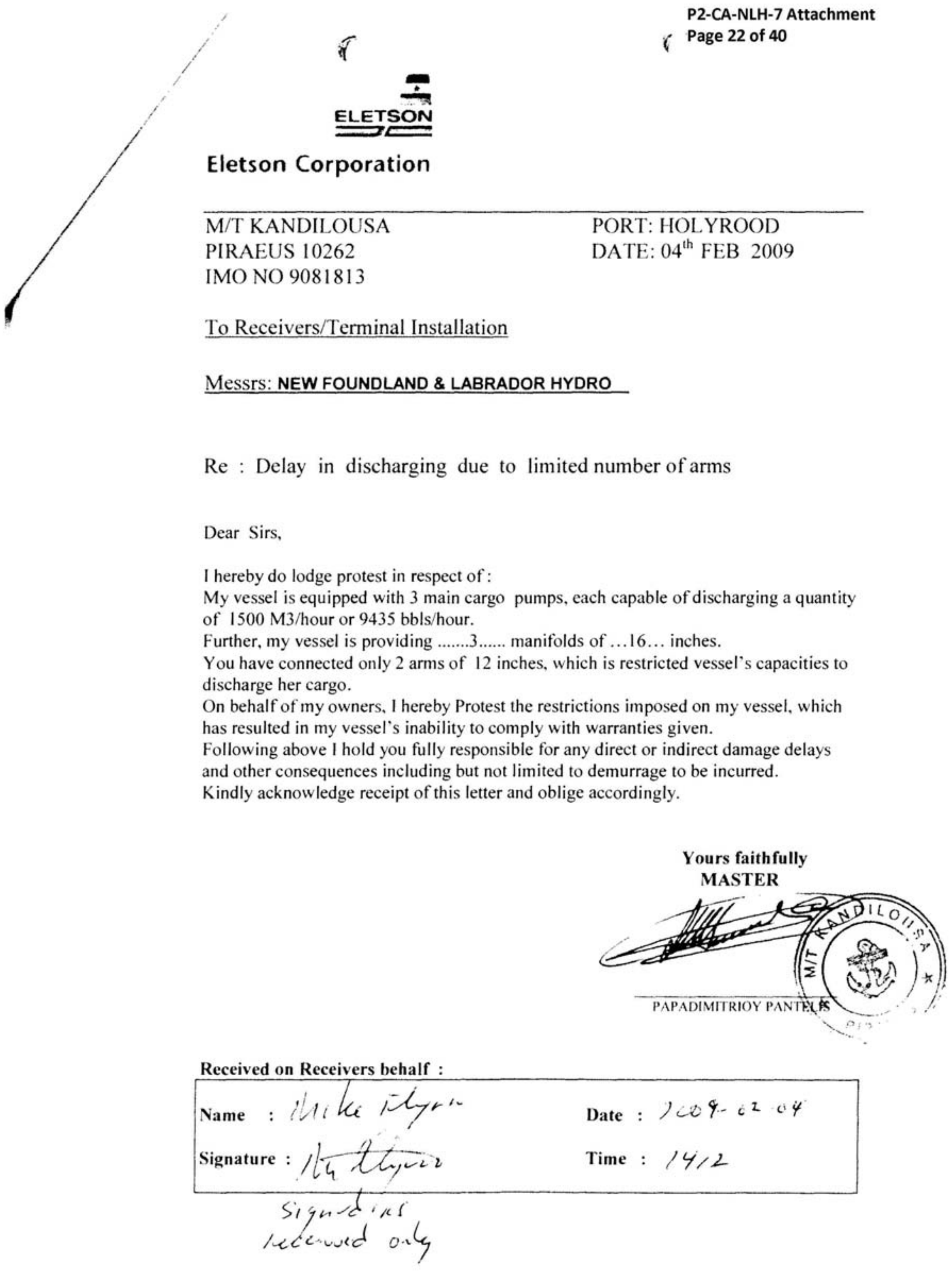
Please acknowledge receipt of this letter

For receipt and acknowledgement

Signed as Received

Yours faithfully,
Capt. Stellario Caruso
Master to MT High Performance

Page 1 of 1



ELETSON
Eletson Corporation

M/T KANDILOUSA
PIRAEUS 10262
IMO NO 9081813

PORT: HOLYROOD
DATE: 04th FEB 2009

To Receivers/Terminal Installation

Messrs: **NEW FOUNDLAND & LABRADOR HYDRO**

Re : Delay in discharging due to limited number of arms

Dear Sirs,

I hereby do lodge protest in respect of :
My vessel is equipped with 3 main cargo pumps, each capable of discharging a quantity of 1500 M3/hour or 9435 bbls/hour.
Further, my vessel is providing ....3...... manifolds of …16… inches.
You have connected only 2 arms of 12 inches, which is restricted vessel's capacities to discharge her cargo.
On behalf of my owners, I hereby Protest the restrictions imposed on my vessel, which has resulted in my vessel's inability to comply with warranties given.
Following above I hold you fully responsible for any direct or indirect damage delays and other consequences including but not limited to demurrage to be incurred.
Kindly acknowledge receipt of this letter and oblige accordingly.

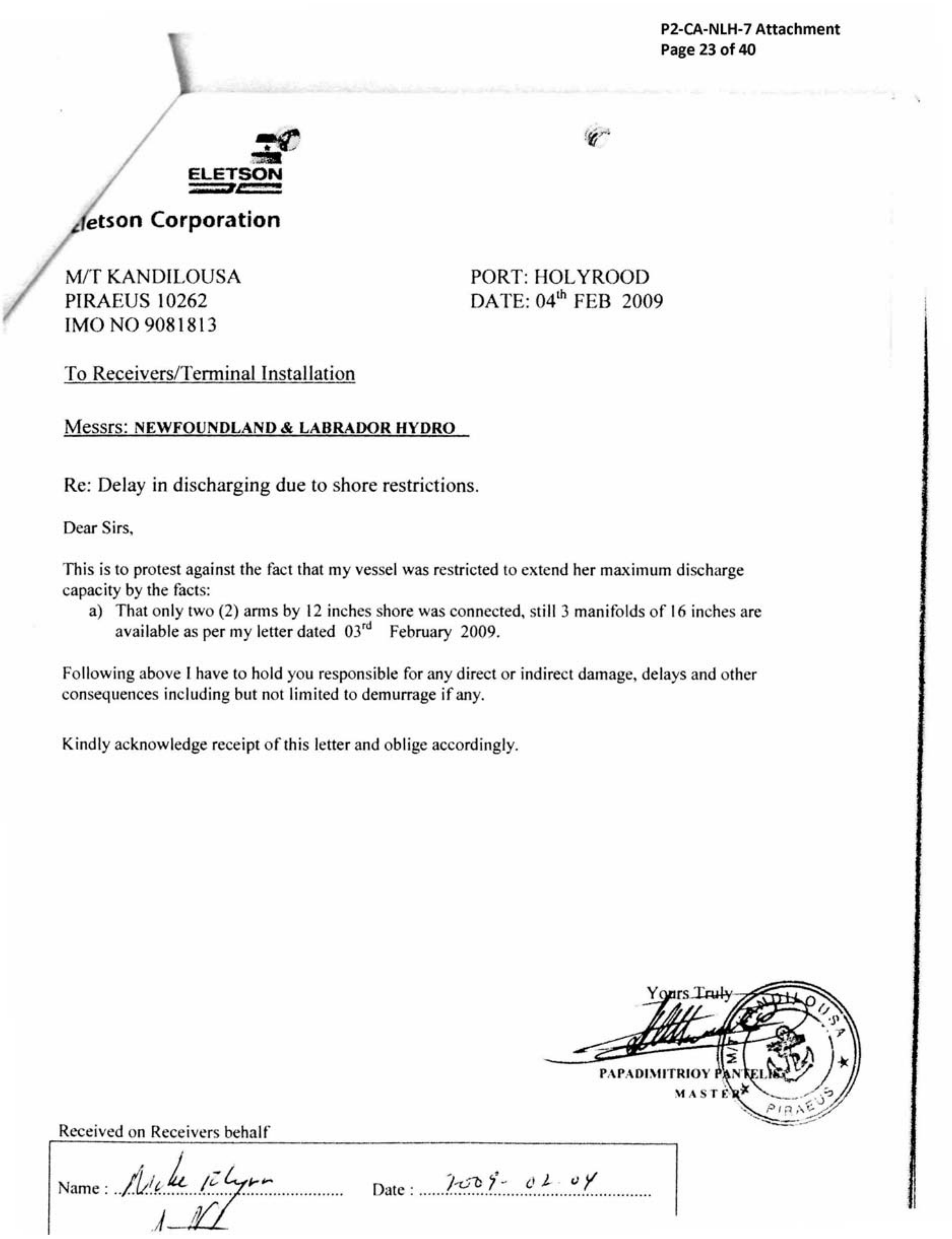
Yours faithfully
MASTER

PAPADIMITRIOY PANTELIS

Received on Receivers behalf :

Name : Mike Flynn	**Date** : 2009-02-04
Signature : M Flynn	**Time** : 1412

Signature received only



ELETSON

letson Corporation

M/T KANDILOUSA
PIRAEUS 10262
IMO NO 9081813

PORT: HOLYROOD
DATE: 04th FEB 2009

To Receivers/Terminal Installation

Messrs: **NEWFOUNDLAND & LABRADOR HYDRO**

Re: Delay in discharging due to shore restrictions.

Dear Sirs,

This is to protest against the fact that my vessel was restricted to extend her maximum discharge capacity by the facts:

a) That only two (2) arms by 12 inches shore was connected, still 3 manifolds of 16 inches are available as per my letter dated 03rd February 2009.

Following above I have to hold you responsible for any direct or indirect damage, delays and other consequences including but not limited to demurrage if any.

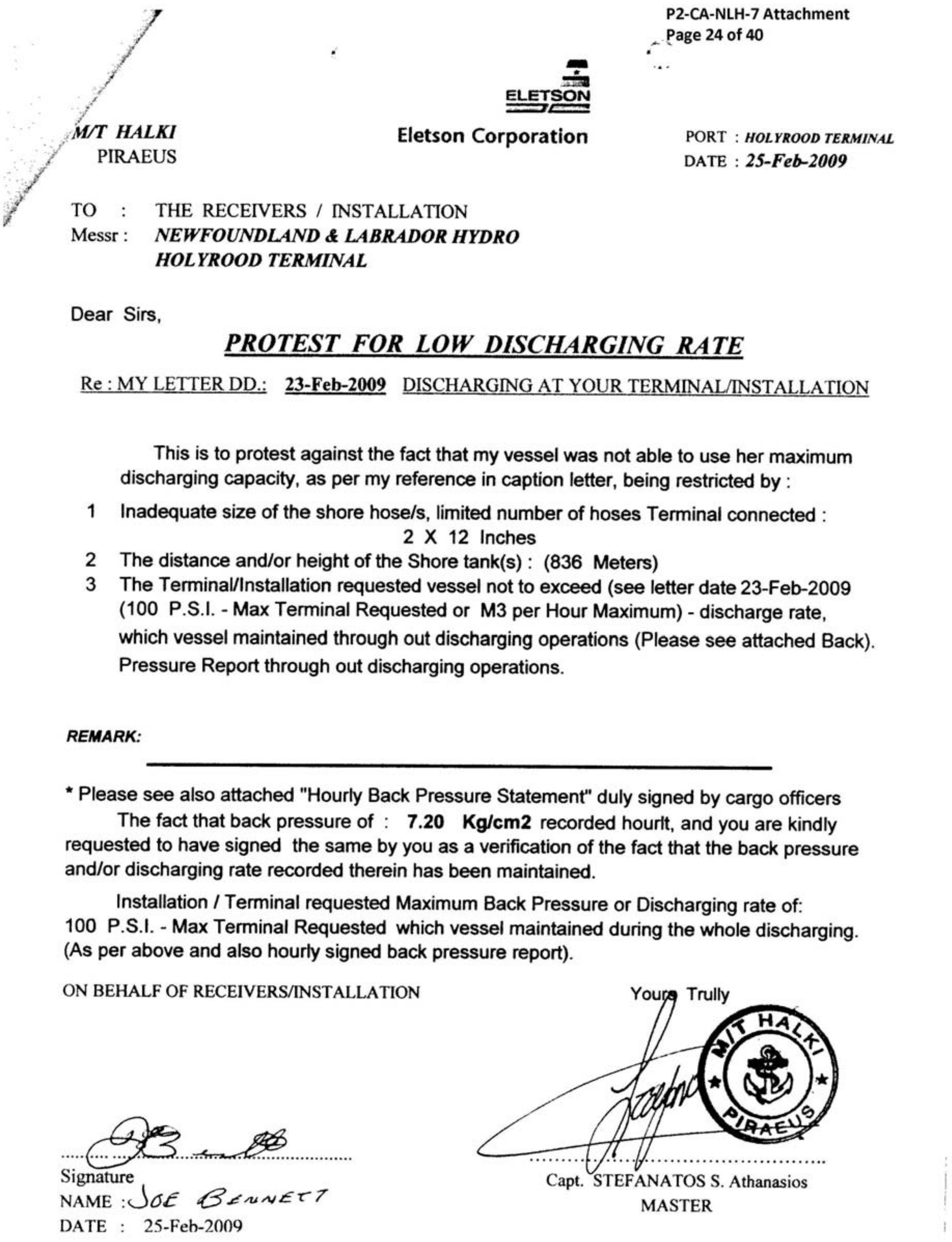
Kindly acknowledge receipt of this letter and oblige accordingly.

Yours Truly

PAPADIMITRIOY PANTELIS
MASTER

Received on Receivers behalf

Name : Mike Flynn Date : 2009-02-04



ELETSON
Eletson Corporation

M/T HALKI
PIRAEUS

PORT : ***HOLYROOD TERMINAL***
DATE : ***25-Feb-2009***

TO : THE RECEIVERS / INSTALLATION
Messr : ***NEWFOUNDLAND & LABRADOR HYDRO***
HOLYROOD TERMINAL

Dear Sirs,

PROTEST FOR LOW DISCHARGING RATE

Re : MY LETTER DD.: **23-Feb-2009** DISCHARGING AT YOUR TERMINAL/INSTALLATION

This is to protest against the fact that my vessel was not able to use her maximum discharging capacity, as per my reference in caption letter, being restricted by :

1. Inadequate size of the shore hose/s, limited number of hoses Terminal connected :
   2 X 12 Inches
2. The distance and/or height of the Shore tank(s) : (836 Meters)
3. The Terminal/Installation requested vessel not to exceed (see letter date 23-Feb-2009 (100 P.S.I. - Max Terminal Requested or M3 per Hour Maximum) - discharge rate, which vessel maintained through out discharging operations (Please see attached Back). Pressure Report through out discharging operations.

REMARK:

---

* Please see also attached "Hourly Back Pressure Statement" duly signed by cargo officers

The fact that back pressure of : **7.20 Kg/cm2** recorded hourlt, and you are kindly requested to have signed the same by you as a verification of the fact that the back pressure and/or discharging rate recorded therein has been maintained.

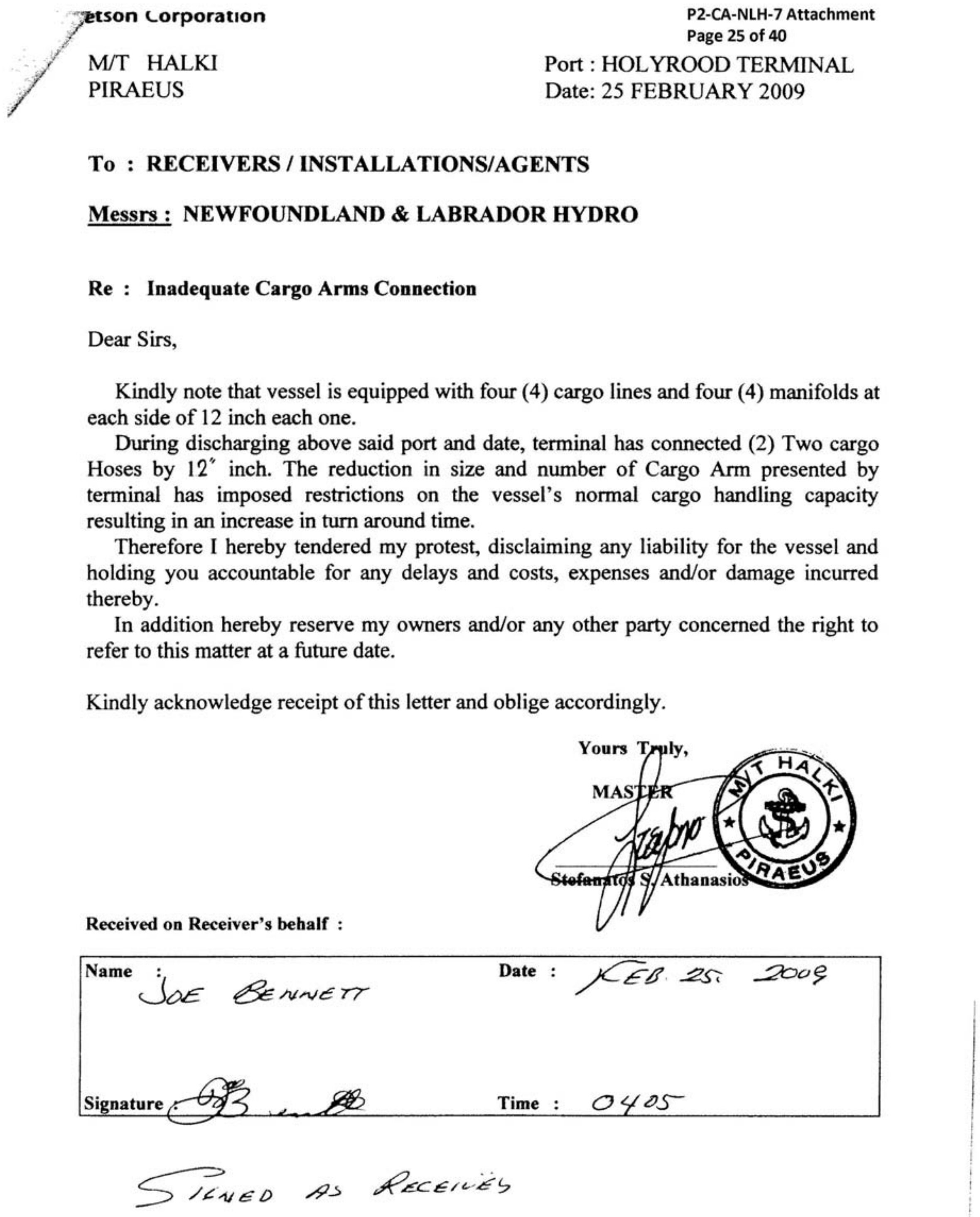
Installation / Terminal requested Maximum Back Pressure or Discharging rate of: 100 P.S.I. - Max Terminal Requested which vessel maintained during the whole discharging. (As per above and also hourly signed back pressure report).

ON BEHALF OF RECEIVERS/INSTALLATION

Signature
NAME : JOE BENNETT
DATE : 25-Feb-2009

Yours Trully

Capt. STEFANATOS S. Athanasios
MASTER



etson Corporation

M/T HALKI
PIRAEUS

Port : HOLYROOD TERMINAL
Date: 25 FEBRUARY 2009

To : RECEIVERS / INSTALLATIONS/AGENTS

Messrs : NEWFOUNDLAND & LABRADOR HYDRO

Re : Inadequate Cargo Arms Connection

Dear Sirs,

Kindly note that vessel is equipped with four (4) cargo lines and four (4) manifolds at each side of 12 inch each one.

During discharging above said port and date, terminal has connected (2) Two cargo Hoses by 12" inch. The reduction in size and number of Cargo Arm presented by terminal has imposed restrictions on the vessel's normal cargo handling capacity resulting in an increase in turn around time.

Therefore I hereby tendered my protest, disclaiming any liability for the vessel and holding you accountable for any delays and costs, expenses and/or damage incurred thereby.

In addition hereby reserve my owners and/or any other party concerned the right to refer to this matter at a future date.

Kindly acknowledge receipt of this letter and oblige accordingly.

Yours Truly,

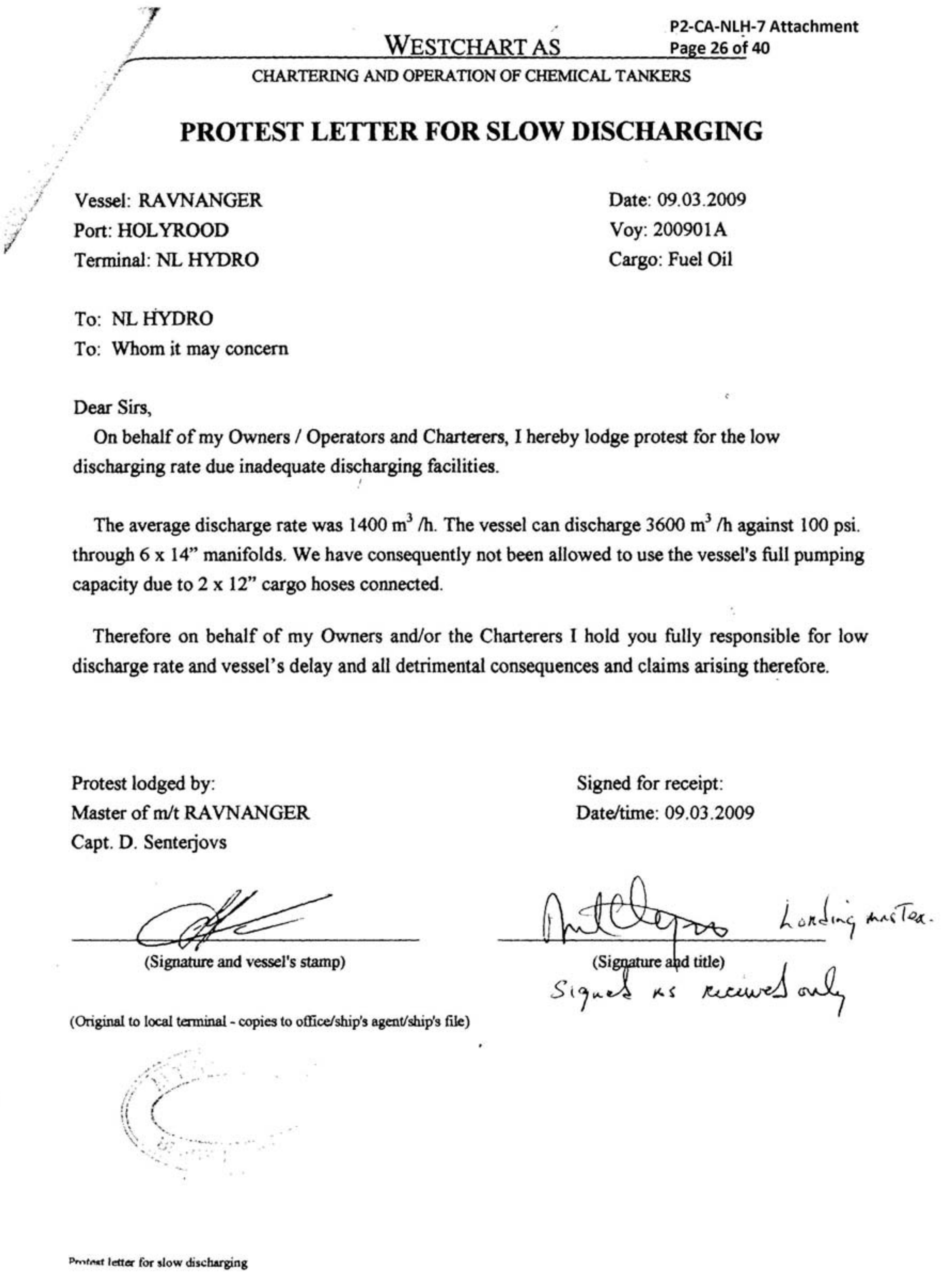
MASTER

Stefanatos S. Athanasios

Received on Receiver's behalf :

Name : JOE BENNETT	**Date :** FEB. 25. 2009
Signature :	**Time :** 0405

SIGNED AS RECEIVED



WESTCHART AS
CHARTERING AND OPERATION OF CHEMICAL TANKERS

PROTEST LETTER FOR SLOW DISCHARGING

Vessel: RAVNANGER	Date: 09.03.2009
Port: HOLYROOD	Voy: 200901A
Terminal: NL HYDRO	Cargo: Fuel Oil

To: NL HYDRO
To: Whom it may concern

Dear Sirs,

On behalf of my Owners / Operators and Charterers, I hereby lodge protest for the low discharging rate due inadequate discharging facilities.

The average discharge rate was 1400 m^3 /h. The vessel can discharge 3600 m^3 /h against 100 psi. through 6 x 14" manifolds. We have consequently not been allowed to use the vessel's full pumping capacity due to 2 x 12" cargo hoses connected.

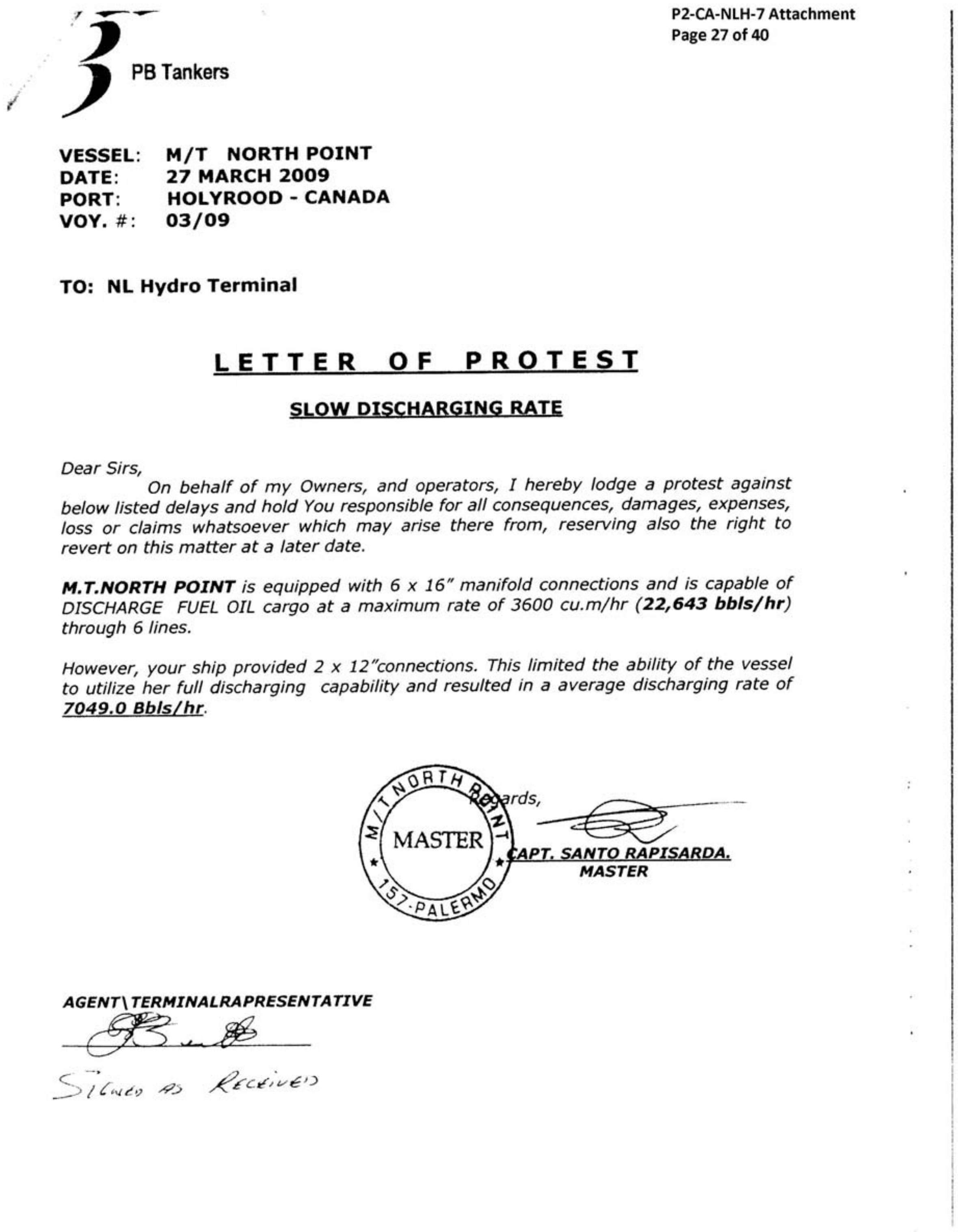
Therefore on behalf of my Owners and/or the Charterers I hold you fully responsible for low discharge rate and vessel's delay and all detrimental consequences and claims arising therefore.

Protest lodged by:	Signed for receipt:
Master of m/t RAVNANGER	Date/time: 09.03.2009
Capt. D. Senterjovs	

(Signature and vessel's stamp)

Loading master.
(Signature and title)
Signed as received only

(Original to local terminal - copies to office/ship's agent/ship's file)



P2-CA-NLH-7 Attachment
Page 27 of 40

PB Tankers

VESSEL: M/T NORTH POINT
DATE: 27 MARCH 2009
PORT: HOLYROOD - CANADA
VOY. #: 03/09

TO: NL Hydro Terminal

LETTER OF PROTEST

SLOW DISCHARGING RATE

Dear Sirs,

On behalf of my Owners, and operators, I hereby lodge a protest against below listed delays and hold You responsible for all consequences, damages, expenses, loss or claims whatsoever which may arise there from, reserving also the right to revert on this matter at a later date.

***M.T.NORTH POINT** is equipped with 6 x 16" manifold connections and is capable of DISCHARGE FUEL OIL cargo at a maximum rate of 3600 cu.m/hr (**22,643 bbls/hr**) through 6 lines.*

*However, your ship provided 2 x 12"connections. This limited the ability of the vessel to utilize her full discharging capability and resulted in a average discharging rate of **7049.0 Bbls/hr**.*

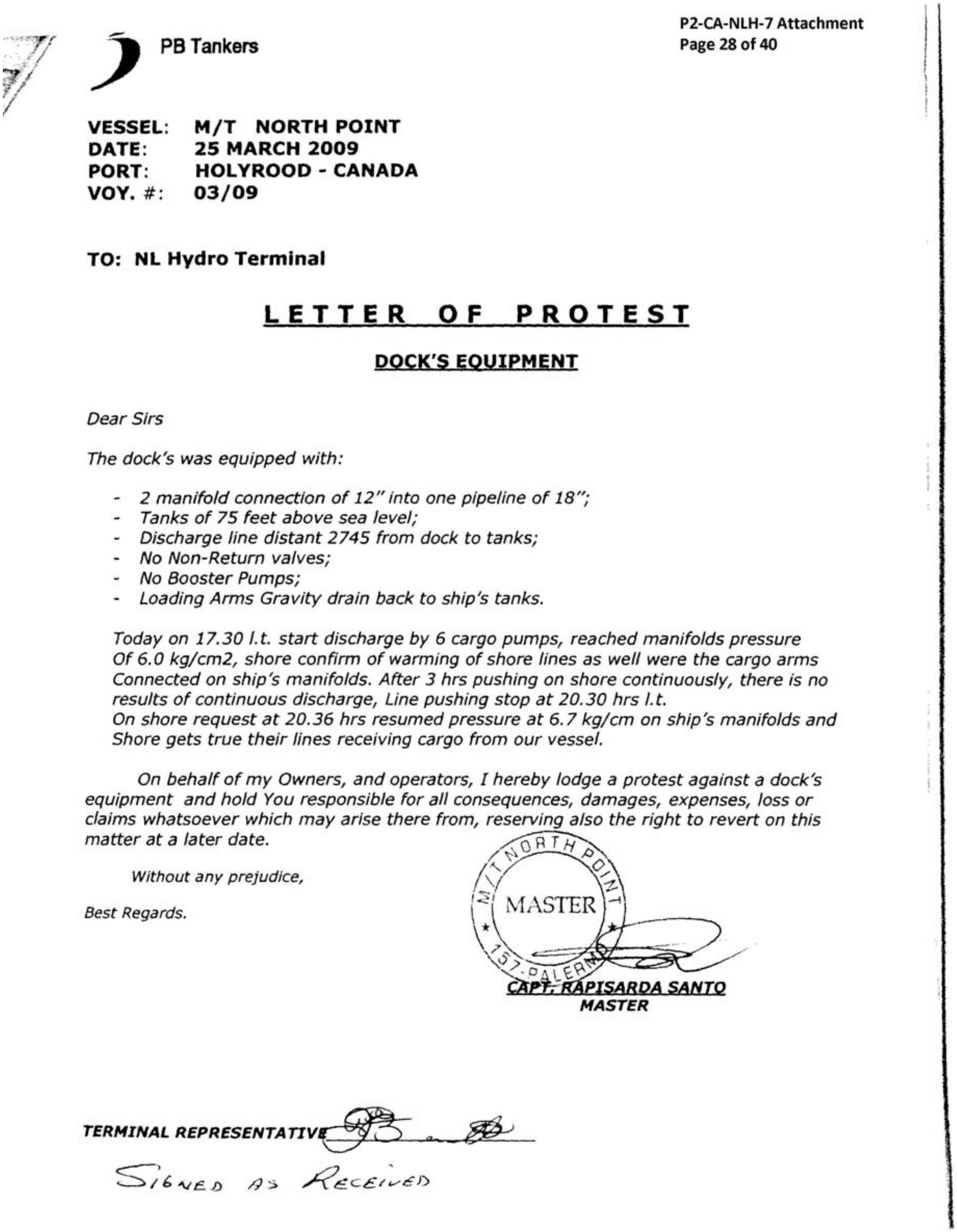
M/T NORTH POINT
MASTER
157-PALERMO

Regards,

CAPT. SANTO RAPISARDA.
MASTER

AGENT\TERMINALRAPRESENTATIVE

SIGNED AS RECEIVED



PB Tankers

VESSEL: **M/T NORTH POINT**
DATE: **25 MARCH 2009**
PORT: **HOLYROOD - CANADA**
VOY. #: **03/09**

TO: NL Hydro Terminal

LETTER OF PROTEST

DOCK'S EQUIPMENT

Dear Sirs

The dock's was equipped with:

- *2 manifold connection of 12" into one pipeline of 18";*
- *Tanks of 75 feet above sea level;*
- *Discharge line distant 2745 from dock to tanks;*
- *No Non-Return valves;*
- *No Booster Pumps;*
- *Loading Arms Gravity drain back to ship's tanks.*

Today on 17.30 l.t. start discharge by 6 cargo pumps, reached manifolds pressure Of 6.0 kg/cm2, shore confirm of warming of shore lines as well were the cargo arms Connected on ship's manifolds. After 3 hrs pushing on shore continuously, there is no results of continuous discharge, Line pushing stop at 20.30 hrs l.t.
On shore request at 20.36 hrs resumed pressure at 6.7 kg/cm on ship's manifolds and Shore gets true their lines receiving cargo from our vessel.

On behalf of my Owners, and operators, I hereby lodge a protest against a dock's equipment and hold You responsible for all consequences, damages, expenses, loss or claims whatsoever which may arise there from, reserving also the right to revert on this matter at a later date.

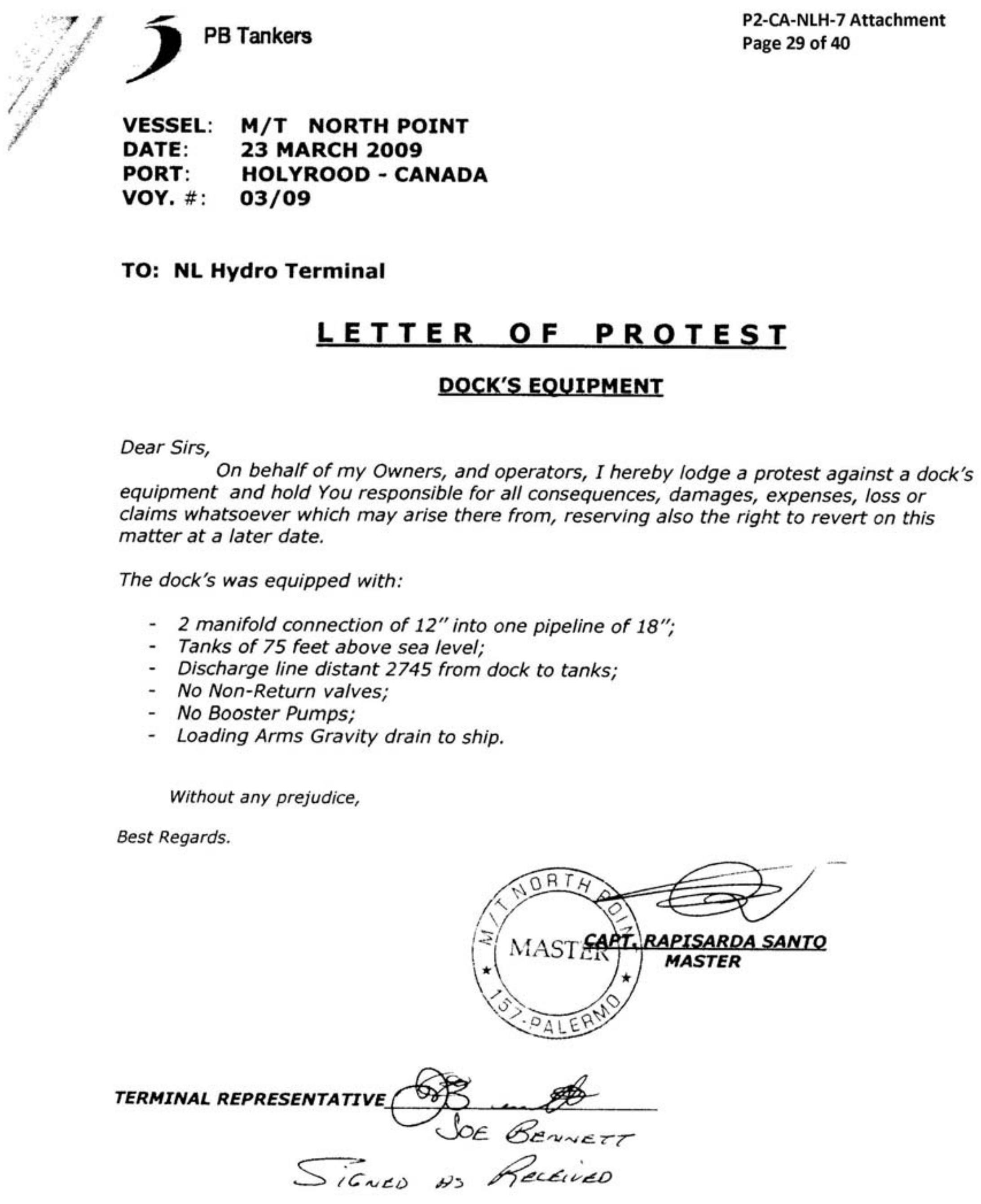
Without any prejudice,

Best Regards.

CAPT. RAPISARDA SANTO
MASTER

TERMINAL REPRESENTATIVE

SIGNED AS RECEIVED



PB Tankers

VESSEL: **M/T NORTH POINT**
DATE: **23 MARCH 2009**
PORT: **HOLYROOD - CANADA**
VOY. #: **03/09**

TO: NL Hydro Terminal

LETTER OF PROTEST

DOCK'S EQUIPMENT

Dear Sirs,

On behalf of my Owners, and operators, I hereby lodge a protest against a dock's equipment and hold You responsible for all consequences, damages, expenses, loss or claims whatsoever which may arise there from, reserving also the right to revert on this matter at a later date.

The dock's was equipped with:

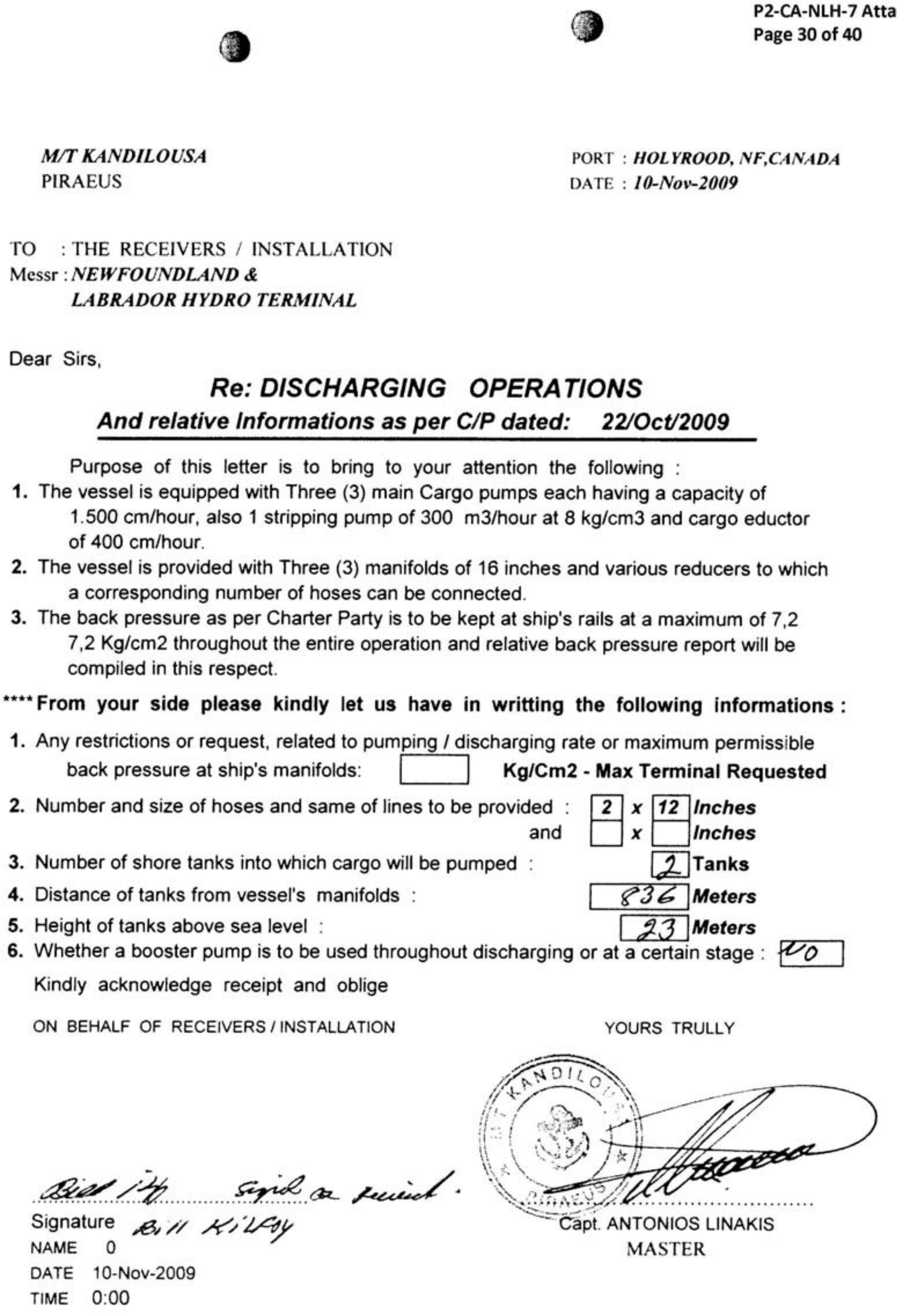
- *2 manifold connection of 12" into one pipeline of 18";*
- *Tanks of 75 feet above sea level;*
- *Discharge line distant 2745 from dock to tanks;*
- *No Non-Return valves;*
- *No Booster Pumps;*
- *Loading Arms Gravity drain to ship.*

Without any prejudice,

Best Regards.

CAPT. RAPISARDA SANTO
MASTER

TERMINAL REPRESENTATIVE
Joe Bennett
Signed as Received



M/T KANDILOUSA
PIRAEUS

PORT : ***HOLYROOD, NF,CANADA***
DATE : ***10-Nov-2009***

TO : THE RECEIVERS / INSTALLATION
Messr : ***NEWFOUNDLAND &***
LABRADOR HYDRO TERMINAL

Dear Sirs,

Re: DISCHARGING OPERATIONS

And relative Informations as per C/P dated: 22/Oct/2009

Purpose of this letter is to bring to your attention the following :

1. The vessel is equipped with Three (3) main Cargo pumps each having a capacity of 1.500 cm/hour, also 1 stripping pump of 300 m3/hour at 8 kg/cm3 and cargo eductor of 400 cm/hour.

2. The vessel is provided with Three (3) manifolds of 16 inches and various reducers to which a corresponding number of hoses can be connected.

3. The back pressure as per Charter Party is to be kept at ship's rails at a maximum of 7,2 7,2 Kg/cm2 throughout the entire operation and relative back pressure report will be compiled in this respect.

****** From your side please kindly let us have in writting the following informations :**

1. Any restrictions or request, related to pumping / discharging rate or maximum permissible back pressure at ship's manifolds: ☐ **Kg/Cm2 - Max Terminal Requested**

2. Number and size of hoses and same of lines to be provided : **2** ***x*** **12** ***Inches***
and ☐ ***x*** ☐ ***Inches***

3. Number of shore tanks into which cargo will be pumped : 2 **Tanks**

4. Distance of tanks from vessel's manifolds : 836 ***Meters***

5. Height of tanks above sea level : 23 ***Meters***

6. Whether a booster pump is to be used throughout discharging or at a certain stage : no

Kindly acknowledge receipt and oblige

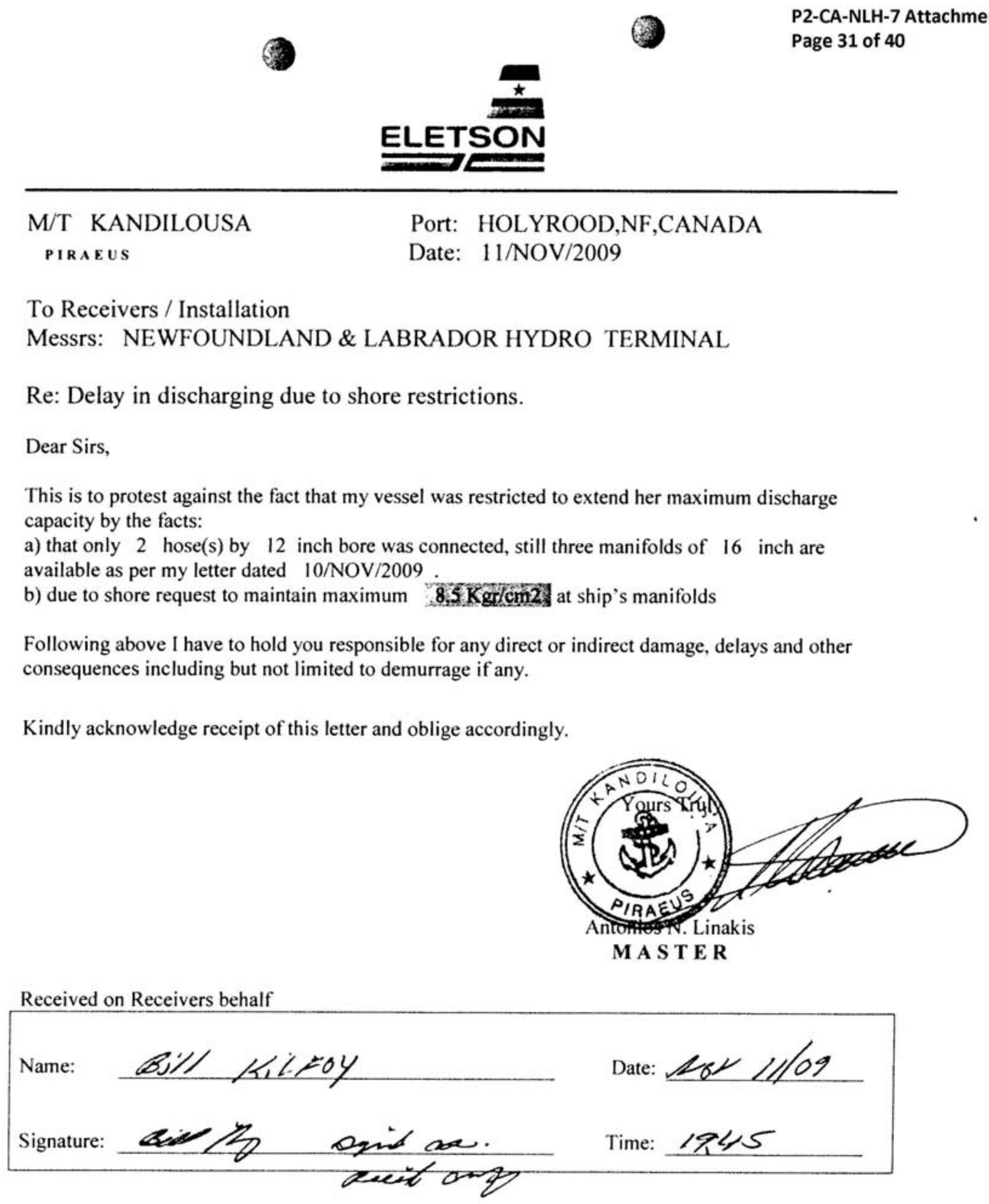
ON BEHALF OF RECEIVERS / INSTALLATION

signed as received.

Signature Bill Kilfoy
NAME 0
DATE 10-Nov-2009
TIME 0:00

YOURS TRULLY

Capt. ANTONIOS LINAKIS
MASTER



ELETSON

M/T KANDILOUSA
PIRAEUS

Port: HOLYROOD,NF,CANADA
Date: 11/NOV/2009

To Receivers / Installation
Messrs: NEWFOUNDLAND & LABRADOR HYDRO TERMINAL

Re: Delay in discharging due to shore restrictions.

Dear Sirs,

This is to protest against the fact that my vessel was restricted to extend her maximum discharge capacity by the facts:
a) that only 2 hose(s) by 12 inch bore was connected, still three manifolds of 16 inch are available as per my letter dated 10/NOV/2009 .
b) due to shore request to maintain maximum 8.5 Kgr/cm2 at ship's manifolds

Following above I have to hold you responsible for any direct or indirect damage, delays and other consequences including but not limited to demurrage if any.

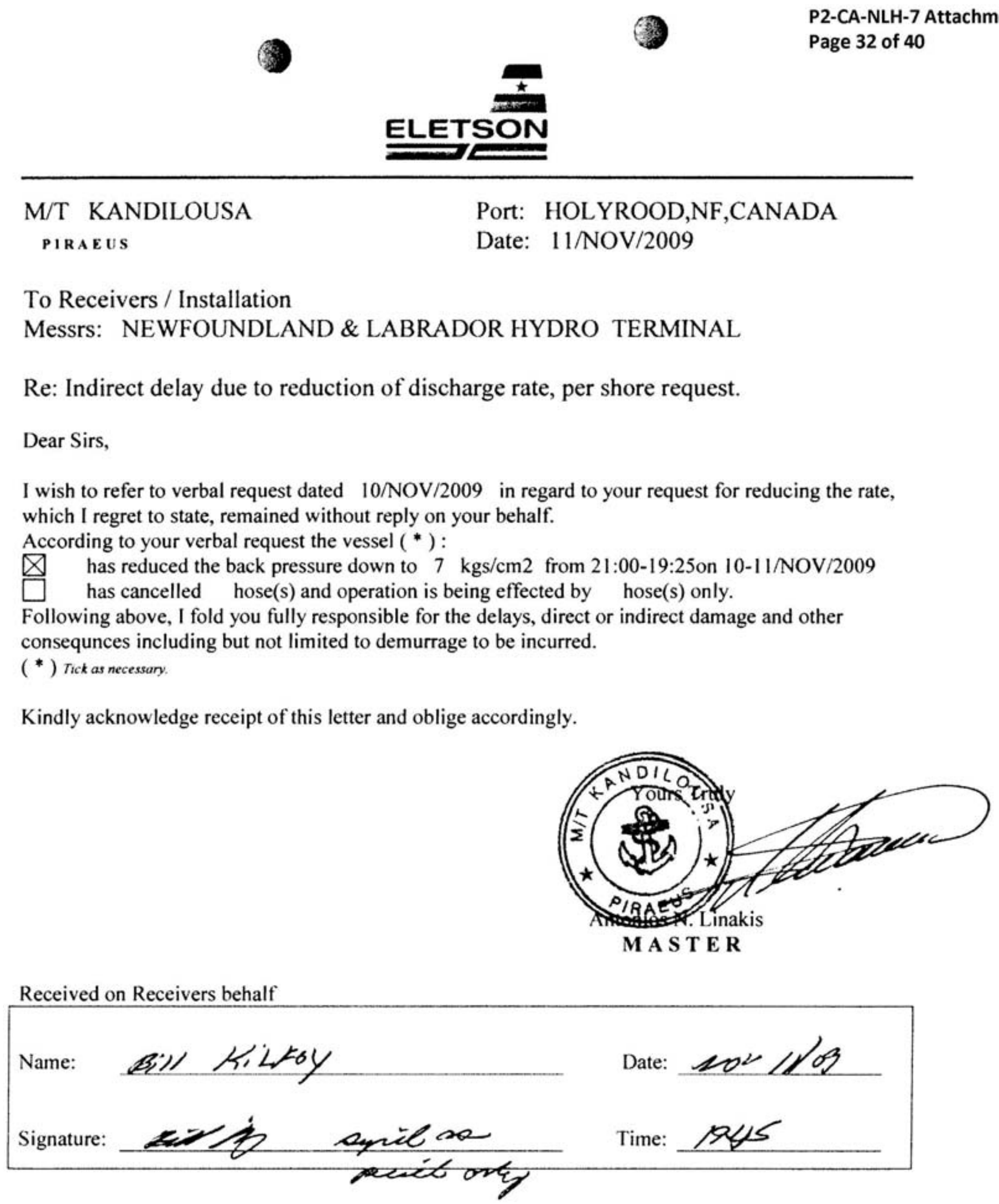
Kindly acknowledge receipt of this letter and oblige accordingly.

Yours Truly

Antonios N. Linakis
MASTER

Received on Receivers behalf

Name:	Bill Kilfoy	Date:	Nov 11/09
Signature:	Bill Ky signed as. receipt only	Time:	1945



ELETSON

M/T KANDILOUSA
PIRAEUS

Port: HOLYROOD,NF,CANADA
Date: 11/NOV/2009

To Receivers / Installation
Messrs: NEWFOUNDLAND & LABRADOR HYDRO TERMINAL

Re: Indirect delay due to reduction of discharge rate, per shore request.

Dear Sirs,

I wish to refer to verbal request dated 10/NOV/2009 in regard to your request for reducing the rate, which I regret to state, remained without reply on your behalf.
According to your verbal request the vessel (*) :
☒ has reduced the back pressure down to 7 kgs/cm2 from 21:00-19:25on 10-11/NOV/2009
☐ has cancelled hose(s) and operation is being effected by hose(s) only.
Following above, I fold you fully responsible for the delays, direct or indirect damage and other consequnces including but not limited to demurrage to be incurred.
(*) *Tick as necessary.*

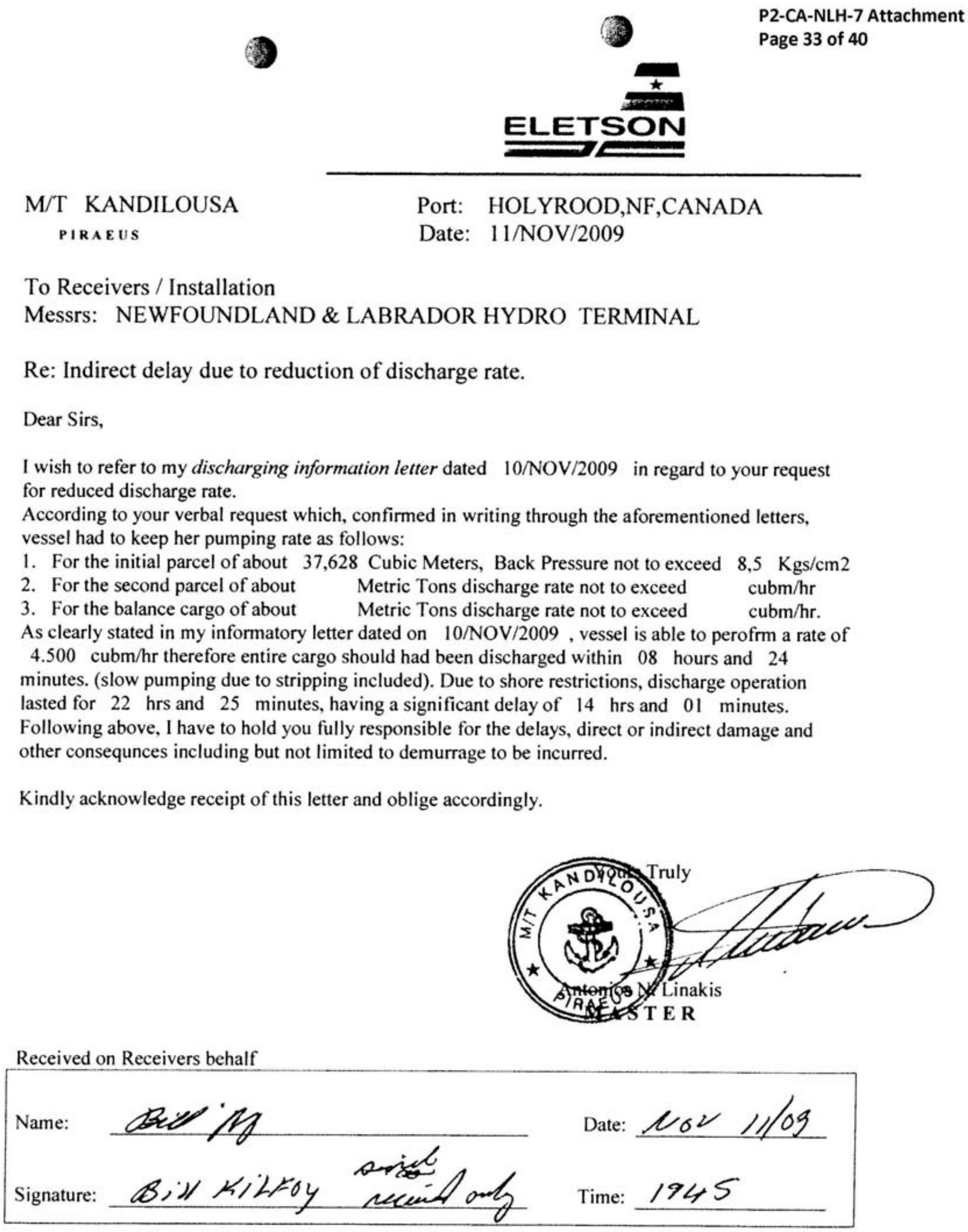
Kindly acknowledge receipt of this letter and oblige accordingly.

Yours Truly

Antonios N. Linakis
MASTER

Received on Receivers behalf

Name: Bill Kilfoy
Date: nov 11/09
Signature: signed as receipt only
Time: 1945



ELETSON

M/T KANDILOUSA
PIRAEUS

Port: HOLYROOD,NF,CANADA
Date: 11/NOV/2009

To Receivers / Installation
Messrs: NEWFOUNDLAND & LABRADOR HYDRO TERMINAL

Re: Indirect delay due to reduction of discharge rate.

Dear Sirs,

I wish to refer to my *discharging information letter* dated 10/NOV/2009 in regard to your request for reduced discharge rate.
According to your verbal request which, confirmed in writing through the aforementioned letters, vessel had to keep her pumping rate as follows:

1. For the initial parcel of about 37,628 Cubic Meters, Back Pressure not to exceed 8,5 Kgs/cm2
2. For the second parcel of about Metric Tons discharge rate not to exceed cubm/hr
3. For the balance cargo of about Metric Tons discharge rate not to exceed cubm/hr.

As clearly stated in my informatory letter dated on 10/NOV/2009 , vessel is able to perofrm a rate of 4.500 cubm/hr therefore entire cargo should had been discharged within 08 hours and 24 minutes. (slow pumping due to stripping included). Due to shore restrictions, discharge operation lasted for 22 hrs and 25 minutes, having a significant delay of 14 hrs and 01 minutes.
Following above, I have to hold you fully responsible for the delays, direct or indirect damage and other consequnces including but not limited to demurrage to be incurred.

Kindly acknowledge receipt of this letter and oblige accordingly.

Yours Truly

Antonios N. Linakis
MASTER

Received on Receivers behalf

Name: Bill M
Date: Nov 11/09
Signature: Bill Kilfoy signed received only
Time: 1945

MINERVA MARINE INC.
141-143 VOULIAGMENIS AVENUE & AEOLOU 1 STREET, VOULA 16673, ATHENS - GREECE
PH: 210-8907570, TLX: 214544/214545 MIMA GR, FAX: 210-8907670, E-MAIL: op@minervatank.gr

VESSEL MINERVA VASO

Port HOLYROOD/CANADA

Date 14/01/2010

TO: RECEIVERS / TERMINAL /INSTALLATION

NOTE OF PROTEST

RE: DELAY IN DISCHARGING DUE TO HIGH BACK PRESSURE

This is to protest against the fact that my vessel, although maintaining a constant pressure of 7.2 kgs/cm^2 at ships' rails is unable to exercise her maximum discharging capability as indicated in my letter dated 13/01/2010, and it is being restricted by high back pressure attributed to the following reasons:

☒ Limited number of hoses 2 x 12 mm and their small bore.

☒ Considerable length of the shore pipeline and the raised location of the shore tanks.

☒ Limited number of hoses and their small bore, combined with the considerable pipe line distance and high location of shore tanks.

Following above, I hold you fully responsible for any direct or indirect damage, delays and other consequences including but not limited to demurrage to be incurred.

M/T MINERVA VASO
PIRAEUS

Yours faithfully,

Capt Ioannis G.Linardos
Master

☒ **Tick as necessary**

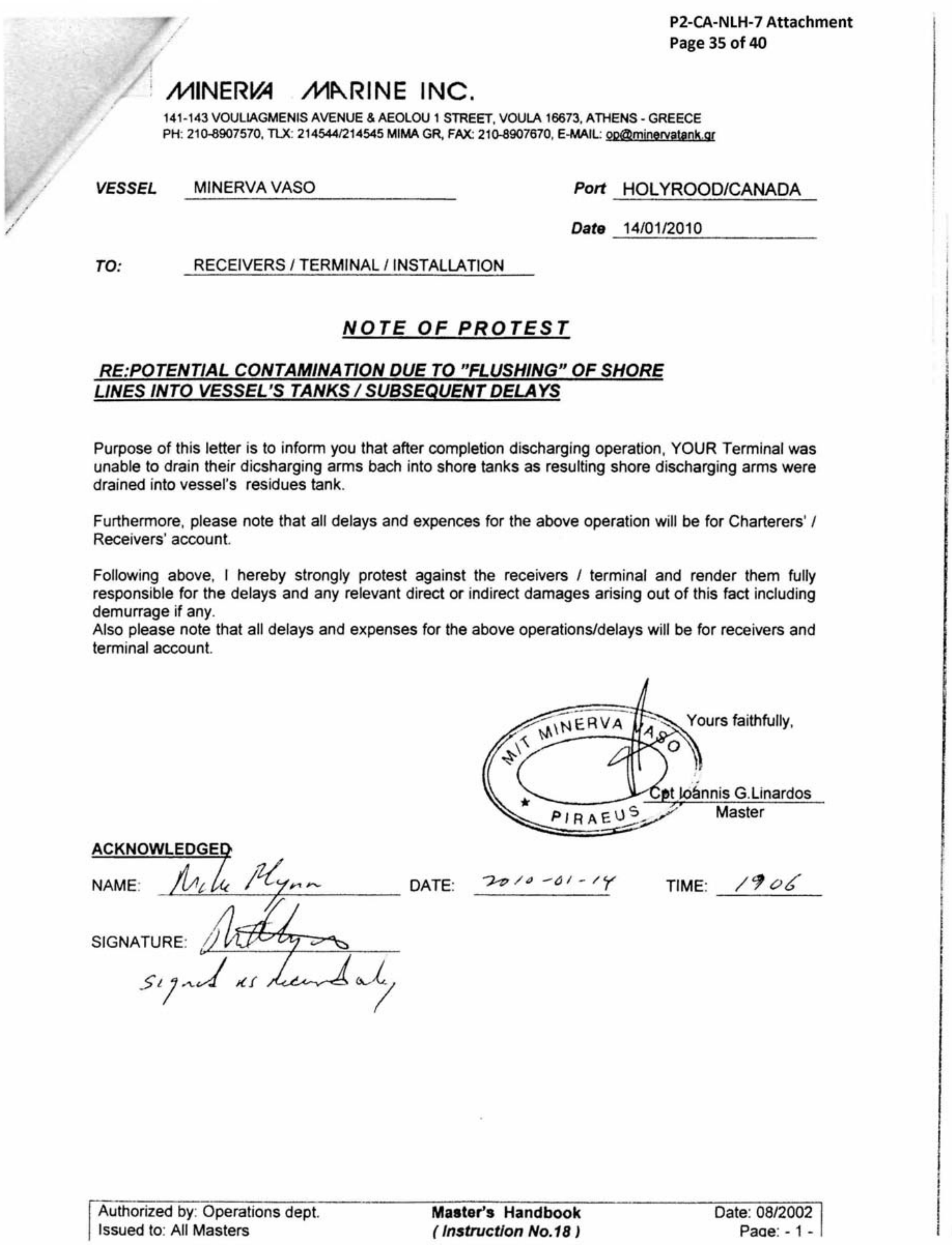
ACKNOWLEDGED

NAME: Mike Flynn DATE: 2010-01-14 TIME: 1906

SIGNATURE:

signed as received only

Authorized by: Operations dept. Issued to: All Masters	**Master's Handbook** ***(Instruction No.19)***	Date: 08/2002 Page: - 1 -



MINERVA MARINE INC.
141-143 VOULIAGMENIS AVENUE & AEOLOU 1 STREET, VOULA 16673, ATHENS - GREECE
PH: 210-8907570, TLX: 214544/214545 MIMA GR, FAX: 210-8907670, E-MAIL: op@minervatank.gr

VESSEL MINERVA VASO

Port HOLYROOD/CANADA

Date 14/01/2010

TO: RECEIVERS / TERMINAL / INSTALLATION

NOTE OF PROTEST

RE:POTENTIAL CONTAMINATION DUE TO "FLUSHING" OF SHORE LINES INTO VESSEL'S TANKS / SUBSEQUENT DELAYS

Purpose of this letter is to inform you that after completion discharging operation, YOUR Terminal was unable to drain their dicsharging arms bach into shore tanks as resulting shore discharging arms were drained into vessel's residues tank.

Furthermore, please note that all delays and expences for the above operation will be for Charterers' / Receivers' account.

Following above, I hereby strongly protest against the receivers / terminal and render them fully responsible for the delays and any relevant direct or indirect damages arising out of this fact including demurrage if any.
Also please note that all delays and expenses for the above operations/delays will be for receivers and terminal account.

M/T MINERVA VASO
PIRAEUS

Yours faithfully,

Cpt Ioánnis G.Linardos
Master

ACKNOWLEDGED

NAME: Mike Flynn DATE: 2010-01-14 TIME: 1906

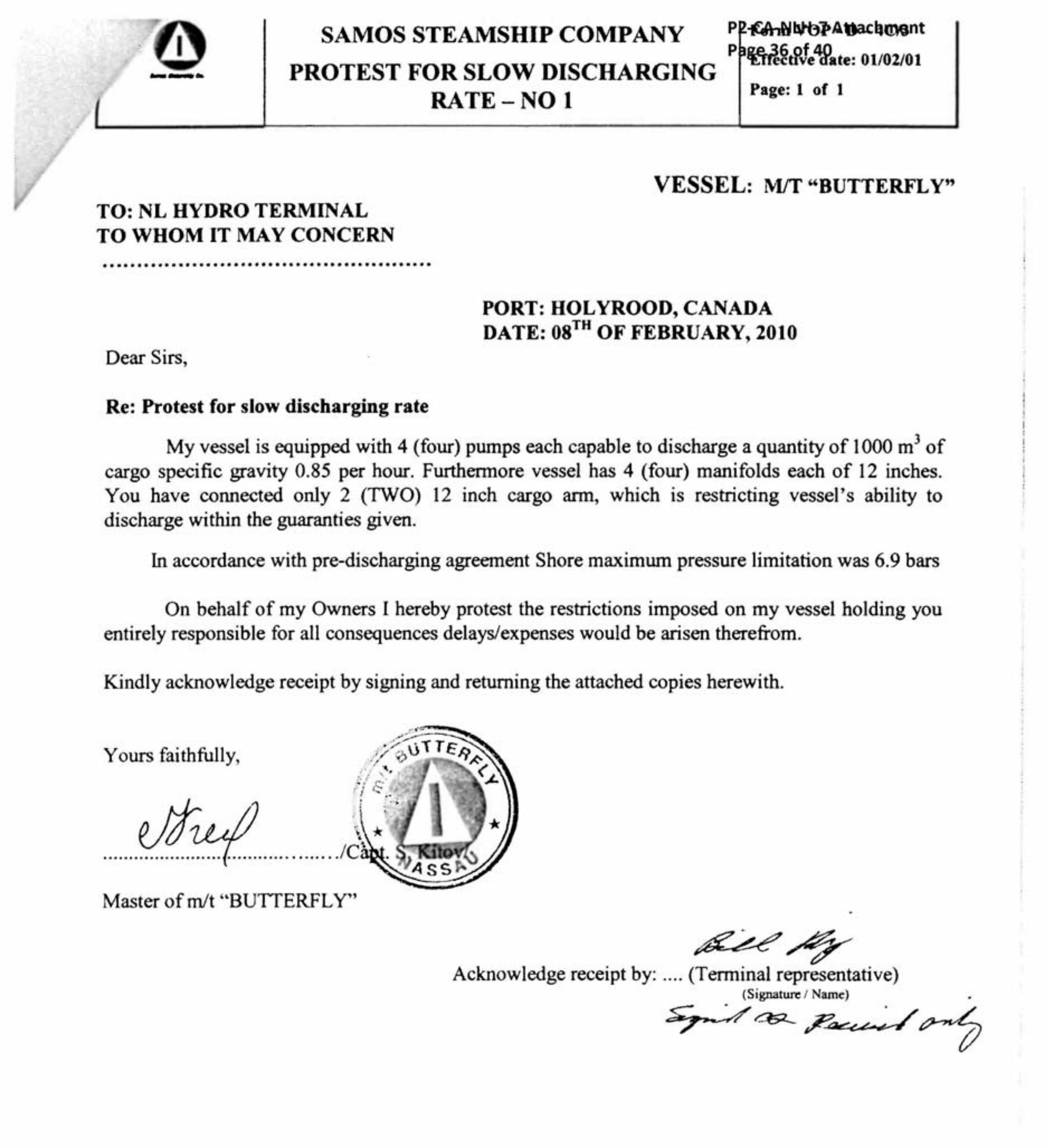
SIGNATURE:

signed as receipt only

Authorized by: Operations dept.
Issued to: All Masters

Master's Handbook
(Instruction No.18)

Date: 08/2002
Page: - 1 -



SAMOS STEAMSHIP COMPANY
PROTEST FOR SLOW DISCHARGING RATE – NO 1

Form: OP-B-[illegible]
Effective date: 01/02/01
Page: 1 of 1

VESSEL: M/T "BUTTERFLY"

TO: NL HYDRO TERMINAL
TO WHOM IT MAY CONCERN
……………………………………………

PORT: HOLYROOD, CANADA
DATE: 08TH OF FEBRUARY, 2010

Dear Sirs,

Re: Protest for slow discharging rate

My vessel is equipped with 4 (four) pumps each capable to discharge a quantity of 1000 m^3 of cargo specific gravity 0.85 per hour. Furthermore vessel has 4 (four) manifolds each of 12 inches. You have connected only 2 (TWO) 12 inch cargo arm, which is restricting vessel's ability to discharge within the guaranties given.

In accordance with pre-discharging agreement Shore maximum pressure limitation was 6.9 bars

On behalf of my Owners I hereby protest the restrictions imposed on my vessel holding you entirely responsible for all consequences delays/expenses would be arisen therefrom.

Kindly acknowledge receipt by signing and returning the attached copies herewith.

Yours faithfully,

m/t BUTTERFLY
NASSAU

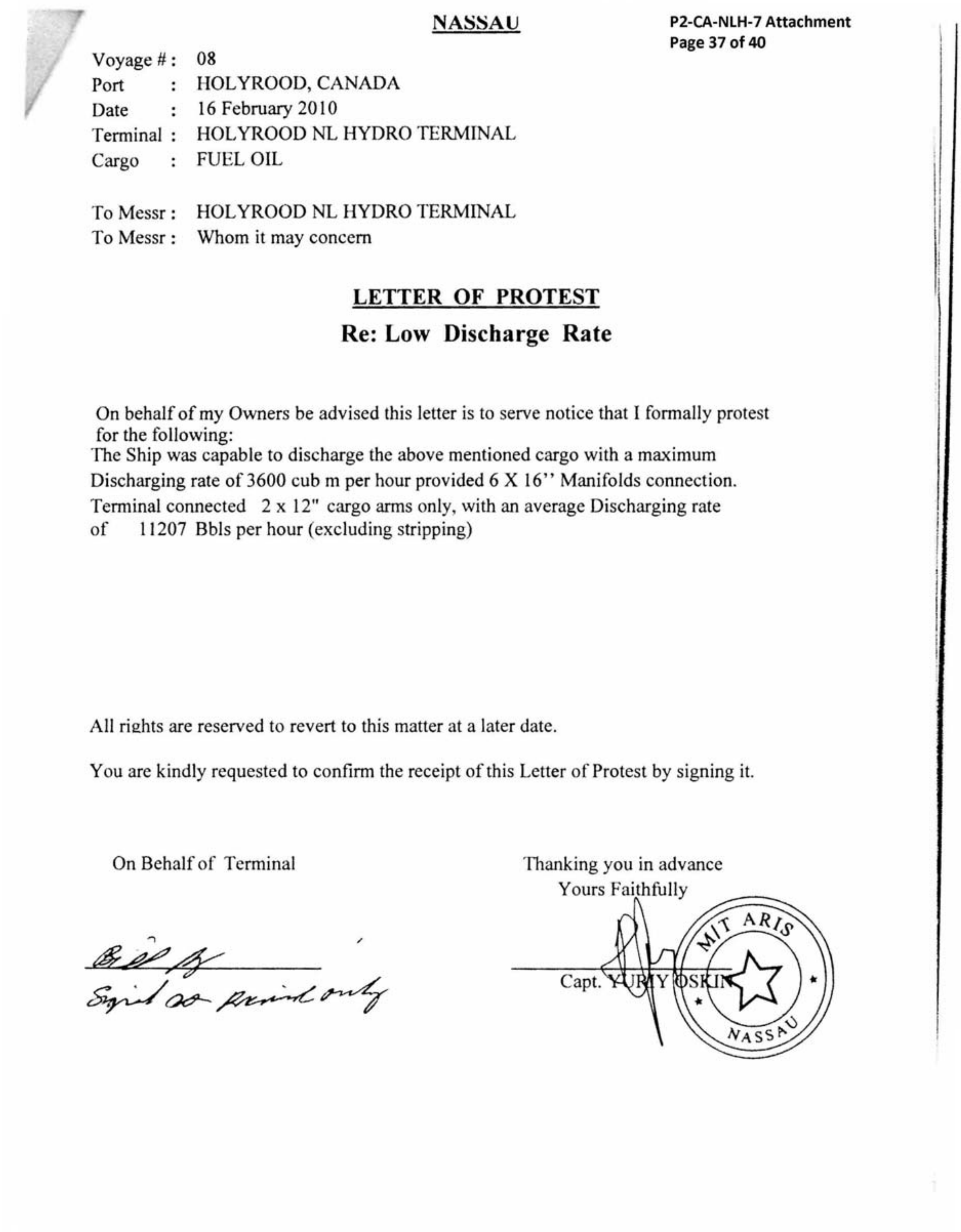
……………………………………/Capt. S. Kitov/

Master of m/t "BUTTERFLY"

Bill Fly

Acknowledge receipt by: .... (Terminal representative)
(Signature / Name)

Signed as Received only



P2-CA-NLH-7 Attachment
Page 37 of 40

NASSAU

Voyage # : 08
Port : HOLYROOD, CANADA
Date : 16 February 2010
Terminal : HOLYROOD NL HYDRO TERMINAL
Cargo : FUEL OIL

To Messr : HOLYROOD NL HYDRO TERMINAL
To Messr : Whom it may concern

LETTER OF PROTEST

Re: Low Discharge Rate

On behalf of my Owners be advised this letter is to serve notice that I formally protest for the following:
The Ship was capable to discharge the above mentioned cargo with a maximum Discharging rate of 3600 cub m per hour provided 6 X 16'' Manifolds connection.
Terminal connected 2 x 12" cargo arms only, with an average Discharging rate of 11207 Bbls per hour (excluding stripping)

All rights are reserved to revert to this matter at a later date.

You are kindly requested to confirm the receipt of this Letter of Protest by signing it.

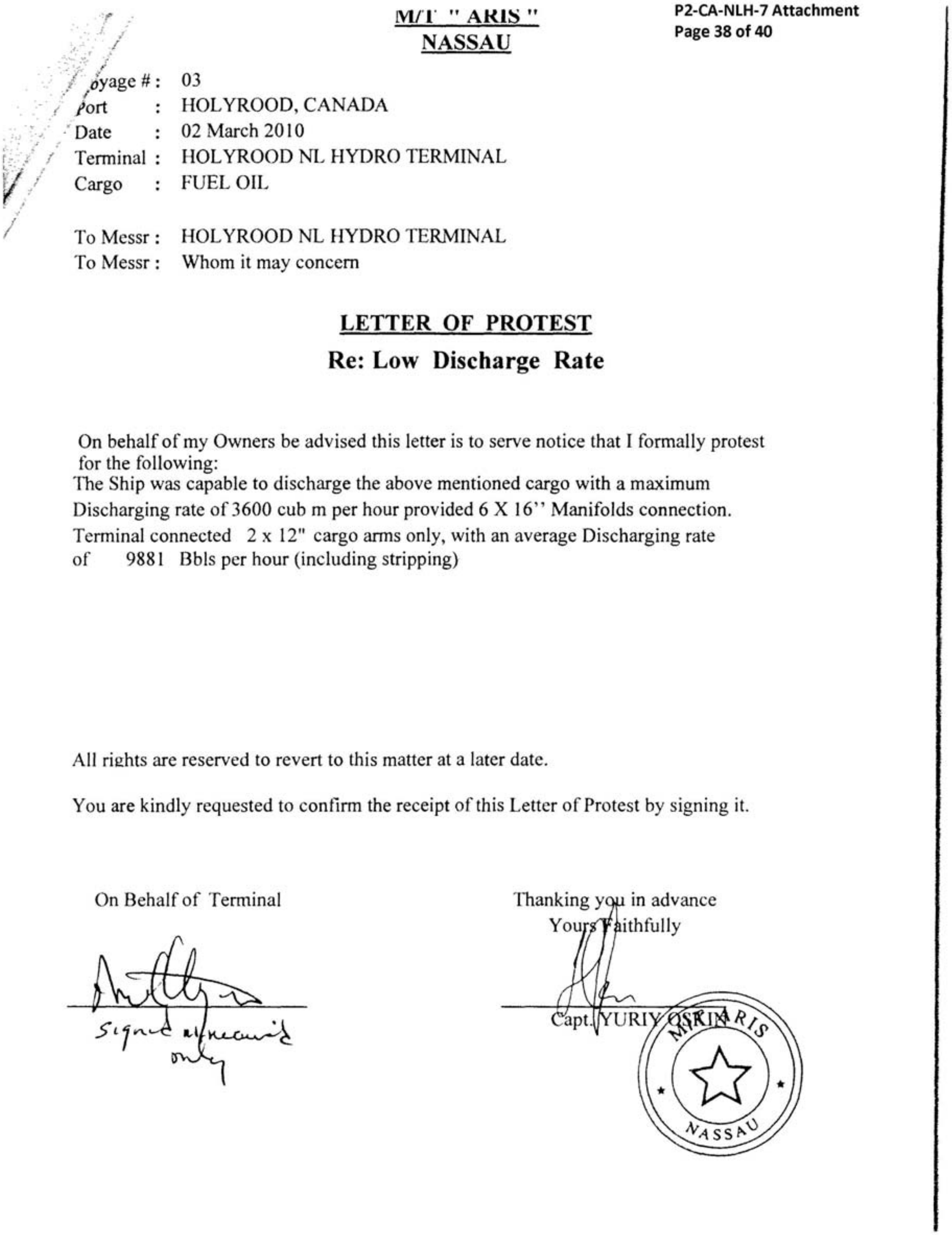
On Behalf of Terminal

Bill B
Signed as received only

Thanking you in advance
Yours Faithfully

Capt. YURIY OSKIN

M/T ARIS
NASSAU



M/T " ARIS "
NASSAU

oyage # : 03
ort : HOLYROOD, CANADA
Date : 02 March 2010
Terminal : HOLYROOD NL HYDRO TERMINAL
Cargo : FUEL OIL

To Messr : HOLYROOD NL HYDRO TERMINAL
To Messr : Whom it may concern

LETTER OF PROTEST

Re: Low Discharge Rate

On behalf of my Owners be advised this letter is to serve notice that I formally protest for the following:
The Ship was capable to discharge the above mentioned cargo with a maximum Discharging rate of 3600 cub m per hour provided 6 X 16'' Manifolds connection.
Terminal connected 2 x 12" cargo arms only, with an average Discharging rate of 9881 Bbls per hour (including stripping)

All rights are reserved to revert to this matter at a later date.

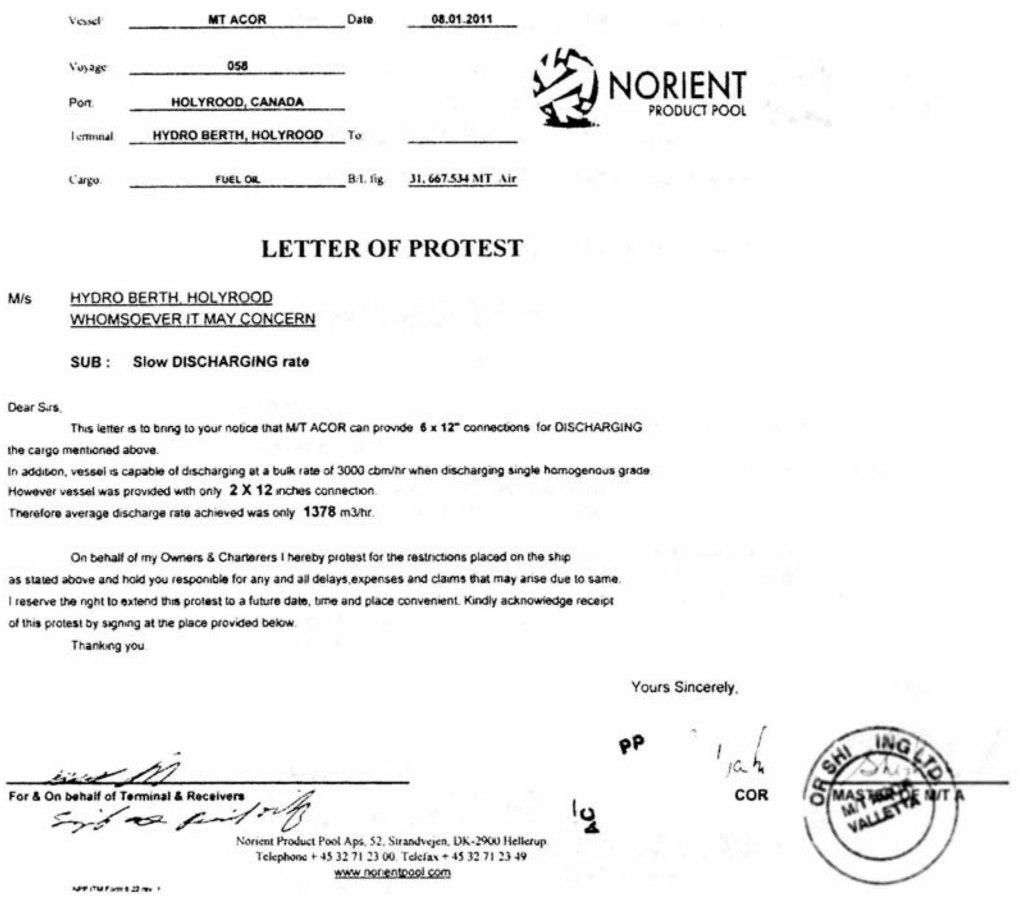
You are kindly requested to confirm the receipt of this Letter of Protest by signing it.

On Behalf of Terminal

Signed as received only

Thanking you in advance
Yours Faithfully

Capt. YURIY OSKIN



Vessel: **MT ACOR** Date: **08.01.2011**

Voyage: **058**

Port: **HOLYROOD, CANADA**

Terminal: **HYDRO BERTH, HOLYROOD** To: ______

Cargo: **FUEL OIL** B/L fig: **31, 667.534 MT Air**

NORIENT
PRODUCT POOL

LETTER OF PROTEST

M/s HYDRO BERTH, HOLYROOD
WHOMSOEVER IT MAY CONCERN

SUB : Slow DISCHARGING rate

Dear Sirs,

This letter is to bring to your notice that M/T ACOR can provide **6 x 12"** connections for DISCHARGING the cargo mentioned above.
In addition, vessel is capable of discharging at a bulk rate of 3000 cbm/hr when discharging single homogenous grade.
However vessel was provided with only **2 X 12** inches connection.
Therefore average discharge rate achieved was only **1378** m3/hr.

On behalf of my Owners & Charterers I hereby protest for the restrictions placed on the ship as stated above and hold you responible for any and all delays,expenses and claims that may arise due to same.
I reserve the right to extend this protest to a future date, time and place convenient. Kindly acknowledge receipt of this protest by signing at the place provided below.

Thanking you.

Yours Sincerely,

PP

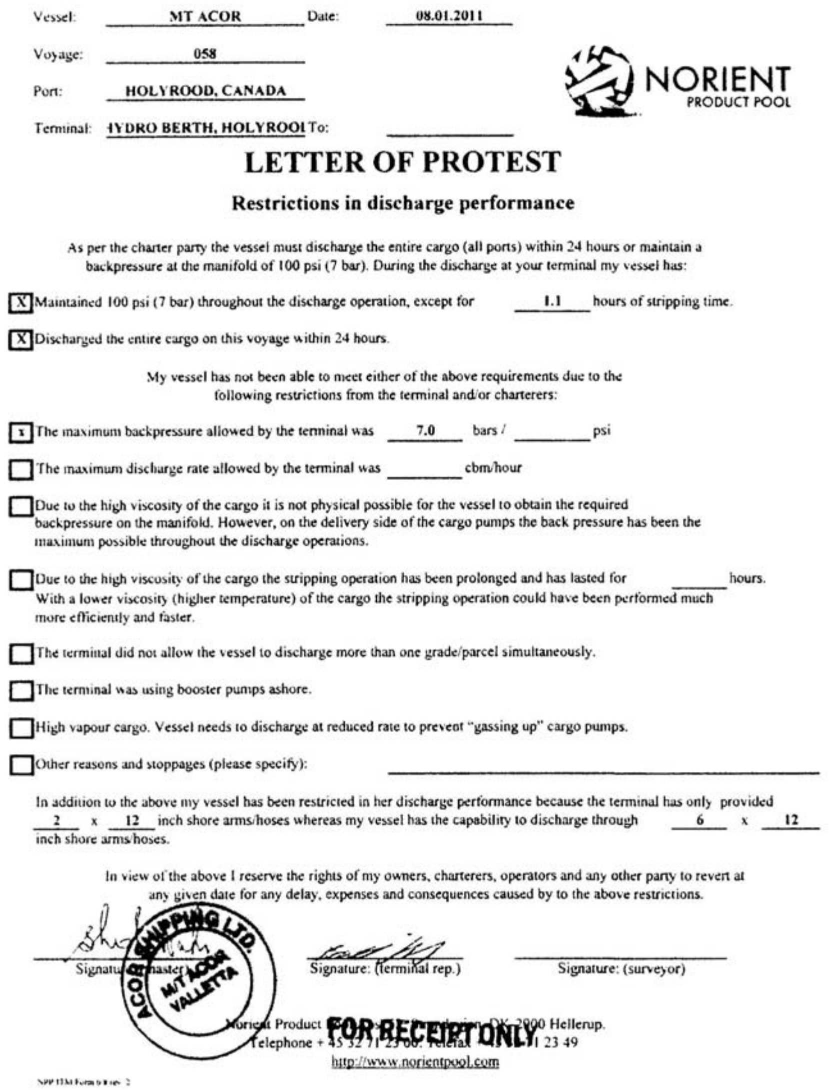
COR

MASTER OF M/T A
VALLETTA

For & On behalf of Terminal & Receivers

Norient Product Pool Aps, 52, Strandvejen, DK-2900 Hellerup
Telephone + 45 32 71 23 00, Telefax + 45 32 71 23 49
www.norientpool.com

P2-CA-NLH-7 Attachment
Page 40 of 40



Vessel: MT ACOR Date: 08.01.2011

Voyage: 058

Port: HOLYROOD, CANADA

Terminal: HYDRO BERTH, HOLYROOI To: ________

NORIENT PRODUCT POOL

LETTER OF PROTEST

Restrictions in discharge performance

As per the charter party the vessel must discharge the entire cargo (all ports) within 24 hours or maintain a backpressure at the manifold of 100 psi (7 bar). During the discharge at your terminal my vessel has:

☒ Maintained 100 psi (7 bar) throughout the discharge operation, except for 1.1 hours of stripping time.

☒ Discharged the entire cargo on this voyage within 24 hours.

My vessel has not been able to meet either of the above requirements due to the following restrictions from the terminal and/or charterers:

☒ The maximum backpressure allowed by the terminal was 7.0 bars / ______ psi

☐ The maximum discharge rate allowed by the terminal was ______ cbm/hour

☐ Due to the high viscosity of the cargo it is not physical possible for the vessel to obtain the required backpressure on the manifold. However, on the delivery side of the cargo pumps the back pressure has been the maximum possible throughout the discharge operations.

☐ Due to the high viscosity of the cargo the stripping operation has been prolonged and has lasted for ______ hours. With a lower viscosity (higher temperature) of the cargo the stripping operation could have been performed much more efficiently and faster.

☐ The terminal did not allow the vessel to discharge more than one grade/parcel simultaneously.

☐ The terminal was using booster pumps ashore.

☐ High vapour cargo. Vessel needs to discharge at reduced rate to prevent "gassing up" cargo pumps.

☐ Other reasons and stoppages (please specify): ____________

In addition to the above my vessel has been restricted in her discharge performance because the terminal has only provided 2 x 12 inch shore arms/hoses whereas my vessel has the capability to discharge through 6 x 12 inch shore arms/hoses.

In view of the above I reserve the rights of my owners, charterers, operators and any other party to revert at any given date for any delay, expenses and consequences caused by to the above restrictions.

ACOR SHIPPING LTD.
M/T ACOR
VALLETTA

Signature: (master) Signature: (terminal rep.) Signature: (surveyor)

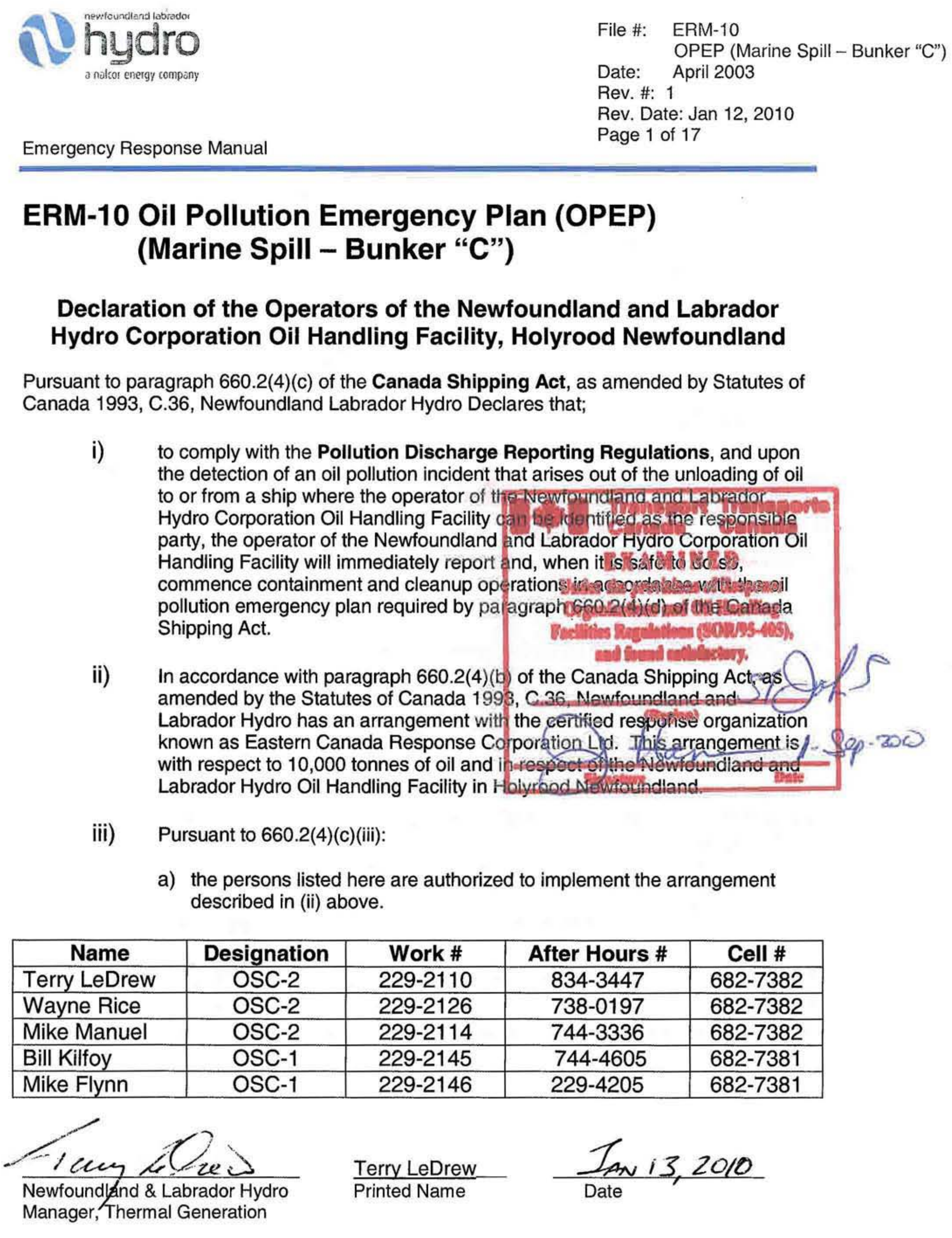
FOR RECEIPT ONLY

Norient Product [illegible] DK-2900 Hellerup.
Telephone + 45 32 71 23 00. Telefax [illegible] 1 23 49
http://www.norientpool.com

NPP [illegible] Rev. 2

APPENDIX D

Erm Oil Pollution Emergency Plan - (Marine Spill –Bunker “C”)



newfoundland labrador hydro
a nalcor energy company

Emergency Response Manual

File #: ERM-10
OPEP (Marine Spill – Bunker "C")
Date: April 2003
Rev. #: 1
Rev. Date: Jan 12, 2010
Page 1 of 17

ERM-10 Oil Pollution Emergency Plan (OPEP) (Marine Spill – Bunker "C")

Declaration of the Operators of the Newfoundland and Labrador Hydro Corporation Oil Handling Facility, Holyrood Newfoundland

Pursuant to paragraph 660.2(4)(c) of the **Canada Shipping Act**, as amended by Statutes of Canada 1993, C.36, Newfoundland Labrador Hydro Declares that;

i) to comply with the **Pollution Discharge Reporting Regulations**, and upon the detection of an oil pollution incident that arises out of the unloading of oil to or from a ship where the operator of the Newfoundland and Labrador Hydro Corporation Oil Handling Facility can be identified as the responsible party, the operator of the Newfoundland and Labrador Hydro Corporation Oil Handling Facility will immediately report and, when it is safe to do so, commence containment and cleanup operations in accordance with the oil pollution emergency plan required by paragraph 660.2(4)(d) of the Canada Shipping Act.

ii) In accordance with paragraph 660.2(4)(b) of the Canada Shipping Act, as amended by the Statutes of Canada 1993, C.36, Newfoundland and Labrador Hydro has an arrangement with the certified response organization known as Eastern Canada Response Corporation Ltd. This arrangement is with respect to 10,000 tonnes of oil and in respect of the Newfoundland and Labrador Hydro Oil Handling Facility in Holyrood Newfoundland.

Transport Canada Transports Canada
EXAMINED
[illegible]
Facilities Regulations (SOR/95-405),
and found satisfactory.
(Section)
1-Sep-20[illegible]
Signature Date

iii) Pursuant to 660.2(4)(c)(iii):

a) the persons listed here are authorized to implement the arrangement described in (ii) above.

Name	Designation	Work #	After Hours #	Cell #
Terry LeDrew	OSC-2	229-2110	834-3447	682-7382
Wayne Rice	OSC-2	229-2126	738-0197	682-7382
Mike Manuel	OSC-2	229-2114	744-3336	682-7382
Bill Kilfoy	OSC-1	229-2145	744-4605	682-7381
Mike Flynn	OSC-1	229-2146	229-4205	682-7381

Newfoundland & Labrador Hydro
Manager, Thermal Generation

Terry LeDrew
Printed Name

Jan 13, 2010
Date

Other relevant statutes and standards include:

i) **Oil Handling Facility Standards**, Transport Canada TP 12402, August, 1995: and,

ii) **Response Organizations and Oil Handling Facilities Regulations**, August, 1995.

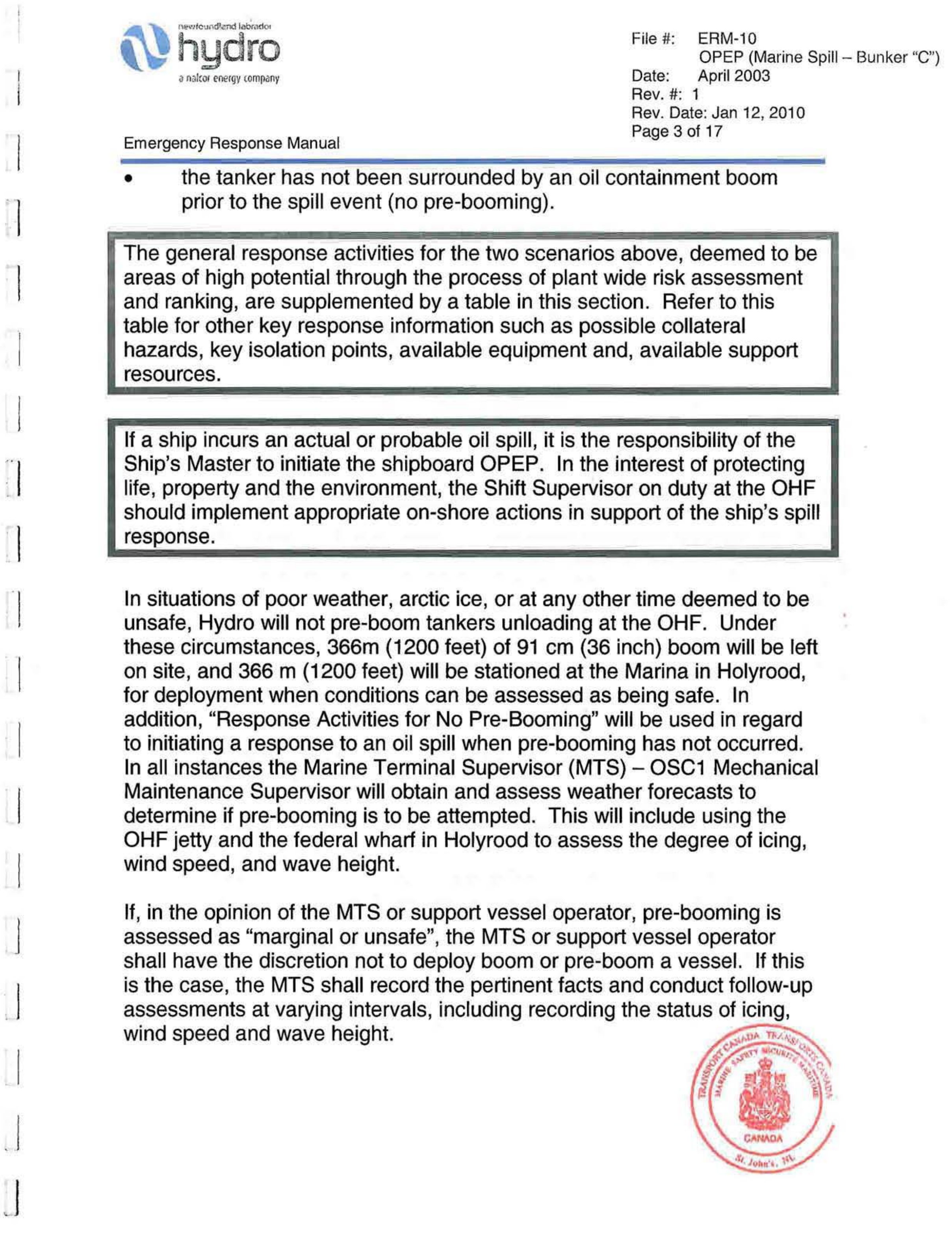
In no sense is it deemed that the content of this OPEP should supersede the immediate on-scene judgement of the On-Scene Commander (OSC). In all cases, the OSC maintains final authority to take actions and to issue notifications. Rather, this plan is intended to prompt response personnel, in times of emergency, to ensure the completeness and appropriateness of actions taken, to guide the notification and reporting process, and to outline mechanisms ensuring preparedness.

Scope of Response:

The principal and only product transferred from ships to the Holyrood Generating Station Oil Handling Facility (OHF) is Bunker C that, under the *Oil Handling Facility Standards*, comes under the category of "Oils". The maximum transfer rate of Bunker C from the ship to shore is 10,000 bph or 1590 m^3/h. Therefore, as per the *Oil Handling Facility Standards*, the scenarios presented herein are for a Bunker C spill not exceeding **15 m^3 (95 barrels)**, a guideline corresponding to a **Level 3 category oil handling facility** and, the response capability of the Holyrood Thermal Generating Station. Ultimately, the On-Scene Commander, with support from the response structure, will use best judgment to determine if and, to what degree the escalation of the response to RO engagement is required.

The scope of this Action Plan is to detail an Emergency Response to a Bunker C fuel oil spill that occurred while offloading a tanker at the Holyrood Thermal Generating Station hereinafter referred to as the Oil Handling Facility (OHF). Two scenarios are presented:

- the tanker has been surrounded by an oil containment boom prior to the spill event (pre-booming); and,



- the tanker has not been surrounded by an oil containment boom prior to the spill event (no pre-booming).

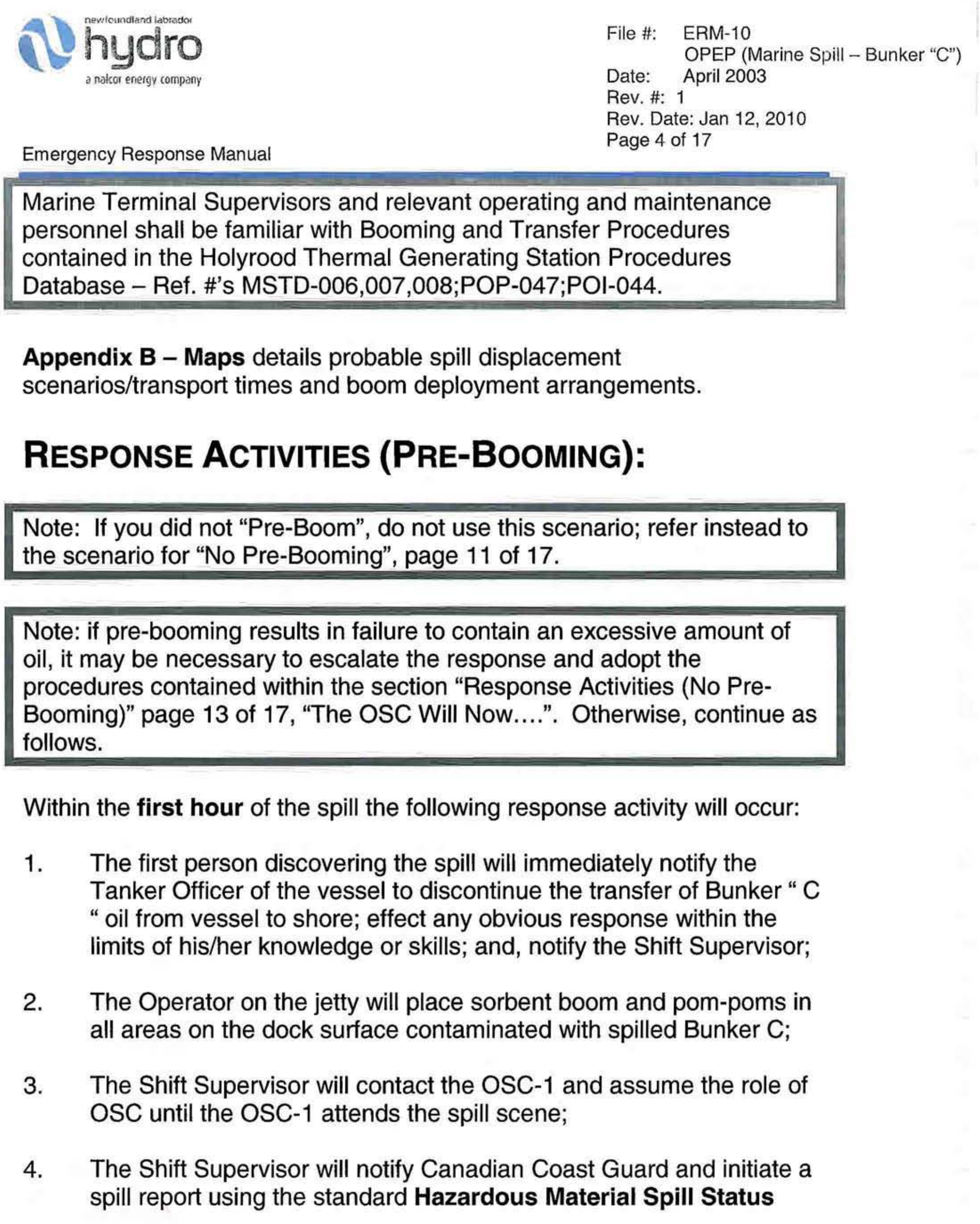
The general response activities for the two scenarios above, deemed to be areas of high potential through the process of plant wide risk assessment and ranking, are supplemented by a table in this section. Refer to this table for other key response information such as possible collateral hazards, key isolation points, available equipment and, available support resources.

If a ship incurs an actual or probable oil spill, it is the responsibility of the Ship's Master to initiate the shipboard OPEP. In the interest of protecting life, property and the environment, the Shift Supervisor on duty at the OHF should implement appropriate on-shore actions in support of the ship's spill response.

In situations of poor weather, arctic ice, or at any other time deemed to be unsafe, Hydro will not pre-boom tankers unloading at the OHF. Under these circumstances, 366m (1200 feet) of 91 cm (36 inch) boom will be left on site, and 366 m (1200 feet) will be stationed at the Marina in Holyrood, for deployment when conditions can be assessed as being safe. In addition, "Response Activities for No Pre-Booming" will be used in regard to initiating a response to an oil spill when pre-booming has not occurred. In all instances the Marine Terminal Supervisor (MTS) – OSC1 Mechanical Maintenance Supervisor will obtain and assess weather forecasts to determine if pre-booming is to be attempted. This will include using the OHF jetty and the federal wharf in Holyrood to assess the degree of icing, wind speed, and wave height.

If, in the opinion of the MTS or support vessel operator, pre-booming is assessed as "marginal or unsafe", the MTS or support vessel operator shall have the discretion not to deploy boom or pre-boom a vessel. If this is the case, the MTS shall record the pertinent facts and conduct follow-up assessments at varying intervals, including recording the status of icing, wind speed and wave height.

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL



newfoundland labrador
hydro
a nalcor energy company

File #: ERM-10
OPEP (Marine Spill – Bunker "C")
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Emergency Response Manual

Marine Terminal Supervisors and relevant operating and maintenance personnel shall be familiar with Booming and Transfer Procedures contained in the Holyrood Thermal Generating Station Procedures Database – Ref. #'s MSTD-006,007,008;POP-047;POI-044.

Appendix B – Maps details probable spill displacement scenarios/transport times and boom deployment arrangements.

RESPONSE ACTIVITIES (PRE-BOOMING):

Note: If you did not "Pre-Boom", do not use this scenario; refer instead to the scenario for "No Pre-Booming", page 11 of 17.

Note: if pre-booming results in failure to contain an excessive amount of oil, it may be necessary to escalate the response and adopt the procedures contained within the section "Response Activities (No Pre-Booming)" page 13 of 17, "The OSC Will Now….". Otherwise, continue as follows.

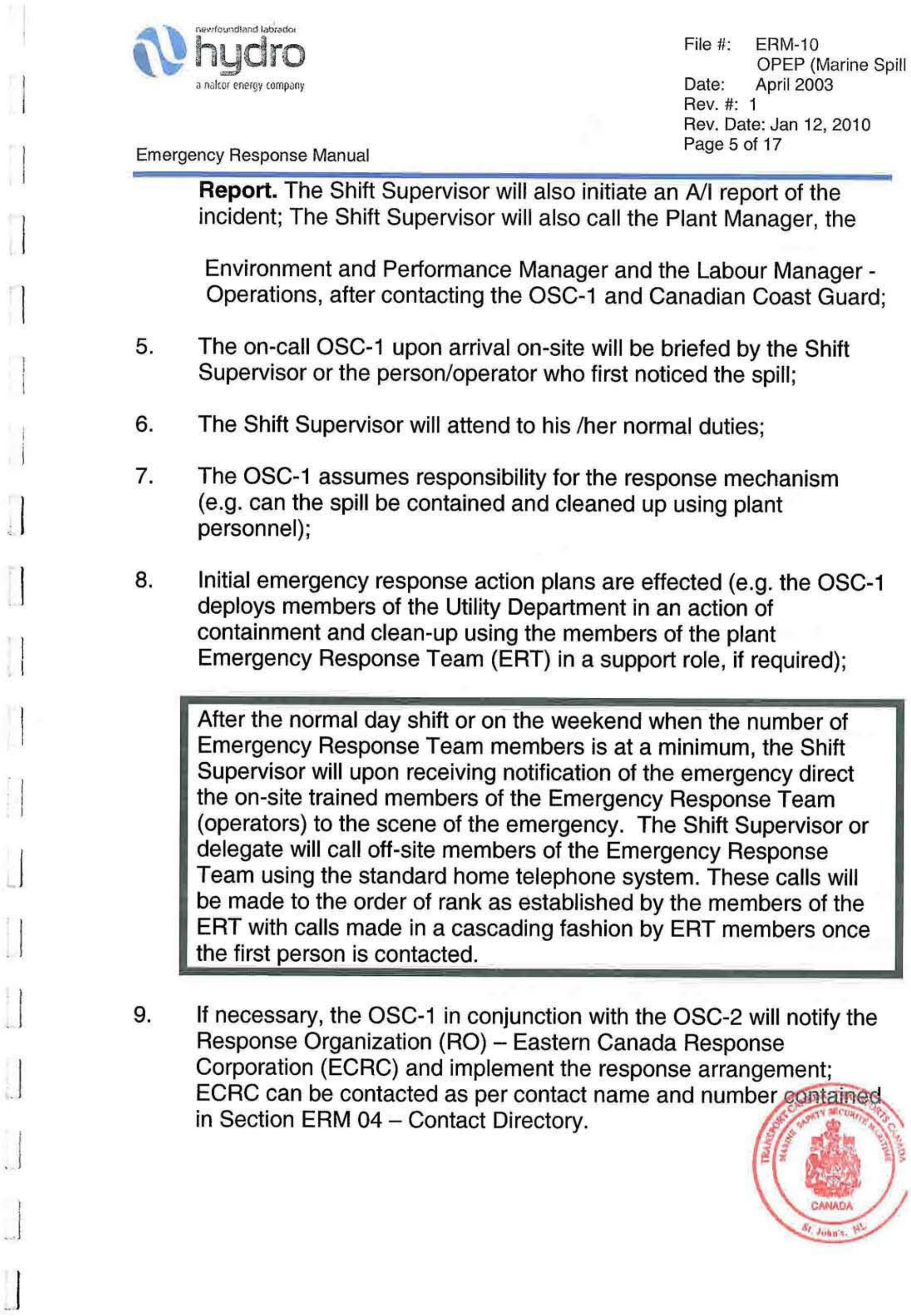
Within the **first hour** of the spill the following response activity will occur:

1. The first person discovering the spill will immediately notify the Tanker Officer of the vessel to discontinue the transfer of Bunker " C " oil from vessel to shore; effect any obvious response within the limits of his/her knowledge or skills; and, notify the Shift Supervisor;

2. The Operator on the jetty will place sorbent boom and pom-poms in all areas on the dock surface contaminated with spilled Bunker C;

3. The Shift Supervisor will contact the OSC-1 and assume the role of OSC until the OSC-1 attends the spill scene;

4. The Shift Supervisor will notify Canadian Coast Guard and initiate a spill report using the standard **Hazardous Material Spill Status**



Report. The Shift Supervisor will also initiate an A/I report of the incident; The Shift Supervisor will also call the Plant Manager, the

Environment and Performance Manager and the Labour Manager - Operations, after contacting the OSC-1 and Canadian Coast Guard;

5. The on-call OSC-1 upon arrival on-site will be briefed by the Shift Supervisor or the person/operator who first noticed the spill;

6. The Shift Supervisor will attend to his /her normal duties;

7. The OSC-1 assumes responsibility for the response mechanism (e.g. can the spill be contained and cleaned up using plant personnel);

8. Initial emergency response action plans are effected (e.g. the OSC-1 deploys members of the Utility Department in an action of containment and clean-up using the members of the plant Emergency Response Team (ERT) in a support role, if required);

After the normal day shift or on the weekend when the number of Emergency Response Team members is at a minimum, the Shift Supervisor will upon receiving notification of the emergency direct the on-site trained members of the Emergency Response Team (operators) to the scene of the emergency. The Shift Supervisor or delegate will call off-site members of the Emergency Response Team using the standard home telephone system. These calls will be made to the order of rank as established by the members of the ERT with calls made in a cascading fashion by ERT members once the first person is contacted.

9. If necessary, the OSC-1 in conjunction with the OSC-2 will notify the Response Organization (RO) – Eastern Canada Response Corporation (ECRC) and implement the response arrangement; ECRC can be contacted as per contact name and number contained in Section ERM 04 – Contact Directory.

St. John's, NL

THE OSC 1 WILL NOW:

10. If required, have the Boom Support Vessel move his vessel from the jetty area and deploy containment booms (**Appendix B - Maps** - Figures #3, #4, and #5);

11. Have the Mechanical Maintenance Supervisor or designate deploy a team to continue monitoring the boom and oiling conditions from the jetty;

12. Have the Mechanical Maintenance Supervisor or designate report back with information relating to the position and flotation status of the Bunker C;

13. Determine if Bunker C is still leaking from the vessel, line, or boom;

14. Consider environmental sensitivities (refer to **Appendix C – Sensitivity Maps**);

15. Liaise with the Regional Environmental Emergency Team (REET).

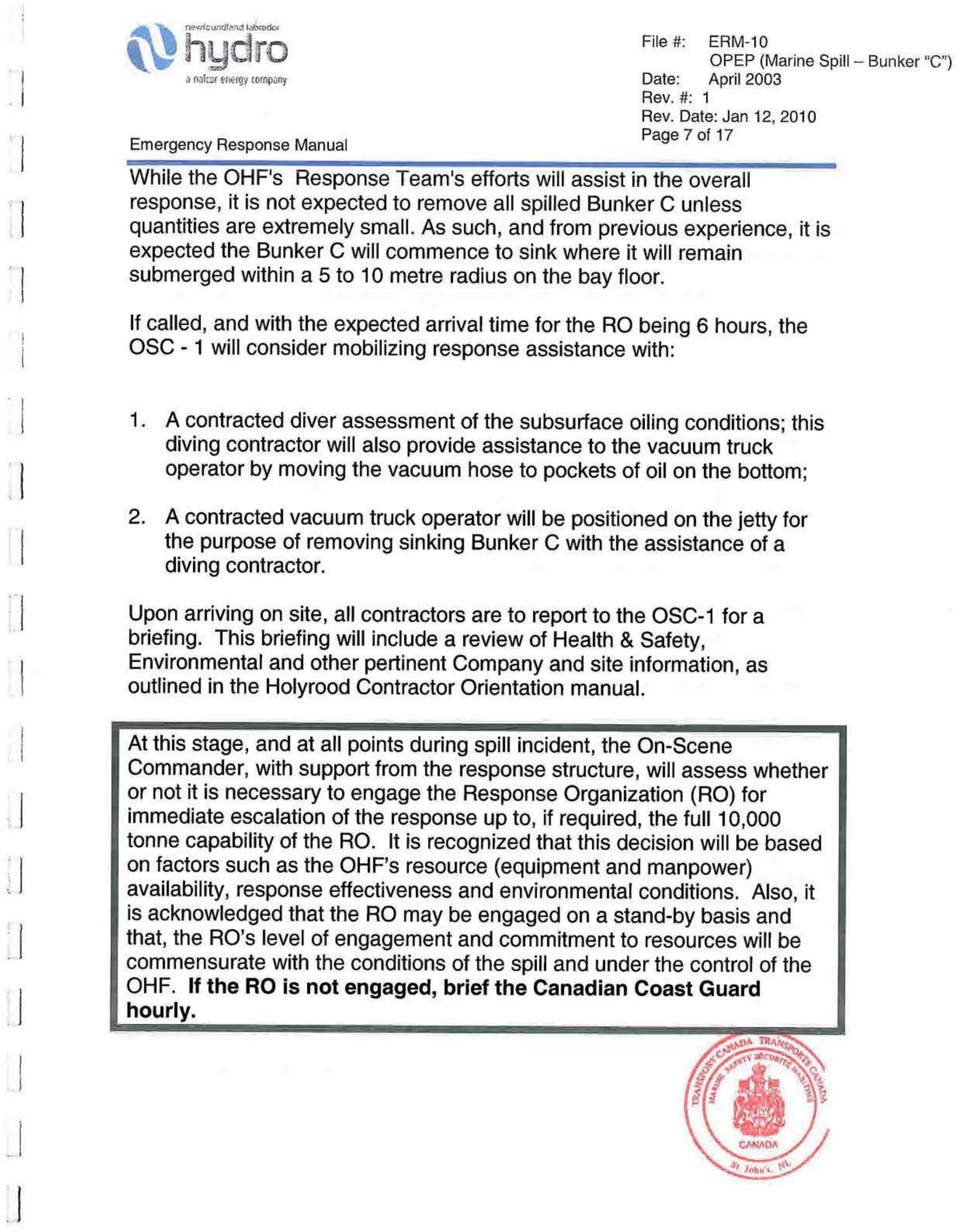
EVENT TIME: 1 - 5 HRS (STAGE 1 RECOVERY OPERATIONS)

During this period spilled Bunker C will continue to move outwards in a northeasterly direction where it will be contained against the 91 cm (36 inch) solid flotation boom previously deployed. With the oil thus contained, the OHF Spill Response Team (**Utility Department Employees**) can commence Stage 1 recovery operations.

THE OSC-1 WILL NOW:

1. Have the Response Personnel, under supervision of the Utility Department Supervisor, or designate use pom-poms to absorb Bunker C deposited on the jetty surface in the vicinity of the spill;

2. After becoming saturated with Bunker C, the pom-poms will be placed in containment drums that have been positioned on the jetty for this purpose.



While the OHF's Response Team's efforts will assist in the overall response, it is not expected to remove all spilled Bunker C unless quantities are extremely small. As such, and from previous experience, it is expected the Bunker C will commence to sink where it will remain submerged within a 5 to 10 metre radius on the bay floor.

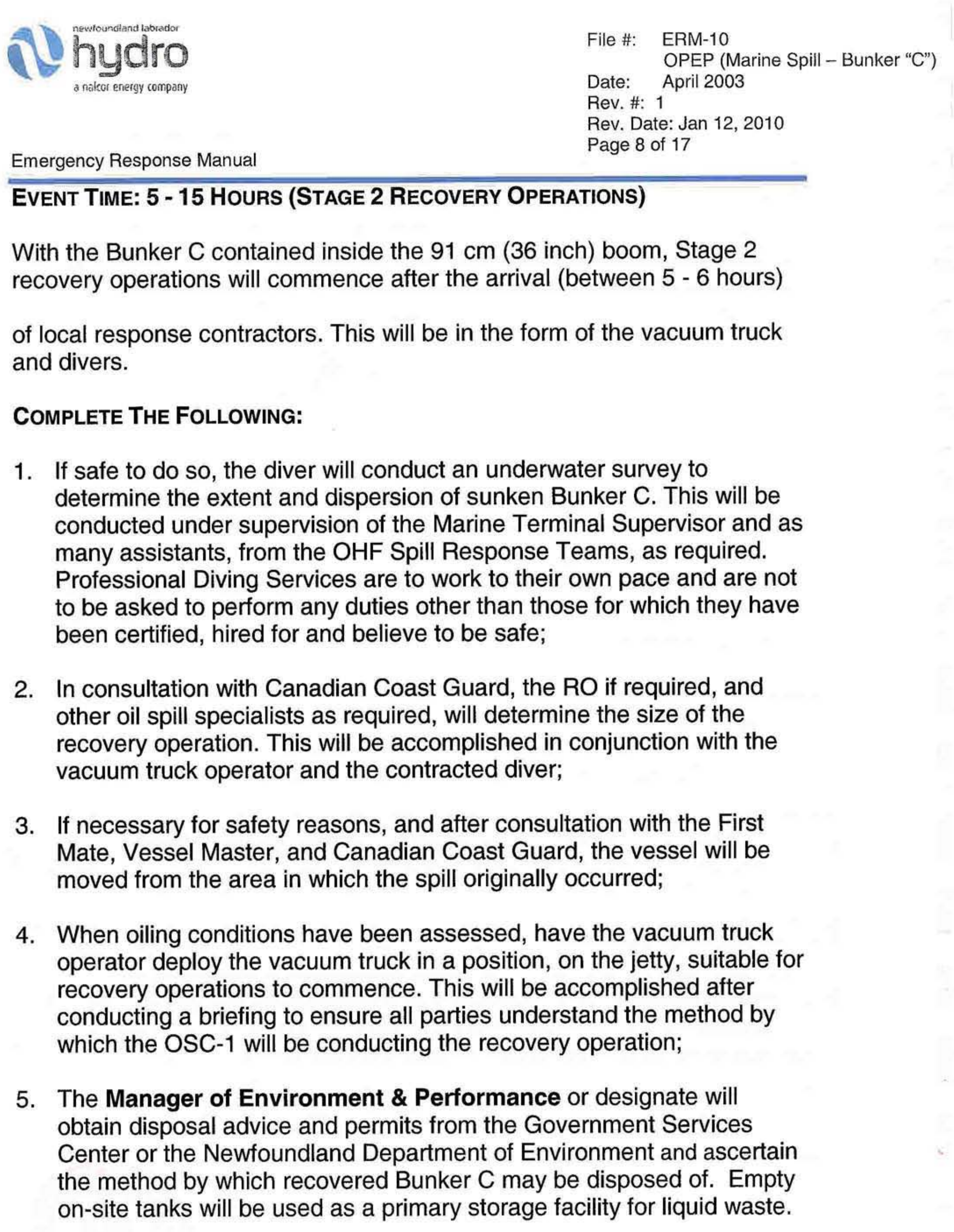
If called, and with the expected arrival time for the RO being 6 hours, the OSC - 1 will consider mobilizing response assistance with:

1. A contracted diver assessment of the subsurface oiling conditions; this diving contractor will also provide assistance to the vacuum truck operator by moving the vacuum hose to pockets of oil on the bottom;
2. A contracted vacuum truck operator will be positioned on the jetty for the purpose of removing sinking Bunker C with the assistance of a diving contractor.

Upon arriving on site, all contractors are to report to the OSC-1 for a briefing. This briefing will include a review of Health & Safety, Environmental and other pertinent Company and site information, as outlined in the Holyrood Contractor Orientation manual.

At this stage, and at all points during spill incident, the On-Scene Commander, with support from the response structure, will assess whether or not it is necessary to engage the Response Organization (RO) for immediate escalation of the response up to, if required, the full 10,000 tonne capability of the RO. It is recognized that this decision will be based on factors such as the OHF's resource (equipment and manpower) availability, response effectiveness and environmental conditions. Also, it is acknowledged that the RO may be engaged on a stand-by basis and that, the RO's level of engagement and commitment to resources will be commensurate with the conditions of the spill and under the control of the OHF. **If the RO is not engaged, brief the Canadian Coast Guard hourly.**

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St John's, NL



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Emergency Response Manual

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EVENT TIME: 5 - 15 HOURS (STAGE 2 RECOVERY OPERATIONS)

With the Bunker C contained inside the 91 cm (36 inch) boom, Stage 2 recovery operations will commence after the arrival (between 5 - 6 hours)

of local response contractors. This will be in the form of the vacuum truck and divers.

COMPLETE THE FOLLOWING:

1. If safe to do so, the diver will conduct an underwater survey to determine the extent and dispersion of sunken Bunker C. This will be conducted under supervision of the Marine Terminal Supervisor and as many assistants, from the OHF Spill Response Teams, as required. Professional Diving Services are to work to their own pace and are not to be asked to perform any duties other than those for which they have been certified, hired for and believe to be safe;
2. In consultation with Canadian Coast Guard, the RO if required, and other oil spill specialists as required, will determine the size of the recovery operation. This will be accomplished in conjunction with the vacuum truck operator and the contracted diver;
3. If necessary for safety reasons, and after consultation with the First Mate, Vessel Master, and Canadian Coast Guard, the vessel will be moved from the area in which the spill originally occurred;
4. When oiling conditions have been assessed, have the vacuum truck operator deploy the vacuum truck in a position, on the jetty, suitable for recovery operations to commence. This will be accomplished after conducting a briefing to ensure all parties understand the method by which the OSC-1 will be conducting the recovery operation;
5. The **Manager of Environment & Performance** or designate will obtain disposal advice and permits from the Government Services Center or the Newfoundland Department of Environment and ascertain the method by which recovered Bunker C may be disposed of. Empty on-site tanks will be used as a primary storage facility for liquid waste.

EVENT TIME: 15 - 24 HOURS (STAGE 3 RECOVERY OPERATIONS)

During this period the vacuum truck and divers will continue removing and transporting recovered Bunker C to the temporary storage containers (rented). The OSC-1 will conduct a strategy briefing with the RO if it has been necessary to call the RO.

THE OSC-1 WILL THEN:

1. Commence on-water recovery operations with the 0.61 metre (24 inch) belt skimmer or GT-185 provided and operated by the Response Organization
2. Utilize on-site storage facilities for storage of recovered oil and water.

SHORELINE CLEANUP:

The predominant shoreline around the Holyrood Plant is classified as low cliff in the area of the docking facility and cobble/shingle beach in the Indian Pond Beach area. Although the shoreline energy is moderate to high, spilled Bunker C will persist for a considerable amount of time due to its persistence and consistency. As the Bunker C weathers it will also commence to solidify and, as such, become even harder to handle and remove. Shoreline clean-up crews will be assisted by the OHF Spill Response Team (**Utility Department)** in the initial response, subject to the size of the spill.

THE OSC-1 WILL NOW:

Conduct an assessment of the shoreline oiling conditions with the Response Team or, if required due to the size of the spill, qualified Shoreline Cleanup and Assessment Technologists.

1. Review sensitivities using **Appendix C - Sensitivity Maps**;
2. Segment the shoreline to determine response priorities;
3. Document the segmented shoreline;

4. Photograph and take video of the oiling conditions;

5. Collect sediment and oil samples as required;

6. Characterize the overall health of the shoreline, inter-tidal zone and wildlife communities, and the effects of oil or cleanup operations on those sensitivities;

7. Make an assessment of operational constraints on the recovery potential of the area based upon the condition of the marine environment in unspoiled areas, productivity of the area, and recruitment potential from adjacent or nearby areas. Indicator species are agreed upon prior to the initiation of a shoreline survey;

8. Recommend precautions or constraints that could be followed during cleanup and or treatment to minimize effects on the marine environment;

9. Liaise with the Regional Environmental Emergency Team (REET).

GENERAL NOTES

The appropriate mitigative measures to complete the spill response include, but are not limited to, the following:

1. Monitoring, containment, sampling, recovery and disposal of floating oil;

2. Monitoring, containment, sampling, recovery and disposal of sinking oil;

3. Shoreline treatment.

To implement the appropriate mitigative countermeasures the OSC-1 will continue to oversee:

1. Daily situation analysis in consultation with Canadian Coast Guard, REET, and the RO (Response Organization) if called, and other private contractors, as required;
2. Development of an action plan for the following day's field response activities.

This approach will continue on a repetitive daily cycle until the spill response has been completed. When any field group conducting mitigate measures becomes ineffective, that group will be de-mobilized and its resources made available for other response measures deemed more effective.

RESPONSE ACTIVITIES (NO PRE-BOOMING):

Within the **first hour** of the spill the following response activity occurs:

1. The first person discovering the spill will immediately notify the Tanker Officer of the vessel to discontinue the transfer of Bunker " C " oil from vessel to shore; effect any obvious response within the limits of his/her knowledge or skills; and, notify the Shift Supervisor;
2. The Shift Supervisor will contact the OSC-1and assume the role of OSC until the OSC-1 attends the spill scene;
3. Initial emergency response action plans are effected;
4. The Operator on the jetty will place sorbent boom and pom-poms in all areas on the dock surface contaminated with spilled Bunker C;
5. The Shift Supervisor will notify Canadian Coast Guard and initiate a spill report using the standard **Hazardous Material Spill Status Report.** The Shift Supervisor will also initiate an A / I report of the incident;
6. The on-call OSC-1 upon arrival on-site will be briefed by the Shift Supervisor or the operator who first noticed the spill;

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7. The OSC-1 assumes responsibility for the response;

8. If necessary, the OSC-1 has notified the Response Organization (RO) and implemented the response arrangement (see block note page 7 of 17);

9. The Shift Supervisor continues with his normal responsibilities.

THE OSC-1 WILL NOW:

1. If required, have the Boom Support Vessel move his vessel from the jetty area and deploy containment booms (refer to **Appendix B – Maps** - Figures #3, #4, and #5);

2. Have the Mechanical Maintenance Supervisor deploy a team to continue monitoring the boom and oiling conditions at the jetty and along the shoreline towards Indian Pond;

3. Have the Mechanical Maintenance Supervisor report back with information relating to the position and flotation status of the Bunker C;

4. Determine if Bunker C is still leaking from the vessel, line, or boom;

5. Consider environmental sensitivities (**Appendix C - Sensitivity Maps**);

6. Liaise with REET.

EVENT TIME: 1 - 5 HRS (STAGE 1 CONTAINMENT OPERATIONS)

During this period spilled Bunker C will continue to move in a northeasterly direction where it will impact the shoreline between the jetty and, after approximately 4 hours, the entrance to Indian Pond. From previous experience, it is expected that the Bunker C will also commence to sink while continuing to move in a northeast direction. Under these circumstances the protection of the entrance to Indian Pond will be a priority for the OSC-1 due to the tidal influence in the pond and the need to protect the plant's water intake. However, if weather, ice, or other safety issue is still present, the on-water response operation is not to commence. If this is the case, the OSC-1 will continue to have the spill response team, via the Mechanical Maintenance Supervisor, monitor the extent of oiling.

Accordingly, from this point, this scenario assumes that weather conditions have improved and that an on-water containment and recovery operation has been deemed to be safe. If this is not the case, continue monitoring the spill and liaise with Coast Guard, REET, the RO if required, and other response contractors as required.

THE OSC-1 WILL NOW:

1. Direct the Mechanical Maintenance Supervisor to ready the response trailer and boom reel complete with 366 m (1200 feet) of 91 cm (36 inch) solid flotation boom.

NOTE: If you have been referred to this scenario from the pre-booming scenario, one 366 m (1200 feet) reel of 91 cm (36 inch) solid flotation boom will be at the federal wharf in Holyrood and on 366 m reel of 91 cm will be located on-scene at the generating station.

2. Determine, in consultation with the Mechanical Maintenance Supervisor if on-water containment is possible, and if possible, deploy 366 m of 91 cm (36 inch) solid flotation boom to contain the oil in accordance with the diagram in **Appendix B - Maps** Figures #3, #5, and #6.
3. If necessary, have 1 reel positioned ready for deployment between Indian Pond and Holyrood Bay.
4. If necessary, direct the master of the Boom Support Vessel to relocate the vessel to the Generating Station and under direction of the Mechanical Maintenance Supervisor, have him standby approximately 250 m offshore opposite the boom deployment site. Ensure that the vessel does not enter the path of spilled Bunker C.

With the expected arrival time for the RO being 5 hours, the OSC-1 will consider mobilizing response assistance with:

1. A diving contractor who will be used to provide an assessment of the subsurface oiling conditions and will provide assistance to the vacuum truck operator by moving the vacuum hose to pockets of oil on the surface and bottom of the harbor.

2. A vacuum truck operator who will provide a vacuum truck to be positioned, initially, on the jetty for the purpose of removing floating and sinking Bunker C with the assistance of the diving contractor.

On arrival, all contractors are to report to the OSC-1 for a briefing.

EVENT TIME: 5 – 15 HOURS (STAGE 2 RECOVERY OPERATIONS)

With the Bunker C contained inside the 91 cm (36 inch) boom, Stage 2 recovery operations will commence after the arrival (between 5 - 6 hours) of local response contractors and, if required, the RO. This will be in the form of the vacuum truck, divers, and the skimmer provided by the RO.

COMPLETE THE FOLLOWING:

1. Utilizing the Boom Support Vessel and two members of the spill response team, the 91 cm solid flotation boom containing the Bunker C will be brought to the shoreline.

2. If additional on water containment is required the Boom Support Vessel will deploy the second 366 m reel of 91 cm solid flotation boom with the assistance of the two spill response team members.

3. With the first boom secured at the shoreline, deploy a vacuum truck and skimmer at the shoreline to commence the recovery operations in accordance with the boom deployment locations (**Appendix B Maps**). Temporary storage will be provided, on-scene, by the vacuum truck. As the truck becomes full it will be unloaded into a semi permanent storage tank at the Holyrood Generating Station.

4. If safe to do so, have the divers conduct an underwater oiling survey to determine the extent and dispersion of sunken Bunker C (see **Appendix B – Maps**). This will be conducted under supervision of the

5. Mechanical Maintenance Supervisor and as many assistants, from the OHF Spill Response Teams, as required. Diving Contractors are to work to their own pace and are not to be asked to perform any duties other than those for which they have been certified, hired for and believe to be safe.

6. In consultation with Coast Guard, the RO if required, and other oil spill specialists as required, determine the size of the recovery operation and extent of escalation required.

7. If necessary, due to safety reasons, and after consultation with the First Mate, Vessel Master, and Coast Guard, move the tanker from the area in which the spill originally occurred.

8. The **Manager of Environment and Performance** or designate will obtain disposal advice and permits from the Government Services Center and ascertain the method by which recovered Bunker C may be disposed of. Empty On-Site tanks will be used as a primary storage facility for liquid waste.

EVENT TIME: 15 – 24 HOURS (STAGE 3 RECOVERY OPERATIONS)

During this period the vacuum truck, divers, and skimmer (operated by the RO, if required) will continue removing and transporting recovered Bunker C to the on-site storage facilities.

THE OSC-1 WILL:

1. If required, commence on-water recovery operations with the belt skimmer provided and operated by the RO.

2. Utilize temporary storage, from the on-site storage facilities for, recovered oil and oily water. Additional equipment available to the OSC is detailed under "Available Equipment" in the table – this section.

SHORELINE CLEANUP

The predominant shoreline around the Holyrood Plant is classified as low cliff in the area of the docking facility and cobble/shingle beach in the Indian Pond Beach area. Although the shoreline energy is moderate to high, spilled Bunker C will persist for a considerable amount of time due to its persistence and consistency. As the Bunker C weathers it will also commence to solidify and, as such, become even harder to handle and remove. Shoreline cleanup crews will be assisted, in the initial response, by the OHF Spill Response Team (subject to the size of the spill).

THE OSC-1 WILL NOW:

Conduct an assessment of the shoreline oiling conditions with the Spill Response Team or, if required due to the size of the spill, qualified Shoreline Cleanup and Assessment Technologists.

1. Review sensitivities using **Appendix C - Sensitivity Maps**.
2. Segment the shoreline to determine response priorities (see **Appendix B – Maps**);
3. Document the segmented shoreline;
4. Photograph and take video of the oiling conditions;
5. Collect sediment and oil samples as required;
6. Check ecological sensitivities from **Appendix C - Sensitivity Maps**.
7. Characterize the overall health of the shoreline, inter-tidal zone and wildlife communities, and the effects of oil or cleanup operations on those sensitivities;
8. Make assessment of operational constraints on the recovery potential of the area based upon the condition of biota in unoiled areas, productivity of the area, and recruitment potential from

9. adjacent or nearby areas. Indicator species are agreed upon prior to the initiation of a shoreline survey;

10. Recommend precautions or constraints that could be followed during cleanup and or treatment to minimize effects on biota.

GENERAL NOTES

The appropriate measures to complete the spill response include, but are not limited to, the following:

1. Monitoring, containment, recovery and disposal of floating oil;

2. Monitoring, containment, recovery and disposal of sinking oil;

3. Shoreline treatment.

To implement the appropriate countermeasures the OSC will continue to oversee:

1. Daily situation analysis in consultation with Canadian Coast Guard, REET, the RO if required, and other private contractors as required;

2. Development of an action plan for the following day's field response activities.

This approach will continue on a repetitive daily cycle until the spill response has been completed. When any field group conducting mitigating measures becomes ineffective, that group will be de-mobilized and its resources made available for other response measures deemed more effective.

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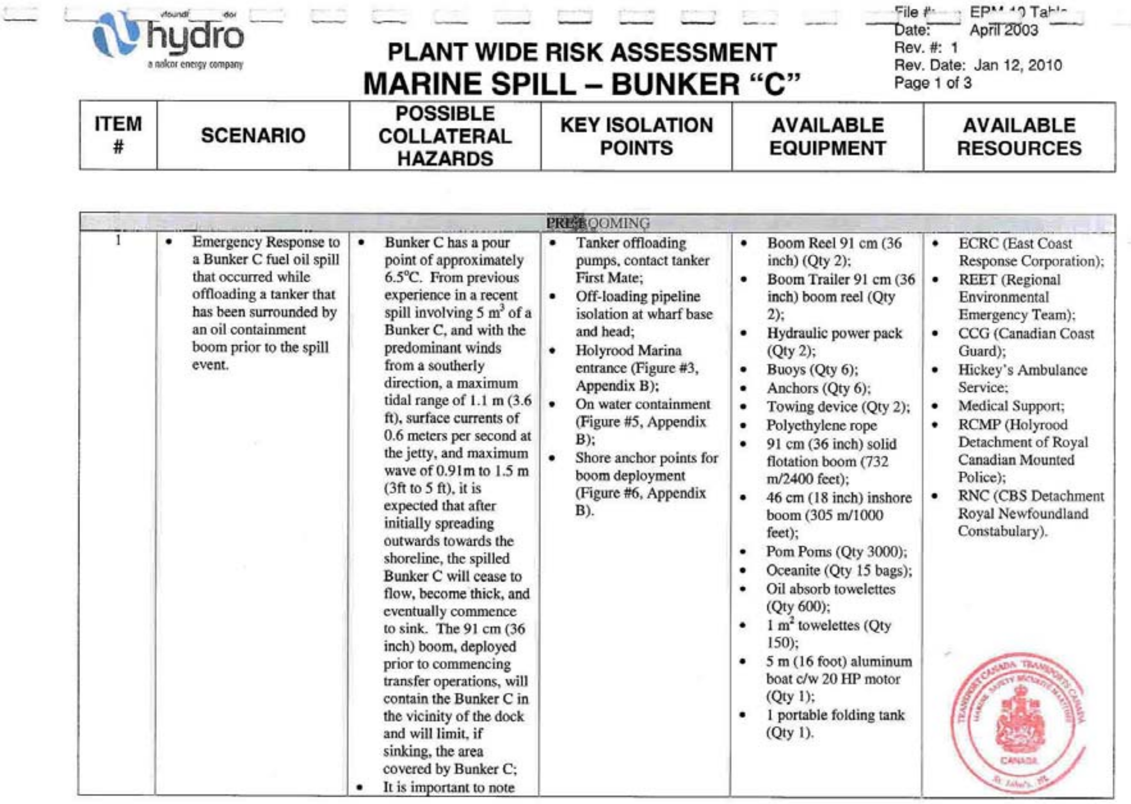

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PLANT WIDE RISK ASSESSMENT
MARINE SPILL – BUNKER "C"

File #: EPM 10 Table
Date: April 2003
Rev. #: 1
Rev. Date: Jan 12, 2010
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ITEM #	SCENARIO	POSSIBLE COLLATERAL HAZARDS	KEY ISOLATION POINTS	AVAILABLE EQUIPMENT	AVAILABLE RESOURCES
PREBOOMING					
1	• Emergency Response to a Bunker C fuel oil spill that occurred while offloading a tanker that has been surrounded by an oil containment boom prior to the spill event.	• Bunker C has a pour point of approximately 6.5°C. From previous experience in a recent spill involving 5 m^3 of a Bunker C, and with the predominant winds from a southerly direction, a maximum tidal range of 1.1 m (3.6 ft), surface currents of 0.6 meters per second at the jetty, and maximum wave of 0.91m to 1.5 m (3ft to 5 ft), it is expected that after initially spreading outwards towards the shoreline, the spilled Bunker C will cease to flow, become thick, and eventually commence to sink. The 91 cm (36 inch) boom, deployed prior to commencing transfer operations, will contain the Bunker C in the vicinity of the dock and will limit, if sinking, the area covered by Bunker C; • It is important to note	• Tanker offloading pumps, contact tanker First Mate; • Off-loading pipeline isolation at wharf base and head; • Holyrood Marina entrance (Figure #3, Appendix B); • On water containment (Figure #5, Appendix B); • Shore anchor points for boom deployment (Figure #6, Appendix B).	• Boom Reel 91 cm (36 inch) (Qty 2); • Boom Trailer 91 cm (36 inch) boom reel (Qty 2); • Hydraulic power pack (Qty 2); • Buoys (Qty 6); • Anchors (Qty 6); • Towing device (Qty 2); • Polyethylene rope • 91 cm (36 inch) solid flotation boom (732 m/2400 feet); • 46 cm (18 inch) inshore boom (305 m/1000 feet); • Pom Poms (Qty 3000); • Oceanite (Qty 15 bags); • Oil absorb towelettes (Qty 600); • 1 m^2 towelettes (Qty 150); • 5 m (16 foot) aluminum boat c/w 20 HP motor (Qty 1); • 1 portable folding tank (Qty 1).	• ECRC (East Coast Response Corporation); • REET (Regional Environmental Emergency Team); • CCG (Canadian Coast Guard); • Hickey's Ambulance Service; • Medical Support; • RCMP (Holyrood Detachment of Royal Canadian Mounted Police); • RNC (CBS Detachment Royal Newfoundland Constabulary).

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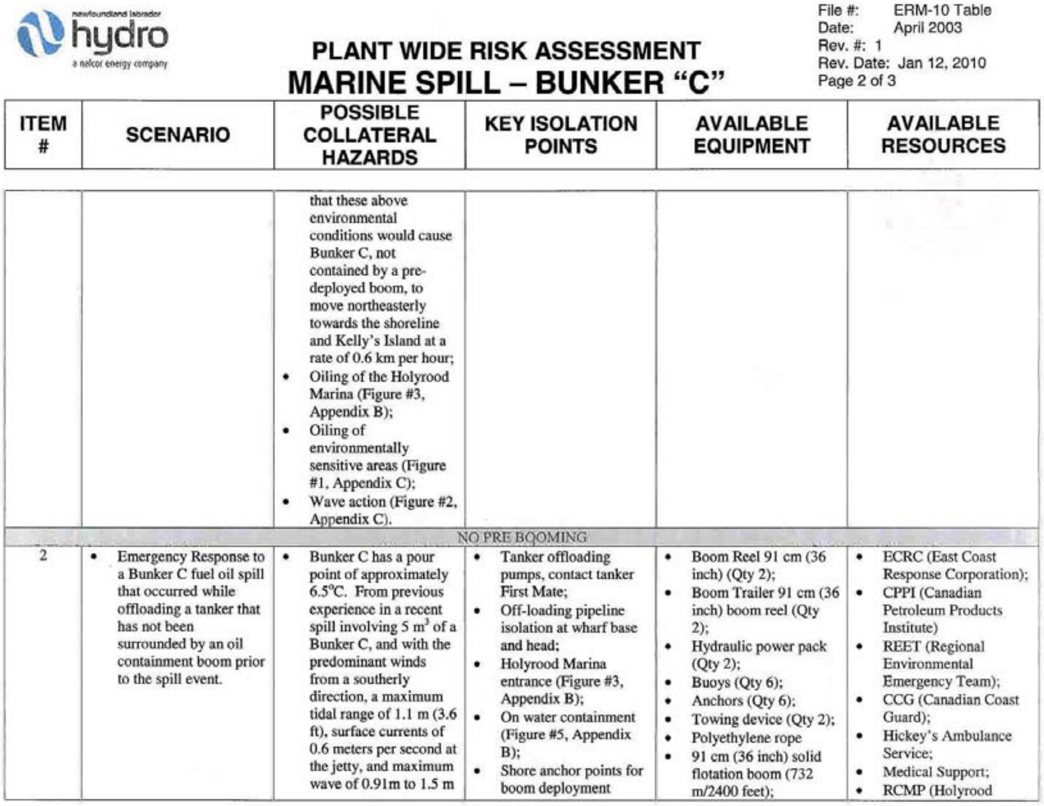

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PLANT WIDE RISK ASSESSMENT
MARINE SPILL – BUNKER "C"

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Date: April 2003
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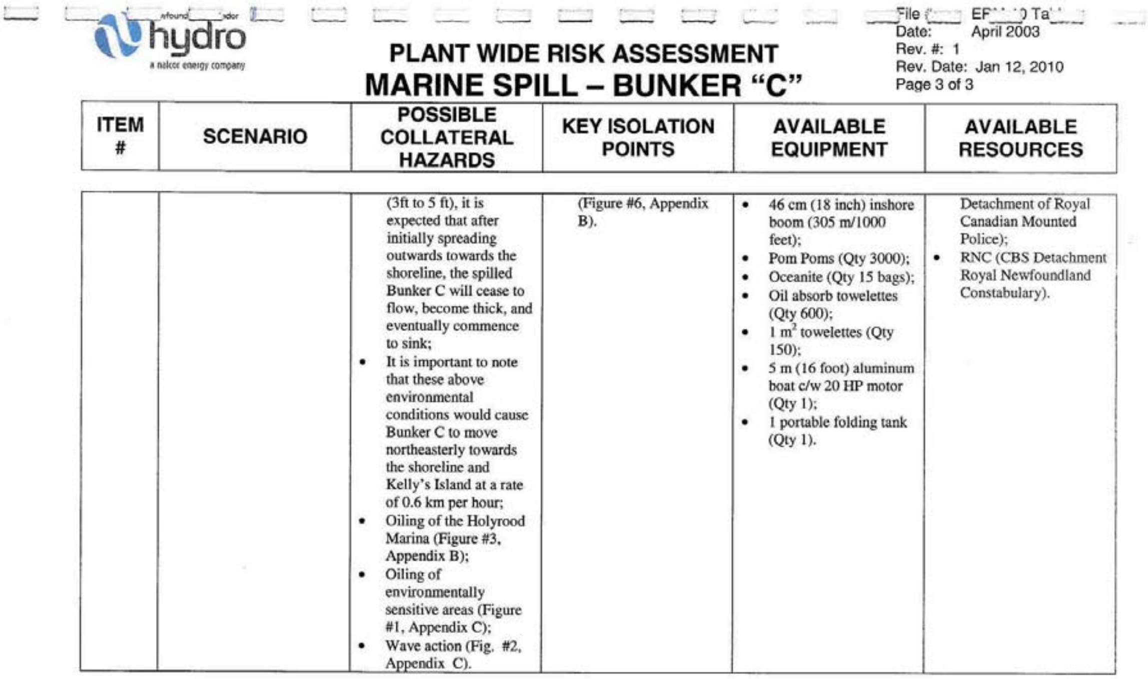
ITEM #	SCENARIO	POSSIBLE COLLATERAL HAZARDS	KEY ISOLATION POINTS	AVAILABLE EQUIPMENT	AVAILABLE RESOURCES
		that these above environmental conditions would cause Bunker C, not contained by a pre-deployed boom, to move northeasterly towards the shoreline and Kelly's Island at a rate of 0.6 km per hour; • Oiling of the Holyrood Marina (Figure #3, Appendix B); • Oiling of environmentally sensitive areas (Figure #1, Appendix C); • Wave action (Figure #2, Appendix C).			
NO PRE BOOMING					
2	• Emergency Response to a Bunker C fuel oil spill that occurred while offloading a tanker that has not been surrounded by an oil containment boom prior to the spill event.	• Bunker C has a pour point of approximately 6.5°C. From previous experience in a recent spill involving 5 m³ of a Bunker C, and with the predominant winds from a southerly direction, a maximum tidal range of 1.1 m (3.6 ft), surface currents of 0.6 meters per second at the jetty, and maximum wave of 0.91m to 1.5 m	• Tanker offloading pumps, contact tanker First Mate; • Off-loading pipeline isolation at wharf base and head; • Holyrood Marina entrance (Figure #3, Appendix B); • On water containment (Figure #5, Appendix B); • Shore anchor points for boom deployment	• Boom Reel 91 cm (36 inch) (Qty 2); • Boom Trailer 91 cm (36 inch) boom reel (Qty 2); • Hydraulic power pack (Qty 2); • Buoys (Qty 6); • Anchors (Qty 6); • Towing device (Qty 2); • Polyethylene rope • 91 cm (36 inch) solid flotation boom (732 m/2400 feet);	• ECRC (East Coast Response Corporation); • CPPI (Canadian Petroleum Products Institute) • REET (Regional Environmental Emergency Team); • CCG (Canadian Coast Guard); • Hickey's Ambulance Service; • Medical Support; • RCMP (Holyrood



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PLANT WIDE RISK ASSESSMENT
MARINE SPILL – BUNKER "C"

ITEM #	SCENARIO	POSSIBLE COLLATERAL HAZARDS	KEY ISOLATION POINTS	AVAILABLE EQUIPMENT	AVAILABLE RESOURCES
		(3ft to 5 ft), it is expected that after initially spreading outwards towards the shoreline, the spilled Bunker C will cease to flow, become thick, and eventually commence to sink; • It is important to note that these above environmental conditions would cause Bunker C to move northeasterly towards the shoreline and Kelly's Island at a rate of 0.6 km per hour; • Oiling of the Holyrood Marina (Figure #3, Appendix B); • Oiling of environmentally sensitive areas (Figure #1, Appendix C); • Wave action (Fig. #2, Appendix C).	(Figure #6, Appendix B).	• 46 cm (18 inch) inshore boom (305 m/1000 feet); • Pom Poms (Qty 3000); • Oceanite (Qty 15 bags); • Oil absorb towelettes (Qty 600); • 1 m^2 towelettes (Qty 150); • 5 m (16 foot) aluminum boat c/w 20 HP motor (Qty 1); • 1 portable folding tank (Qty 1).	Detachment of Royal Canadian Mounted Police); • RNC (CBS Detachment Royal Newfoundland Constabulary).

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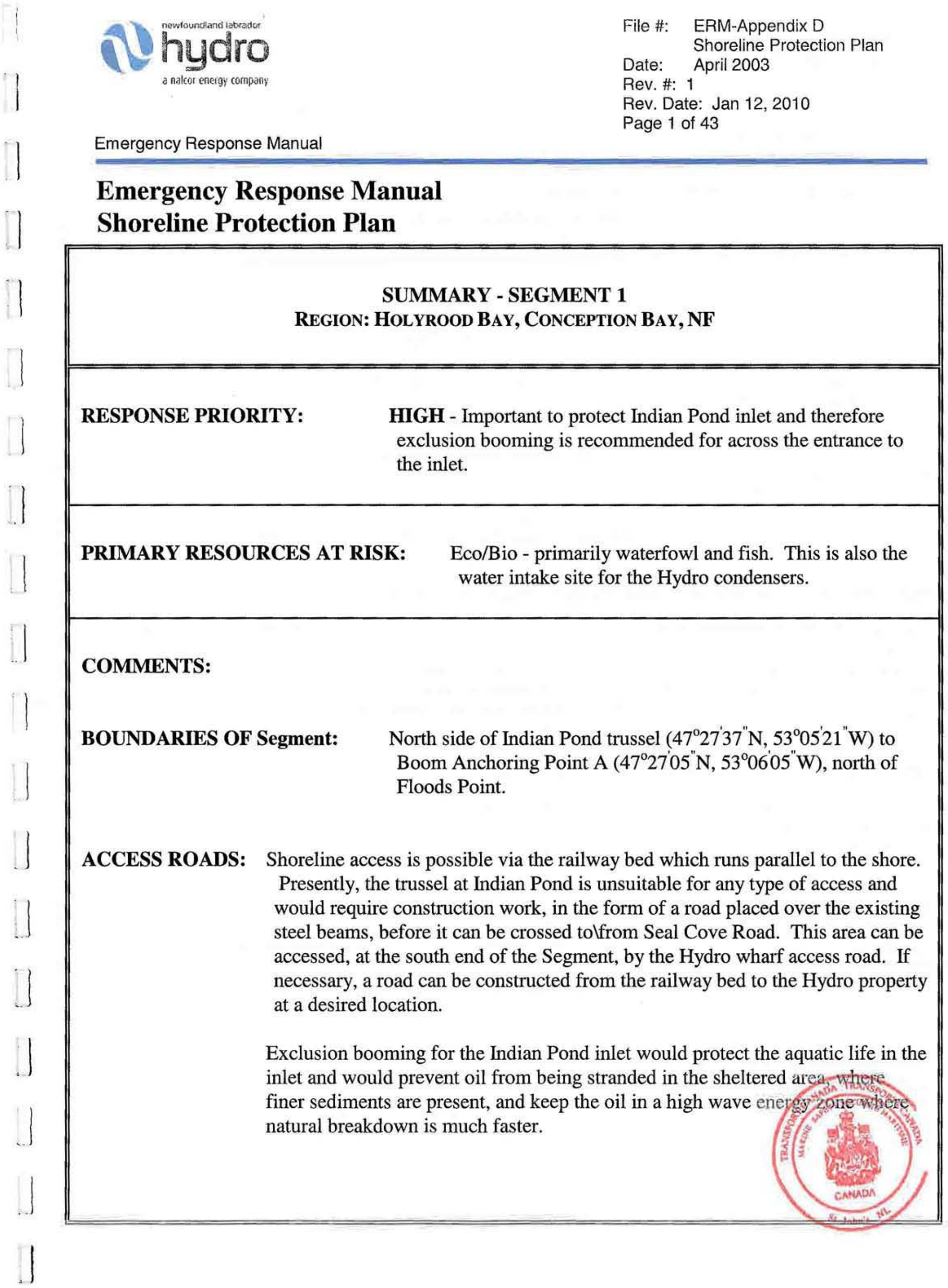

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Emergency Response Manual Shoreline Protection Plan

SUMMARY - SEGMENT 1
REGION: HOLYROOD BAY, CONCEPTION BAY, NF

RESPONSE PRIORITY: **HIGH** - Important to protect Indian Pond inlet and therefore exclusion booming is recommended for across the entrance to the inlet.

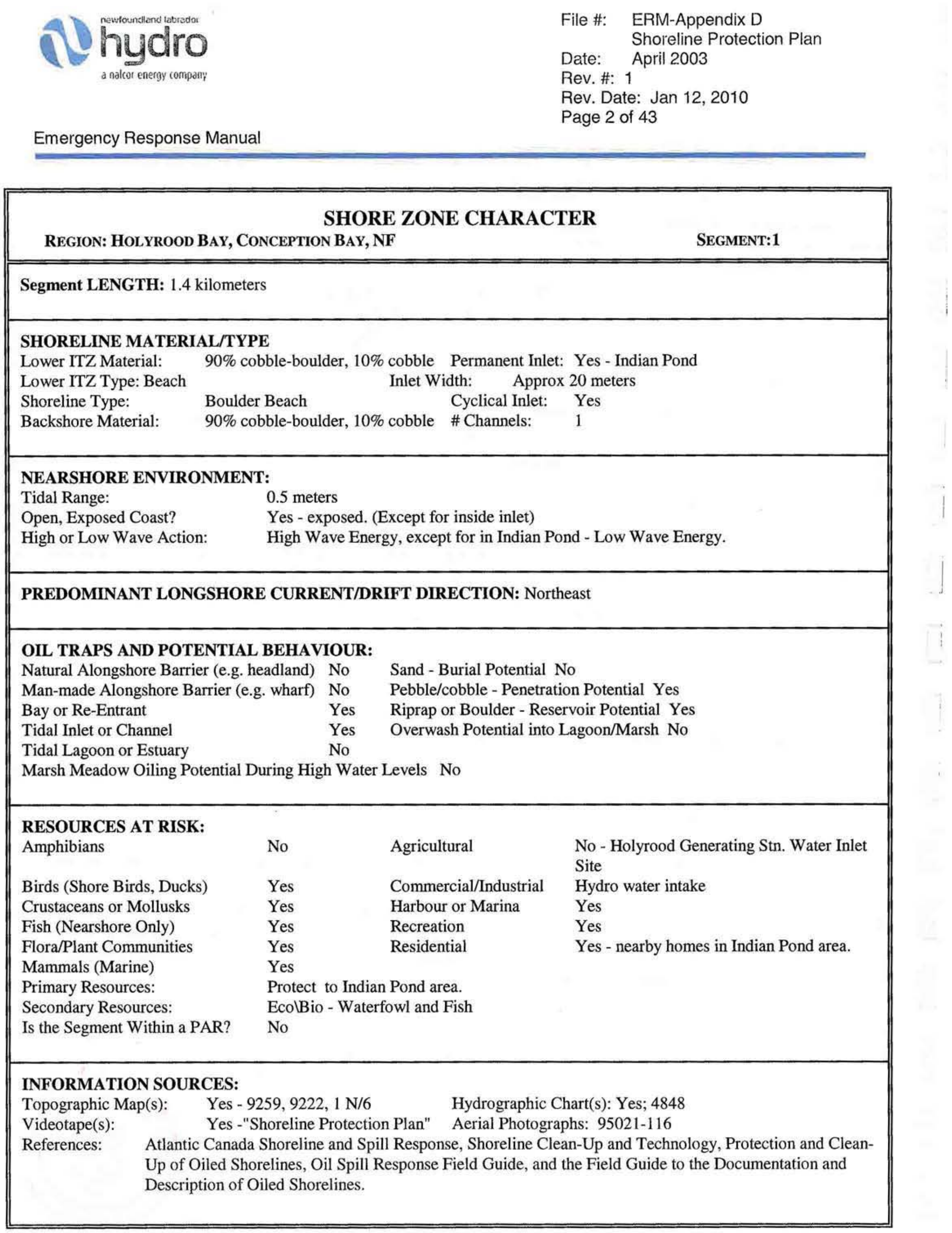
PRIMARY RESOURCES AT RISK: Eco/Bio - primarily waterfowl and fish. This is also the water intake site for the Hydro condensers.

COMMENTS:

BOUNDARIES OF Segment: North side of Indian Pond trussel (47°27'37"N, 53°05'21"W) to Boom Anchoring Point A (47°27'05"N, 53°06'05"W), north of Floods Point.

ACCESS ROADS: Shoreline access is possible via the railway bed which runs parallel to the shore. Presently, the trussel at Indian Pond is unsuitable for any type of access and would require construction work, in the form of a road placed over the existing steel beams, before it can be crossed to\from Seal Cove Road. This area can be accessed, at the south end of the Segment, by the Hydro wharf access road. If necessary, a road can be constructed from the railway bed to the Hydro property at a desired location.

Exclusion booming for the Indian Pond inlet would protect the aquatic life in the inlet and would prevent oil from being stranded in the sheltered area, where finer sediments are present, and keep the oil in a high wave energy zone where natural breakdown is much faster.



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SHORE ZONE CHARACTER

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT: 1**

Segment LENGTH: 1.4 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material:	90% cobble-boulder, 10% cobble	Permanent Inlet:	Yes - Indian Pond
Lower ITZ Type: Beach		Inlet Width:	Approx 20 meters
Shoreline Type:	Boulder Beach	Cyclical Inlet:	Yes
Backshore Material:	90% cobble-boulder, 10% cobble	# Channels:	1

NEARSHORE ENVIRONMENT:

Tidal Range:	0.5 meters
Open, Exposed Coast?	Yes - exposed. (Except for inside inlet)
High or Low Wave Action:	High Wave Energy, except for in Indian Pond - Low Wave Energy.

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION: Northeast

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (e.g. headland)	No	Sand - Burial Potential	No
Man-made Alongshore Barrier (e.g. wharf)	No	Pebble/cobble - Penetration Potential	Yes
Bay or Re-Entrant	Yes	Riprap or Boulder - Reservoir Potential	Yes
Tidal Inlet or Channel	Yes	Overwash Potential into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		
Marsh Meadow Oiling Potential During High Water Levels	No		

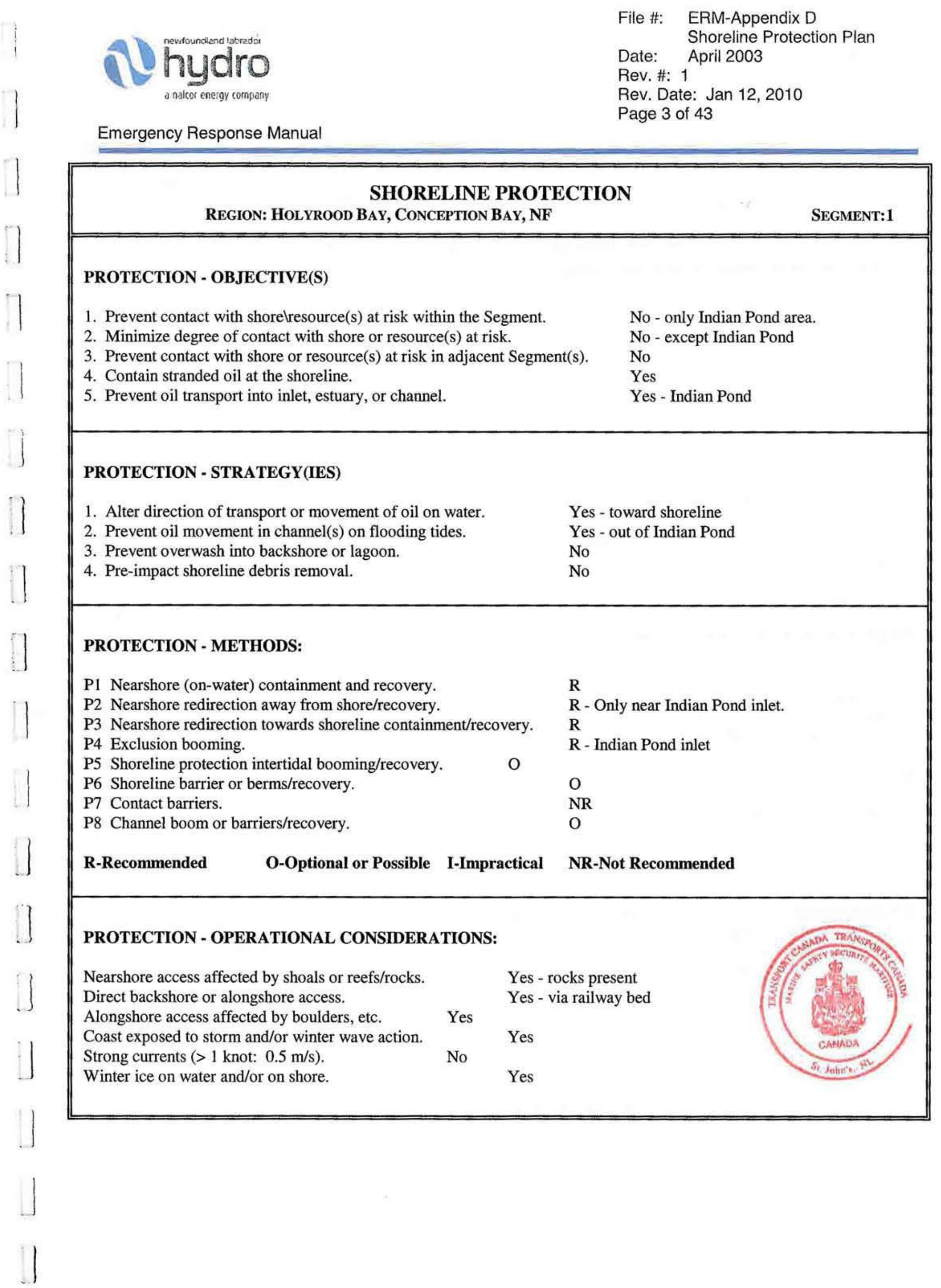
RESOURCES AT RISK:

Amphibians	No	Agricultural	No - Holyrood Generating Stn. Water Inlet Site
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	Hydro water intake
Crustaceans or Mollusks	Yes	Harbour or Marina	Yes
Fish (Nearshore Only)	Yes	Recreation	Yes
Flora/Plant Communities	Yes	Residential	Yes - nearby homes in Indian Pond area.
Mammals (Marine)	Yes		
Primary Resources:	Protect to Indian Pond area.		
Secondary Resources:	Eco\Bio - Waterfowl and Fish		
Is the Segment Within a PAR?	No		

INFORMATION SOURCES:

Topographic Map(s):	Yes - 9259, 9222, 1 N/6	Hydrographic Chart(s):	Yes; 4848
Videotape(s):	Yes -"Shoreline Protection Plan"	Aerial Photographs:	95021-116

References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.



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SHORELINE PROTECTION

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT: 1**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore\resource(s) at risk within the Segment.	No - only Indian Pond area.
2. Minimize degree of contact with shore or resource(s) at risk.	No - except Indian Pond
3. Prevent contact with shore or resource(s) at risk in adjacent Segment(s).	No
4. Contain stranded oil at the shoreline.	Yes
5. Prevent oil transport into inlet, estuary, or channel.	Yes - Indian Pond

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - toward shoreline
2. Prevent oil movement in channel(s) on flooding tides.	Yes - out of Indian Pond
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

PROTECTION - METHODS:

P1 Nearshore (on-water) containment and recovery.	R
P2 Nearshore redirection away from shore/recovery.	R - Only near Indian Pond inlet.
P3 Nearshore redirection towards shoreline containment/recovery.	R
P4 Exclusion booming.	R - Indian Pond inlet
P5 Shoreline protection intertidal booming/recovery.	O
P6 Shoreline barrier or berms/recovery.	O
P7 Contact barriers.	NR
P8 Channel boom or barriers/recovery.	O

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present
Direct backshore or alongshore access.	Yes - via railway bed
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes

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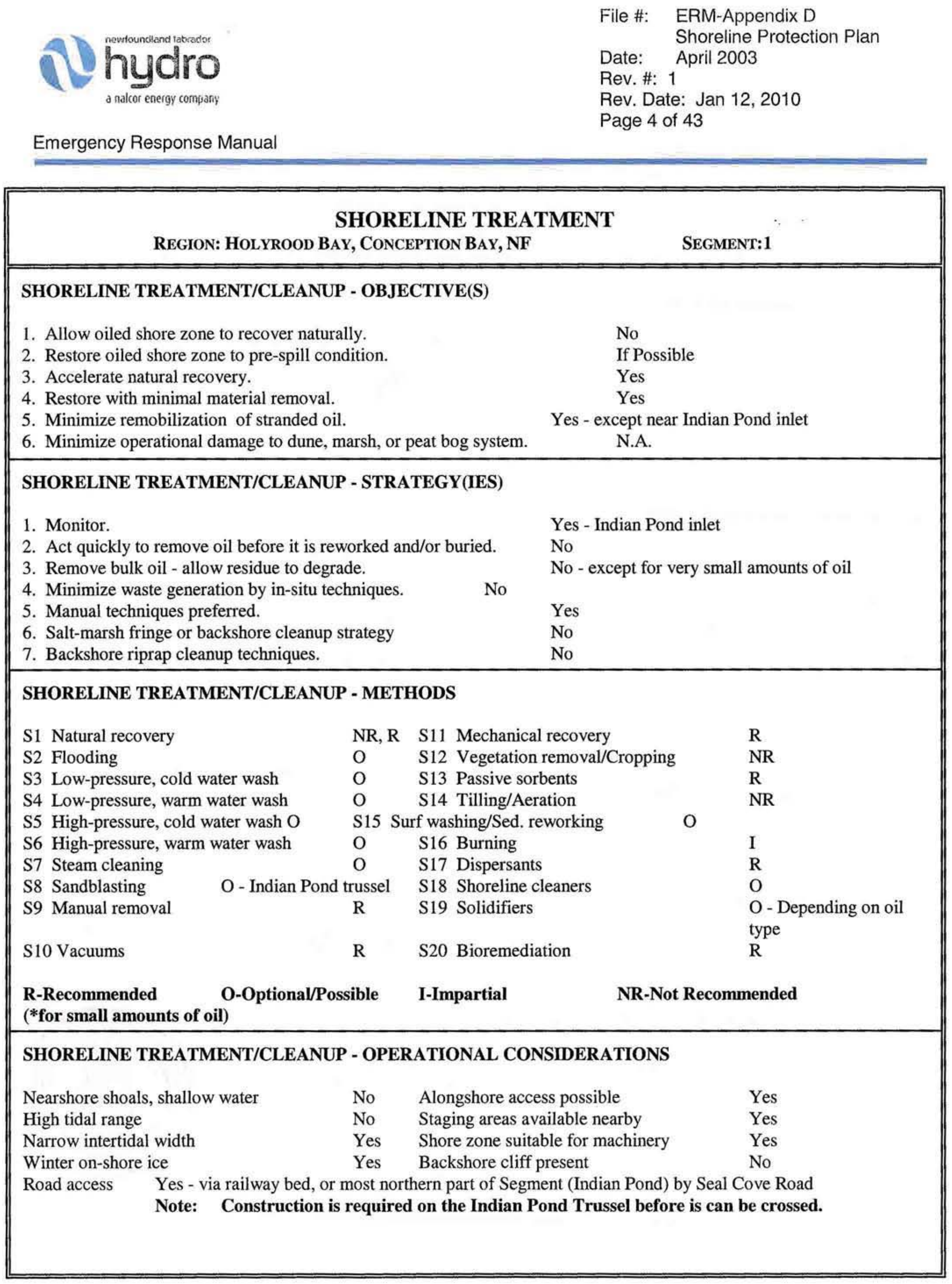

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SHORELINE TREATMENT

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT: 1**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally.	No
2. Restore oiled shore zone to pre-spill condition.	If Possible
3. Accelerate natural recovery.	Yes
4. Restore with minimal material removal.	Yes
5. Minimize remobilization of stranded oil.	Yes - except near Indian Pond inlet
6. Minimize operational damage to dune, marsh, or peat bog system.	N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor.	Yes - Indian Pond inlet
2. Act quickly to remove oil before it is reworked and/or buried.	No
3. Remove bulk oil - allow residue to degrade.	No - except for very small amounts of oil
4. Minimize waste generation by in-situ techniques.	No
5. Manual techniques preferred.	Yes
6. Salt-marsh fringe or backshore cleanup strategy	No
7. Backshore riprap cleanup techniques.	No

SHORELINE TREATMENT/CLEANUP - METHODS

S1 Natural recovery	NR, R	S11 Mechanical recovery	R
S2 Flooding	O	S12 Vegetation removal/Cropping	NR
S3 Low-pressure, cold water wash	O	S13 Passive sorbents	R
S4 Low-pressure, warm water wash	O	S14 Tilling/Aeration	NR
S5 High-pressure, cold water wash	O	S15 Surf washing/Sed. reworking	O
S6 High-pressure, warm water wash	O	S16 Burning	I
S7 Steam cleaning	O	S17 Dispersants	R
S8 Sandblasting	O - Indian Pond trussel	S18 Shoreline cleaners	O
S9 Manual removal	R	S19 Solidifiers	O - Depending on oil type
S10 Vacuums	R	S20 Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	Yes
High tidal range	No	Staging areas available nearby	Yes
Narrow intertidal width	Yes	Shore zone suitable for machinery	Yes
Winter on-shore ice	Yes	Backshore cliff present	No

Road access Yes - via railway bed, or most northern part of Segment (Indian Pond) by Seal Cove Road

Note: Construction is required on the Indian Pond Trussel before is can be crossed.

SUMMARY - SEGMENT 2
REGION: HOLYROOD BAY, CONCEPTION BAY, NF

RESPONSE PRIORITY: **LOW** - This area is composed of mainly low cliff and cobble-boulder beach and therefore the main concern for this Segment is possible oil penetration along the cobble-boulder beach areas.

PRIMARY RESOURCES AT RISK: Marine life in this area consists mainly of waterfowl and fish, but crustaceans\mollusks and flora\plant communities are common also.

COMMENTS:

BOUNDARIES OF Segment: From Boom Anchoring Point A (47°27'05"N, 53°06'05"W), just north of Flood's Point, to the north side of the Hydro oil off-loading wharf (47°26'38"N, 53°06'21"W) .

ACCESS ROADS: Shoreline access is possible via a steep embankment from the backshore to the railway bed. Existing roads which connect to the railway bed include the Hydro wharf access road, Seal Cove Road (but construction is necessary on the Indian Pond trussel before it can be crossed), and if necessary a road can be constructed from the railway bed to the Hydro property at a desired location.

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SHORE ZONE CHARACTER

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:2**

Segment LENGTH: 0.9 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material:	20 % boulder, 40% cobble - boulder, 40% bedrock		
Lower ITZ Type:	Beach and low cliff	Permanent Inlet:	No
Shoreline Type:	20% boulder beach, 40% cobble - boulder beach and 40% low bedrock cliff	Inlet Width:	N.A.
		Cyclical Inlet:	No
Backshore Material:	5% cobble, 40% boulder, 55% bedrock	# Channels:	N.A.

NEARSHORE ENVIRONMENT:

Tidal Range:	0.5 meters
Open, Exposed Coast?	Yes - exposed.
High or Low Wave Action:	High Wave Energy

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION: Northeast

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (ex. headland)	No	Sand - Burial Potential	No
Man-made Alongshore Barrier (ex. wharf)	No	Pebble/cobble - Penetration Potential	No
Bay or Re - Entrant	No	Riprap/Boulder - Reservoir Potential	Yes
Tidal Inlet or Channel	No	Overwash into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		

Marsh Meadow Oiling Potential During High Water Levels No

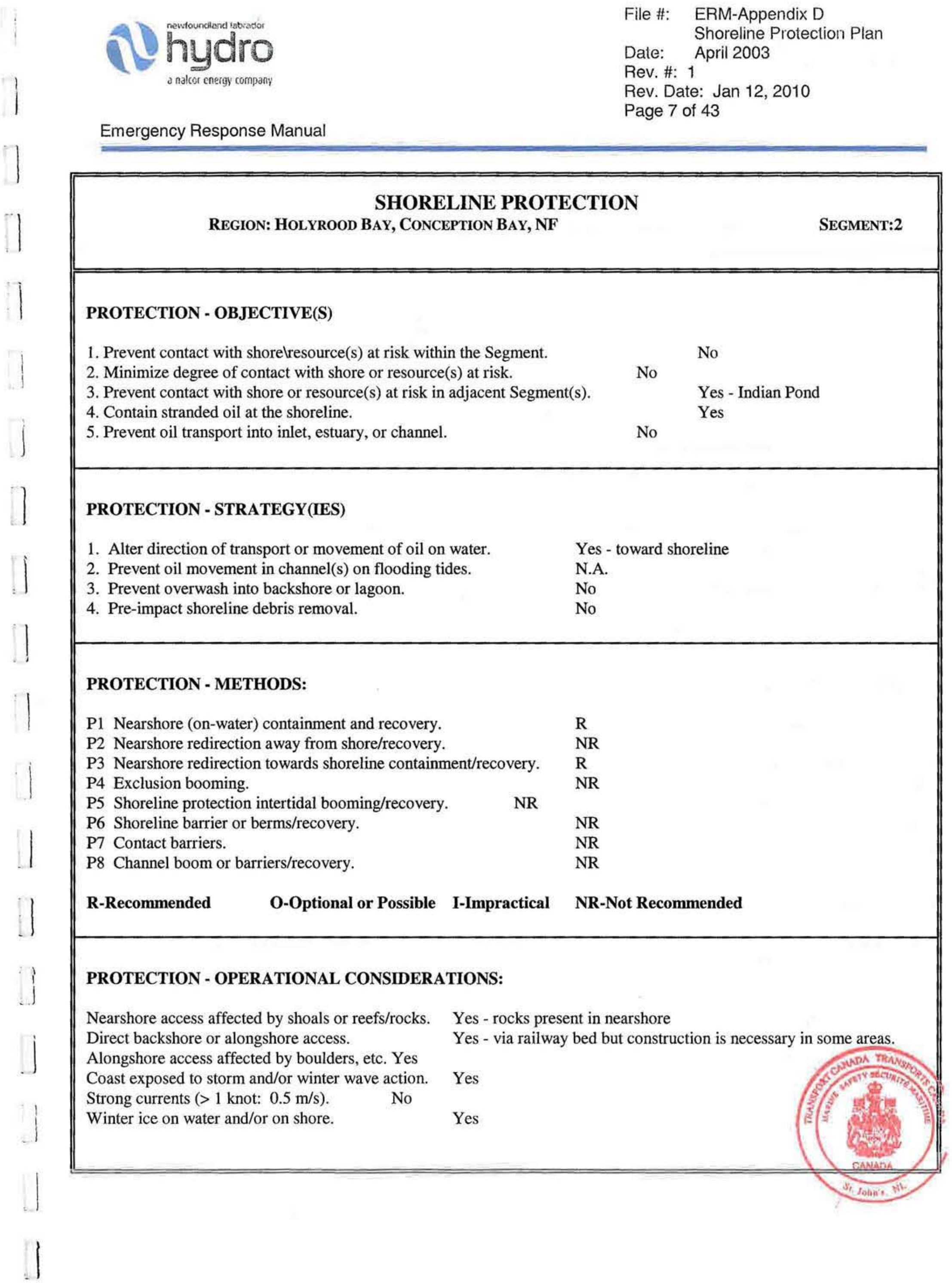
RESOURCES AT RISK:

Amphibians	No	Agricultural	No
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	No
Crustaceans or Mollusks	Yes	Harbour or Marina	No
Fish (Nearshore Only)	Yes	Recreation	No
Flora/Plant Communities	Yes	Residential	No
Mammals (Marine)	Yes		
Primary Resources:	Eco\Bio - waterfowl and fish		
Secondary Resources:			
Is the Segment Within a PAR?	No		

INFORMATION SOURCES:

Topographic Map(s):	Yes - 9259, 9222, 1 N/6	Hydrographic Chart(s):	Yes - 4848
Videotape(s):	Yes - "Shoreline Protection Plan"	Aerial Photographs:	95021-116

References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.



SHORELINE PROTECTION

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:2**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore\resource(s) at risk within the Segment.	No
2. Minimize degree of contact with shore or resource(s) at risk.	No
3. Prevent contact with shore or resource(s) at risk in adjacent Segment(s).	Yes - Indian Pond
4. Contain stranded oil at the shoreline.	Yes
5. Prevent oil transport into inlet, estuary, or channel.	No

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - toward shoreline
2. Prevent oil movement in channel(s) on flooding tides.	N.A.
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

PROTECTION - METHODS:

P1 Nearshore (on-water) containment and recovery.	R
P2 Nearshore redirection away from shore/recovery.	NR
P3 Nearshore redirection towards shoreline containment/recovery.	R
P4 Exclusion booming.	NR
P5 Shoreline protection intertidal booming/recovery.	NR
P6 Shoreline barrier or berms/recovery.	NR
P7 Contact barriers.	NR
P8 Channel boom or barriers/recovery.	NR

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present in nearshore
Direct backshore or alongshore access.	Yes - via railway bed but construction is necessary in some areas.
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes

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CANADA
St. John's, NL

SHORELINE TREATMENT

REGION: HOLYROOD BAY, CONCEPTION BAY, NF. **SEGMENT:2**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally.	No
2. Restore oiled shore zone to pre-spill condition.	If Possible
3. Accelerate natural recovery.	Yes
4. Restore with minimal material removal.	Yes
5. Minimize remobilization of stranded oil.	Yes
6. Minimize operational damage to dune, marsh, or peat bog system.	N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor.	No
2. Act quickly to remove oil before it is reworked and/or buried.	No
3. Remove bulk oil - allow residue to degrade.	No - except for very small amounts of oil
4. Minimize waste generation by in-situ techniques.	No
5. Manual techniques preferred.	Yes
6. Salt-marsh fringe or backshore cleanup strategy	No
7. Backshore riprap cleanup techniques.	No

SHORELINE TREATMENT/CLEANUP - METHODS

S1 Natural recovery	NR, R	S11 Mechanical recovery	R
S2 Flooding	O	S12 Vegetation removal/Cropping	NR
S3 Low-pressure, cold water wash	R	S13 Passive sorbents	O
S4 Low-pressure, warm water wash	R	S14 Tilling/Aeration	NR
S5 High-pressure, cold water wash	R	S15 Surf washing/Sed. reworking	NR
S6 High-pressure, warm water wash	R	S16 Burning	I
S7 Steam cleaning	O	S17 Dispersants	R
S8 Sandblasting	NR	S18 Shoreline cleaners	R
S9 Manual removal	R	S19 Solidifers	O - Depending on oil type
S10 Vacuums	O	S20 Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	No - difficult
High tidal range	No	Staging areas available nearby	Yes
Narrow intertidal width	Yes	Shore zone suitable for machinery	No
Winter on-shore ice	Yes		
Backshore cliff present	Yes - in southern portion of Segment. Other Segment areas has steep embankment.		
Road access	Yes - via railway bed and access road to the Hydro wharf. Seal Cove Road could also be used if the trussel in Indian Pond is repaired.		

SUMMARY - SEGMENT 3

REGION: HOLYROOD BAY, CONCEPTION BAY, NF

RESPONSE PRIORITY: **LOW** - Since the shoreline Segment is composed of bedrock and has high wave energy, the oil should not persist in the environment for long periods of time.

PRIMARY RESOURCES AT RISK: Eco/Bio - primarily waterfowl, plant/flora communities, and fish.

COMMENTS:

BOUNDARIES OF Segment: From the north side of the Hydro oil off-loading wharf (47°26'38"N, 53°06'21"W), to Boom Anchoring Point No.1 (47°26'10"N, 53°06'33"W).

ACCESS ROADS: The railway bed runs parallel to the shoreline and serves as the main access road to this Segment. A steep embankment is present between the backshore and the railway bed and therefore construction would be needed to create an access road or staging area near the shoreline. Existing roads which connect to the railway bed include the Hydro wharf access road and O'Roukes road. Duff's Crescent is an alternative access road, but construction is necessary in the latter portion of the road (near the railway bed) since only a narrow trail presently exists adjacent to private property.

The shoreline impacts and oil persistence in this area are relatively low since bedrock is impermeable, except for fractured areas of bedrock or very small pebble-cobble beach areas, and therefore no oil seepage. An exception would be if the oil should sink to the bottom where it can penetrate the finer sediments and persist for long periods of time.

SHORE ZONE CHARACTER

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:3**

Segment LENGTH: 0.7 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material:	Bedrock and Boulder	Permanent Inlet:	No
Lower ITZ Type: Low Cliff		Inlet Width:	N.A.
Shoreline Type:	Low Bedrock Cliff	Cyclical Inlet:	No
Backshore Material:	Bedrock	# Channels:	N.A.

NEARSHORE ENVIRONMENT:

Tidal Range: 0.5 meters
Open, Exposed Coast? Yes - exposed.
High or Low Wave Action: High Wave Energy

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION: Northeast

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (ex. headland)	No	Sand-Burial Potential	No
Man-made Alongshore Barrier	Yes-Hydro Wharf	Pebble/cobble - Penetration Potential	No
Bay or Re-Entrant	No	Riprap/Boulder - Reservoir Potential	No
Tidal Inlet or Channel	No	Overwash into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		

Marsh Meadow Oiling Potential During High Water Levels No

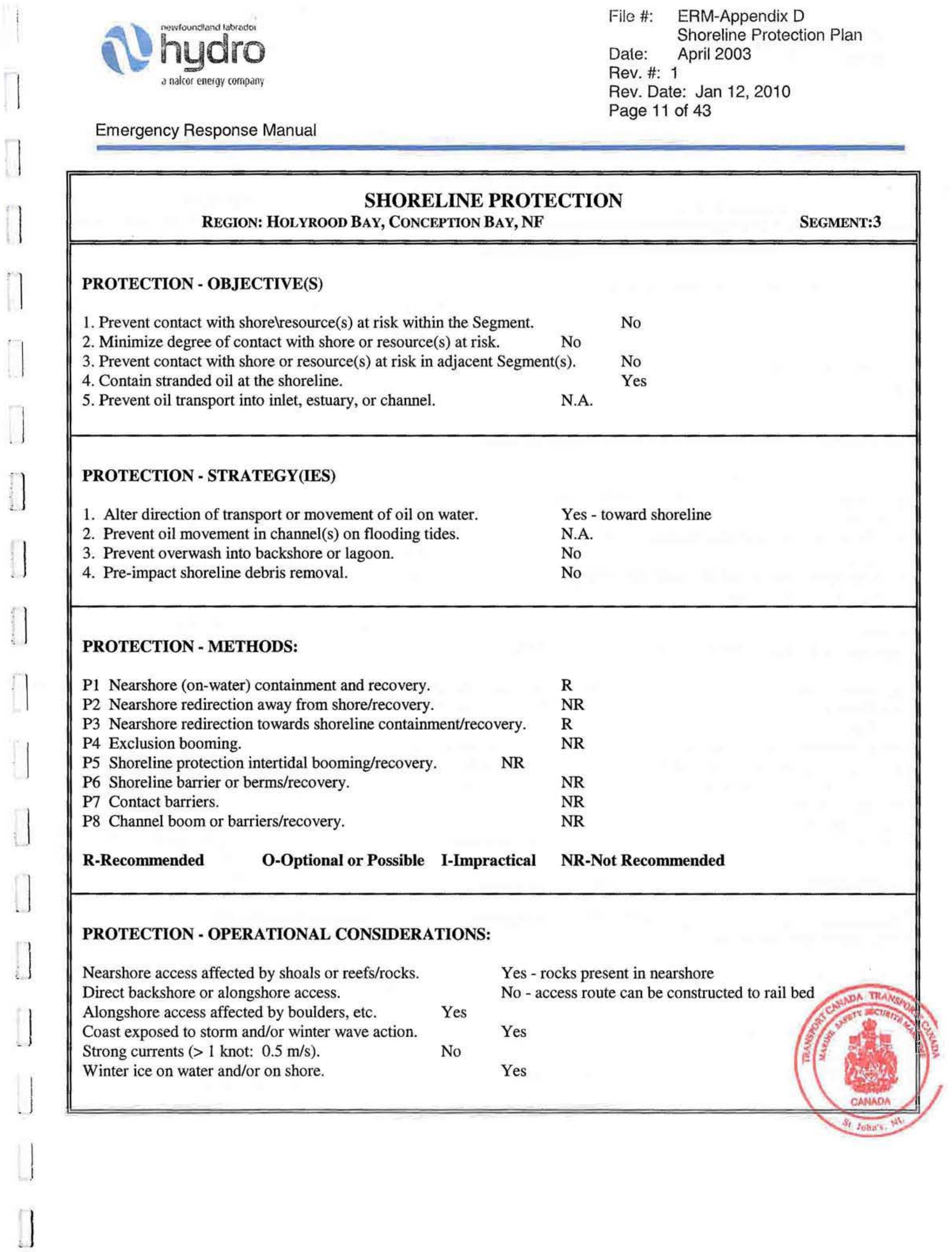
RESOURCES AT RISK:

Amphibians	No	Agricultural	No
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	Yes - Hydro Wharf
Crustaceans or Mollusks	Yes	Harbour or Marina	No
Fish (Nearshore Only)	Yes	Recreation	No
Flora/Plant Communities	Yes	Residential	No
Mammals (Marine)	Yes		

Primary Resources: Eco\Bio - waterfowl, fish, and flora/plant communities.
Secondary Resources:
Is the Segment Within a PAR? No

INFORMATION SOURCES:

Topographic Map(s): Yes - 9258, 1 N/6 Hydrographic Chart(s): Yes - 4848
Videotape(s): Yes - "Shoreline Protection Plan" Aerial Photographs: 95021-116
References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.



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SHORELINE PROTECTION

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:3**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore\resource(s) at risk within the Segment.	No
2. Minimize degree of contact with shore or resource(s) at risk.	No
3. Prevent contact with shore or resource(s) at risk in adjacent Segment(s).	No
4. Contain stranded oil at the shoreline.	Yes
5. Prevent oil transport into inlet, estuary, or channel.	N.A.

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - toward shoreline
2. Prevent oil movement in channel(s) on flooding tides.	N.A.
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

PROTECTION - METHODS:

P1 Nearshore (on-water) containment and recovery.	R
P2 Nearshore redirection away from shore/recovery.	NR
P3 Nearshore redirection towards shoreline containment/recovery.	R
P4 Exclusion booming.	NR
P5 Shoreline protection intertidal booming/recovery.	NR
P6 Shoreline barrier or berms/recovery.	NR
P7 Contact barriers.	NR
P8 Channel boom or barriers/recovery.	NR

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present in nearshore
Direct backshore or alongshore access.	No - access route can be constructed to rail bed
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes

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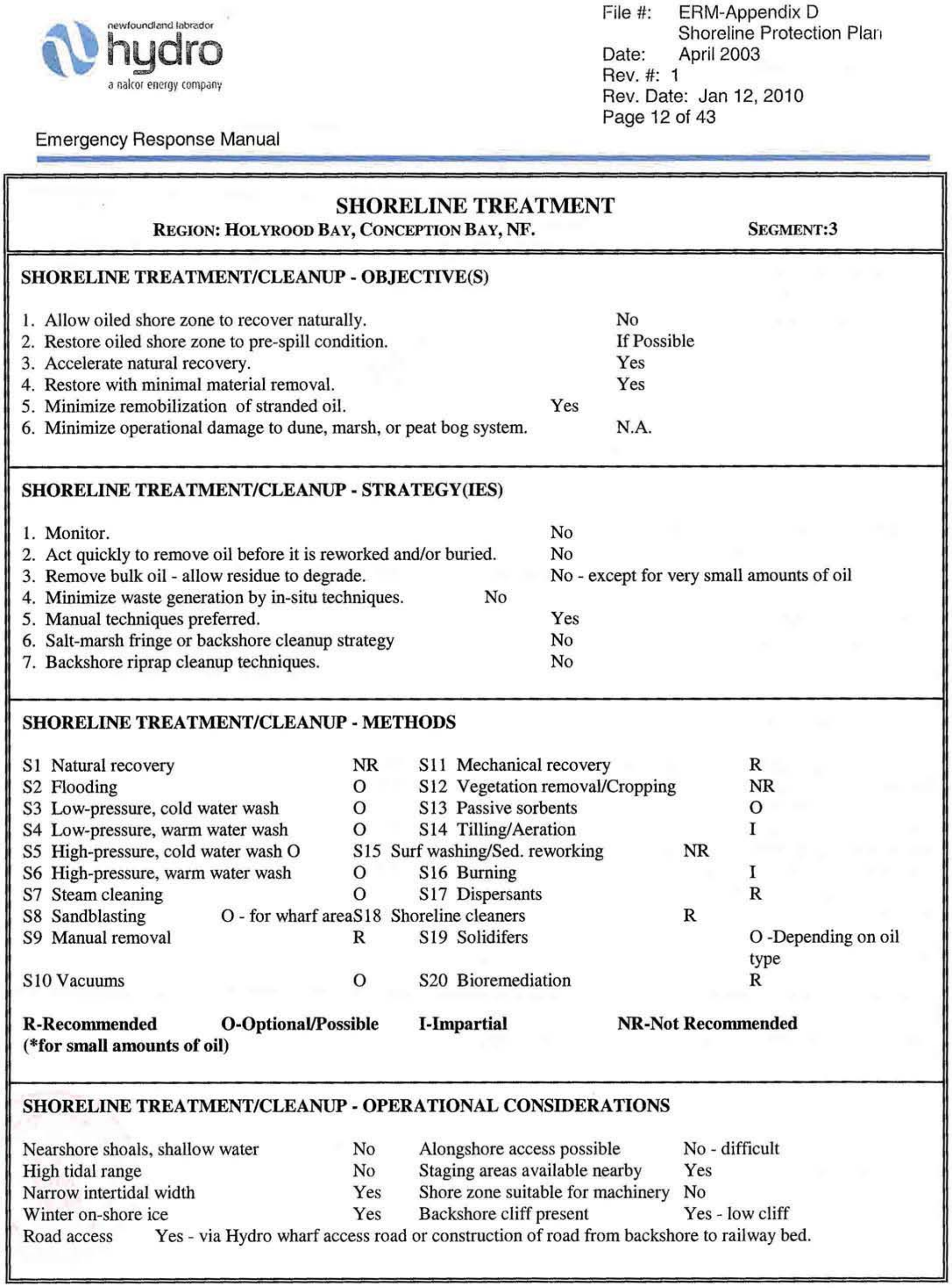

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SHORELINE TREATMENT

REGION: HOLYROOD BAY, CONCEPTION BAY, NF. **SEGMENT:3**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally. No
2. Restore oiled shore zone to pre-spill condition. If Possible
3. Accelerate natural recovery. Yes
4. Restore with minimal material removal. Yes
5. Minimize remobilization of stranded oil. Yes
6. Minimize operational damage to dune, marsh, or peat bog system. N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor. No
2. Act quickly to remove oil before it is reworked and/or buried. No
3. Remove bulk oil - allow residue to degrade. No - except for very small amounts of oil
4. Minimize waste generation by in-situ techniques. No
5. Manual techniques preferred. Yes
6. Salt-marsh fringe or backshore cleanup strategy No
7. Backshore riprap cleanup techniques. No

SHORELINE TREATMENT/CLEANUP - METHODS

S1	Natural recovery	NR	S11	Mechanical recovery	R
S2	Flooding	O	S12	Vegetation removal/Cropping	NR
S3	Low-pressure, cold water wash	O	S13	Passive sorbents	O
S4	Low-pressure, warm water wash	O	S14	Tilling/Aeration	I
S5	High-pressure, cold water wash	O	S15	Surf washing/Sed. reworking	NR
S6	High-pressure, warm water wash	O	S16	Burning	I
S7	Steam cleaning	O	S17	Dispersants	R
S8	Sandblasting	O - for wharf area	S18	Shoreline cleaners	R
S9	Manual removal	R	S19	Solidifers	O -Depending on oil type
S10	Vacuums	O	S20	Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	No - difficult
High tidal range	No	Staging areas available nearby	Yes
Narrow intertidal width	Yes	Shore zone suitable for machinery	No
Winter on-shore ice	Yes	Backshore cliff present	Yes - low cliff

Road access Yes - via Hydro wharf access road or construction of road from backshore to railway bed.

SUMMARY - SEGMENT 4

REGION: HOLYROOD BAY, CONCEPTION BAY, NF

RESPONSE PRIORITY: **LOW** - No structures or areas present which are considered high priority areas.

PRIMARY RESOURCES AT RISK: Eco/Bio - waterfowl, plant/flora communities, and fish.

COMMENTS:

BOUNDARIES OF Segment: From Boom Anchoring Point No.1 (47°26'10, 53°06'33"W) to Boom Anchoring Point No.2 (47°25'39"N, 53°06'50"W).

ACCESS ROADS: The railway bed runs parallel to the shoreline and serves as the main access road to this Segment. A steep embankment is present between the backshore and the railway bed and therefore construction would be needed to create an access road or staging area near the shoreline. Existing roads which connect to the railway bed include the Hydro wharf access road and O'Roukes road. Duff's Crescent is an alternative access road, but construction is necessary since only a narrow trail presently exists (adjacent to private property) in the latter portion of the road.

The shoreline impacts and oil persistence in this area are relatively low since bedrock is impermeable, except for fractured areas of bedrock or very small cobble beach areas, and therefore no oil seepage. There is high wave energy in most of the Segment and therefore natural breakdown is faster than sheltered areas. An exception would be if the oil should sink to the bottom where it can penetrate the finer sediments and persist for long periods of time.

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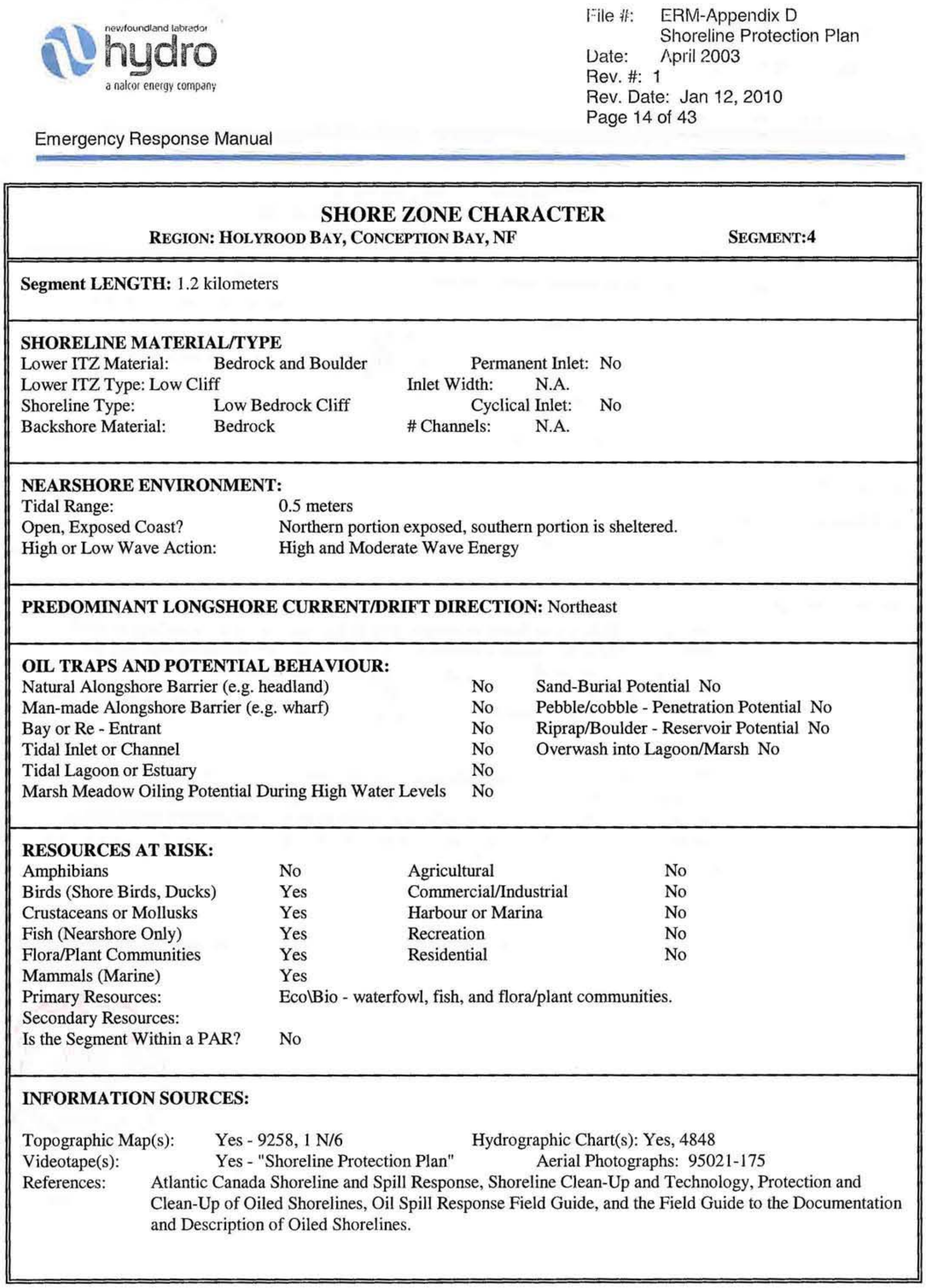
MARINE SAFETY SECURITE MARITIME
CANADA
St. John's, NL



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SHORE ZONE CHARACTER

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:4**

Segment LENGTH: 1.2 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material: Bedrock and Boulder
Lower ITZ Type: Low Cliff
Shoreline Type: Low Bedrock Cliff
Backshore Material: Bedrock
Permanent Inlet: No
Inlet Width: N.A.
Cyclical Inlet: No
Channels: N.A.

NEARSHORE ENVIRONMENT:

Tidal Range: 0.5 meters
Open, Exposed Coast? Northern portion exposed, southern portion is sheltered.
High or Low Wave Action: High and Moderate Wave Energy

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION: Northeast

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (e.g. headland)	No	Sand-Burial Potential	No
Man-made Alongshore Barrier (e.g. wharf)	No	Pebble/cobble - Penetration Potential	No
Bay or Re - Entrant	No	Riprap/Boulder - Reservoir Potential	No
Tidal Inlet or Channel	No	Overwash into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		
Marsh Meadow Oiling Potential During High Water Levels	No		

RESOURCES AT RISK:

Amphibians	No	Agricultural	No
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	No
Crustaceans or Mollusks	Yes	Harbour or Marina	No
Fish (Nearshore Only)	Yes	Recreation	No
Flora/Plant Communities	Yes	Residential	No
Mammals (Marine)	Yes		

Primary Resources: Eco\Bio - waterfowl, fish, and flora/plant communities.
Secondary Resources:
Is the Segment Within a PAR? No

INFORMATION SOURCES:

Topographic Map(s): Yes - 9258, 1 N/6
Hydrographic Chart(s): Yes, 4848
Videotape(s): Yes - "Shoreline Protection Plan"
Aerial Photographs: 95021-175
References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.

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SHORELINE PROTECTION

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:4**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore resource(s) at risk within the Segment.	No
2. Minimize degree of contact with shore or resource(s) at risk.	No
3. Prevent contact with shore or resource(s) at risk in adjacent Segment(s).	No
4. Contain stranded oil at the shoreline.	Yes
5. Prevent oil transport into inlet, estuary, or channel.	N.A.

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - toward shoreline
2. Prevent oil movement in channel(s) on flooding tides.	N.A.
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

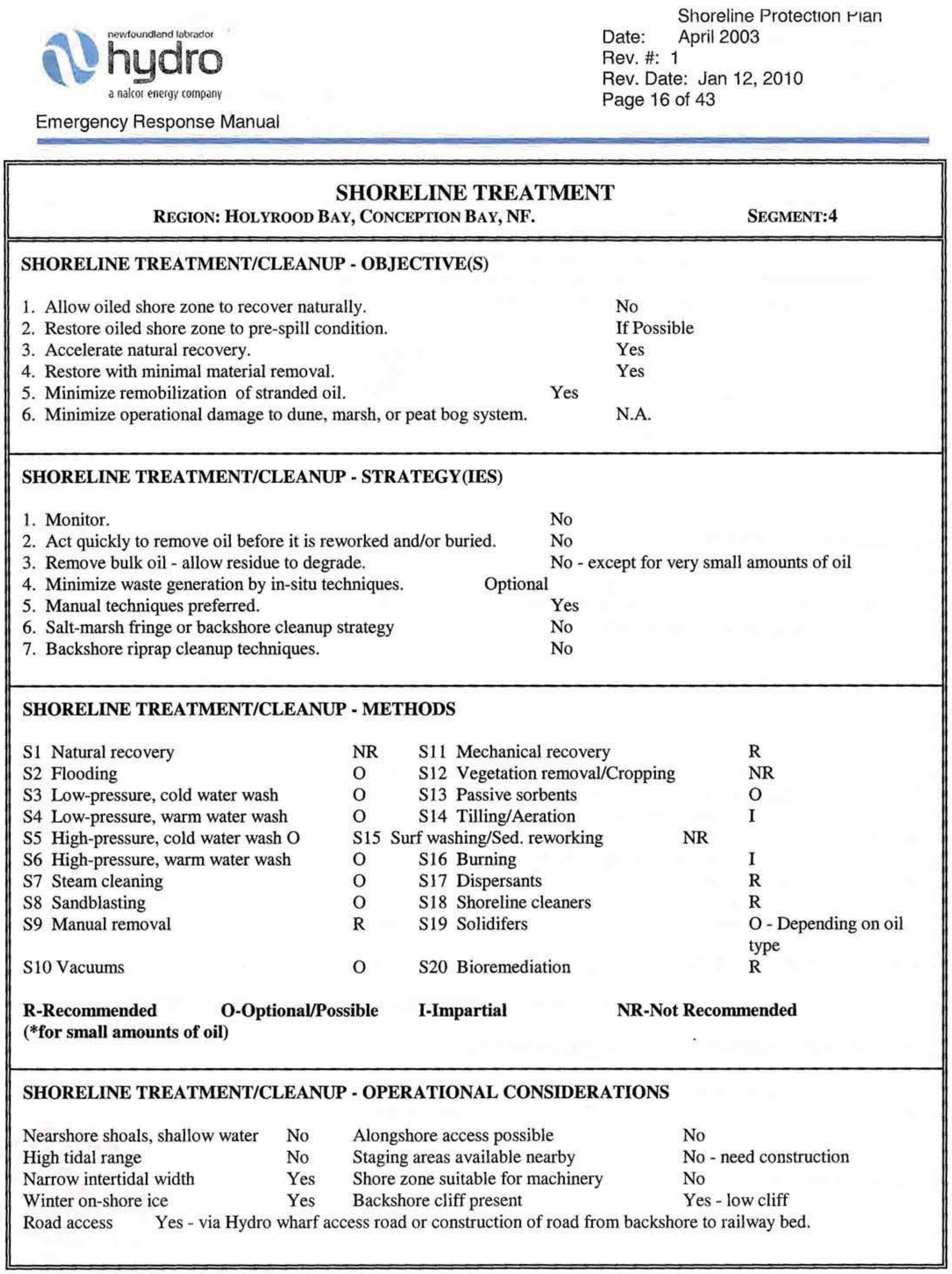
PROTECTION - METHODS:

P1 Nearshore (on-water) containment and recovery.	R
P2 Nearshore redirection away from shore/recovery.	NR
P3 Nearshore redirection towards shoreline containment/recovery.	R
P4 Exclusion booming.	NR
P5 Shoreline protection intertidal booming/recovery.	NR
P6 Shoreline barrier or berms/recovery.	NR
P7 Contact barriers.	NR
P8 Channel boom or barriers/recovery.	NR

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present in nearshore
Direct backshore or alongshore access.	No - access route can be constructed to rail bed
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes



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SHORELINE TREATMENT

REGION: HOLYROOD BAY, CONCEPTION BAY, NF. **SEGMENT:4**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally.	No
2. Restore oiled shore zone to pre-spill condition.	If Possible
3. Accelerate natural recovery.	Yes
4. Restore with minimal material removal.	Yes
5. Minimize remobilization of stranded oil.	Yes
6. Minimize operational damage to dune, marsh, or peat bog system.	N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor.	No
2. Act quickly to remove oil before it is reworked and/or buried.	No
3. Remove bulk oil - allow residue to degrade.	No - except for very small amounts of oil
4. Minimize waste generation by in-situ techniques.	Optional
5. Manual techniques preferred.	Yes
6. Salt-marsh fringe or backshore cleanup strategy	No
7. Backshore riprap cleanup techniques.	No

SHORELINE TREATMENT/CLEANUP - METHODS

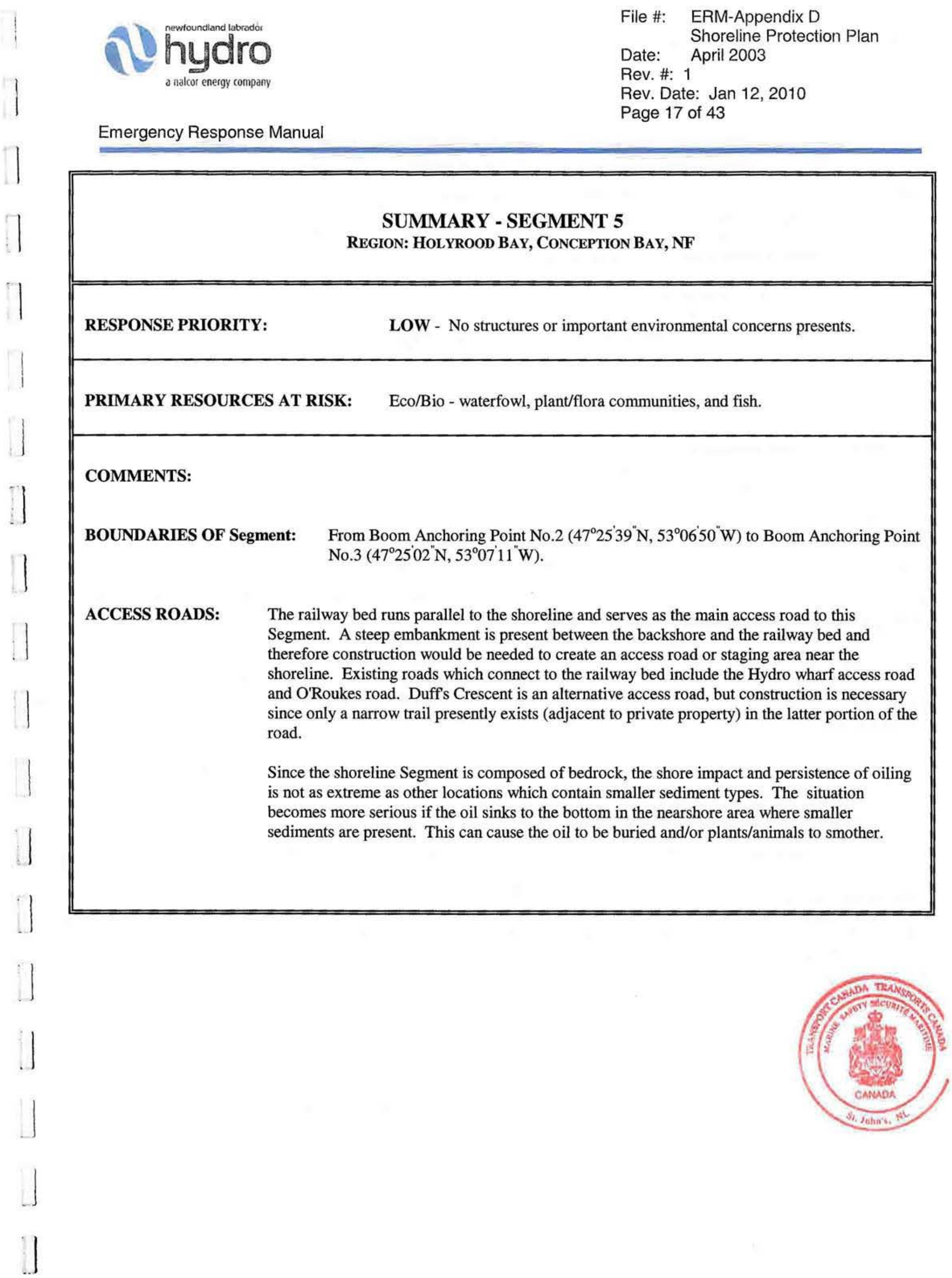
S1 Natural recovery	NR	S11 Mechanical recovery	R
S2 Flooding	O	S12 Vegetation removal/Cropping	NR
S3 Low-pressure, cold water wash	O	S13 Passive sorbents	O
S4 Low-pressure, warm water wash	O	S14 Tilling/Aeration	I
S5 High-pressure, cold water wash	O	S15 Surf washing/Sed. reworking	NR
S6 High-pressure, warm water wash	O	S16 Burning	I
S7 Steam cleaning	O	S17 Dispersants	R
S8 Sandblasting	O	S18 Shoreline cleaners	R
S9 Manual removal	R	S19 Solidifers	O - Depending on oil type
S10 Vacuums	O	S20 Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	No
High tidal range	No	Staging areas available nearby	No - need construction
Narrow intertidal width	Yes	Shore zone suitable for machinery	No
Winter on-shore ice	Yes	Backshore cliff present	Yes - low cliff

Road access Yes - via Hydro wharf access road or construction of road from backshore to railway bed.



SUMMARY - SEGMENT 5

REGION: HOLYROOD BAY, CONCEPTION BAY, NF

RESPONSE PRIORITY: **LOW** - No structures or important environmental concerns presents.

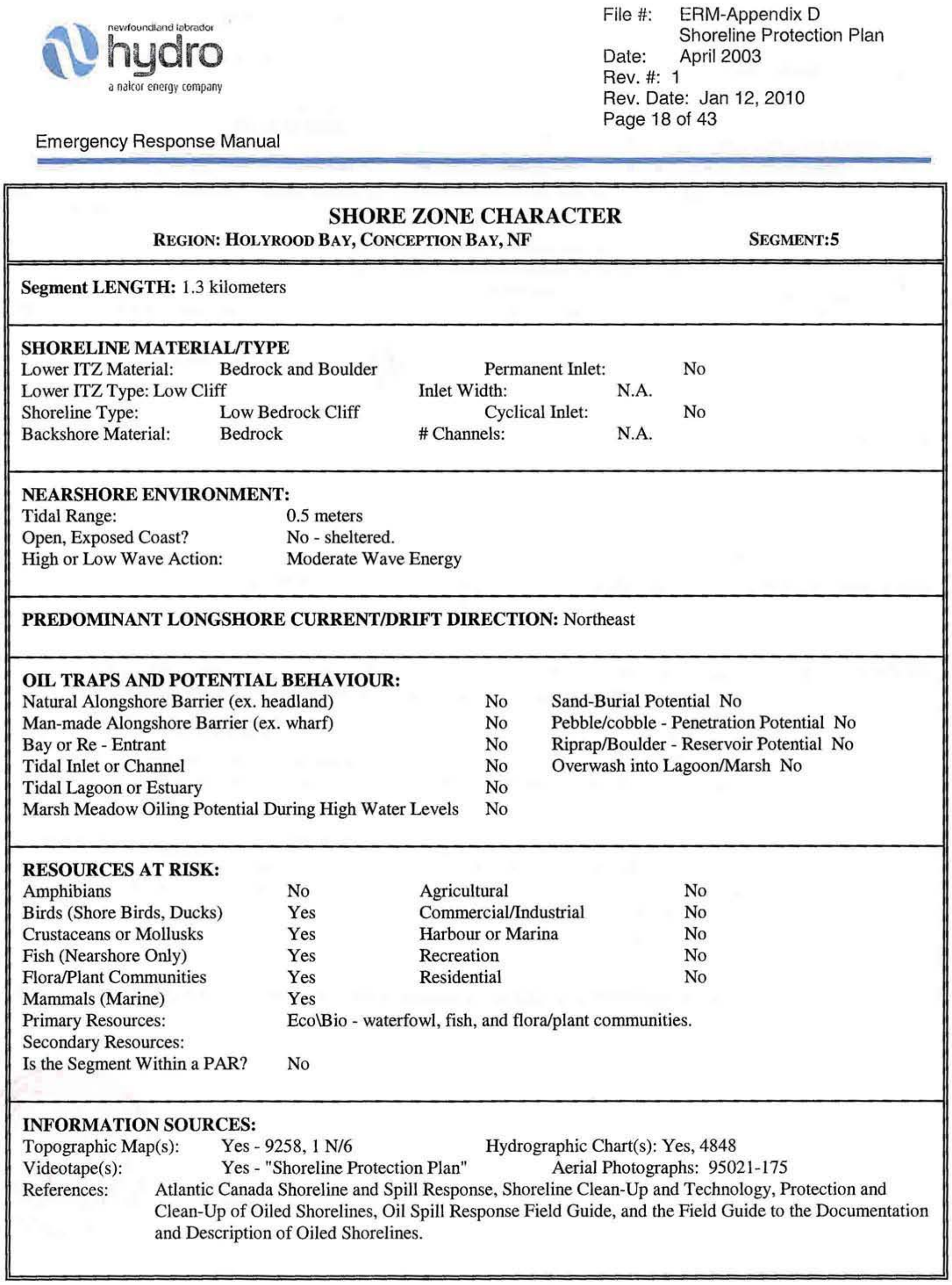
PRIMARY RESOURCES AT RISK: Eco/Bio - waterfowl, plant/flora communities, and fish.

COMMENTS:

BOUNDARIES OF Segment: From Boom Anchoring Point No.2 (47°25'39"N, 53°06'50"W) to Boom Anchoring Point No.3 (47°25'02"N, 53°07'11"W).

ACCESS ROADS: The railway bed runs parallel to the shoreline and serves as the main access road to this Segment. A steep embankment is present between the backshore and the railway bed and therefore construction would be needed to create an access road or staging area near the shoreline. Existing roads which connect to the railway bed include the Hydro wharf access road and O'Roukes road. Duff's Crescent is an alternative access road, but construction is necessary since only a narrow trail presently exists (adjacent to private property) in the latter portion of the road.

Since the shoreline Segment is composed of bedrock, the shore impact and persistence of oiling is not as extreme as other locations which contain smaller sediment types. The situation becomes more serious if the oil sinks to the bottom in the nearshore area where smaller sediments are present. This can cause the oil to be buried and/or plants/animals to smother.



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SHORE ZONE CHARACTER

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:5**

Segment LENGTH: 1.3 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material:	Bedrock and Boulder	Permanent Inlet:	No
Lower ITZ Type: Low Cliff		Inlet Width:	N.A.
Shoreline Type:	Low Bedrock Cliff	Cyclical Inlet:	No
Backshore Material:	Bedrock	# Channels:	N.A.

NEARSHORE ENVIRONMENT:

Tidal Range:	0.5 meters
Open, Exposed Coast?	No - sheltered.
High or Low Wave Action:	Moderate Wave Energy

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION: Northeast

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (ex. headland)	No	Sand-Burial Potential	No
Man-made Alongshore Barrier (ex. wharf)	No	Pebble/cobble - Penetration Potential	No
Bay or Re - Entrant	No	Riprap/Boulder - Reservoir Potential	No
Tidal Inlet or Channel	No	Overwash into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		
Marsh Meadow Oiling Potential During High Water Levels	No		

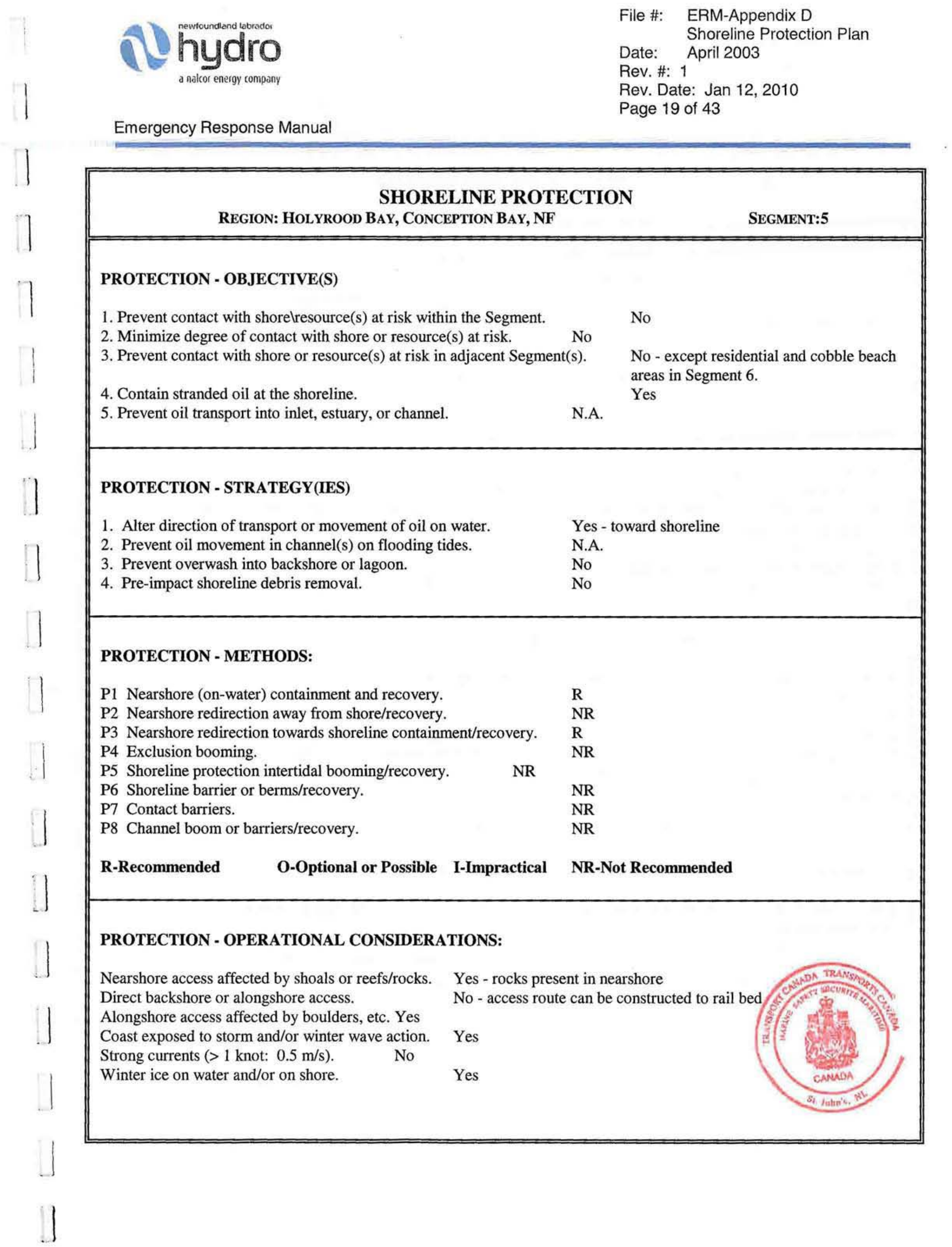
RESOURCES AT RISK:

Amphibians	No	Agricultural	No
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	No
Crustaceans or Mollusks	Yes	Harbour or Marina	No
Fish (Nearshore Only)	Yes	Recreation	No
Flora/Plant Communities	Yes	Residential	No
Mammals (Marine)	Yes		

Primary Resources: Eco\Bio - waterfowl, fish, and flora/plant communities.
Secondary Resources:
Is the Segment Within a PAR? No

INFORMATION SOURCES:

Topographic Map(s): Yes - 9258, 1 N/6 Hydrographic Chart(s): Yes, 4848
Videotape(s): Yes - "Shoreline Protection Plan" Aerial Photographs: 95021-175
References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.



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SHORELINE PROTECTION

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:5**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore\resource(s) at risk within the Segment.	No
2. Minimize degree of contact with shore or resource(s) at risk.	No
3. Prevent contact with shore or resource(s) at risk in adjacent Segment(s).	No - except residential and cobble beach areas in Segment 6.
4. Contain stranded oil at the shoreline.	Yes
5. Prevent oil transport into inlet, estuary, or channel.	N.A.

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - toward shoreline
2. Prevent oil movement in channel(s) on flooding tides.	N.A.
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

PROTECTION - METHODS:

P1 Nearshore (on-water) containment and recovery.	R
P2 Nearshore redirection away from shore/recovery.	NR
P3 Nearshore redirection towards shoreline containment/recovery.	R
P4 Exclusion booming.	NR
P5 Shoreline protection intertidal booming/recovery.	NR
P6 Shoreline barrier or berms/recovery.	NR
P7 Contact barriers.	NR
P8 Channel boom or barriers/recovery.	NR

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present in nearshore
Direct backshore or alongshore access.	No - access route can be constructed to rail bed
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes

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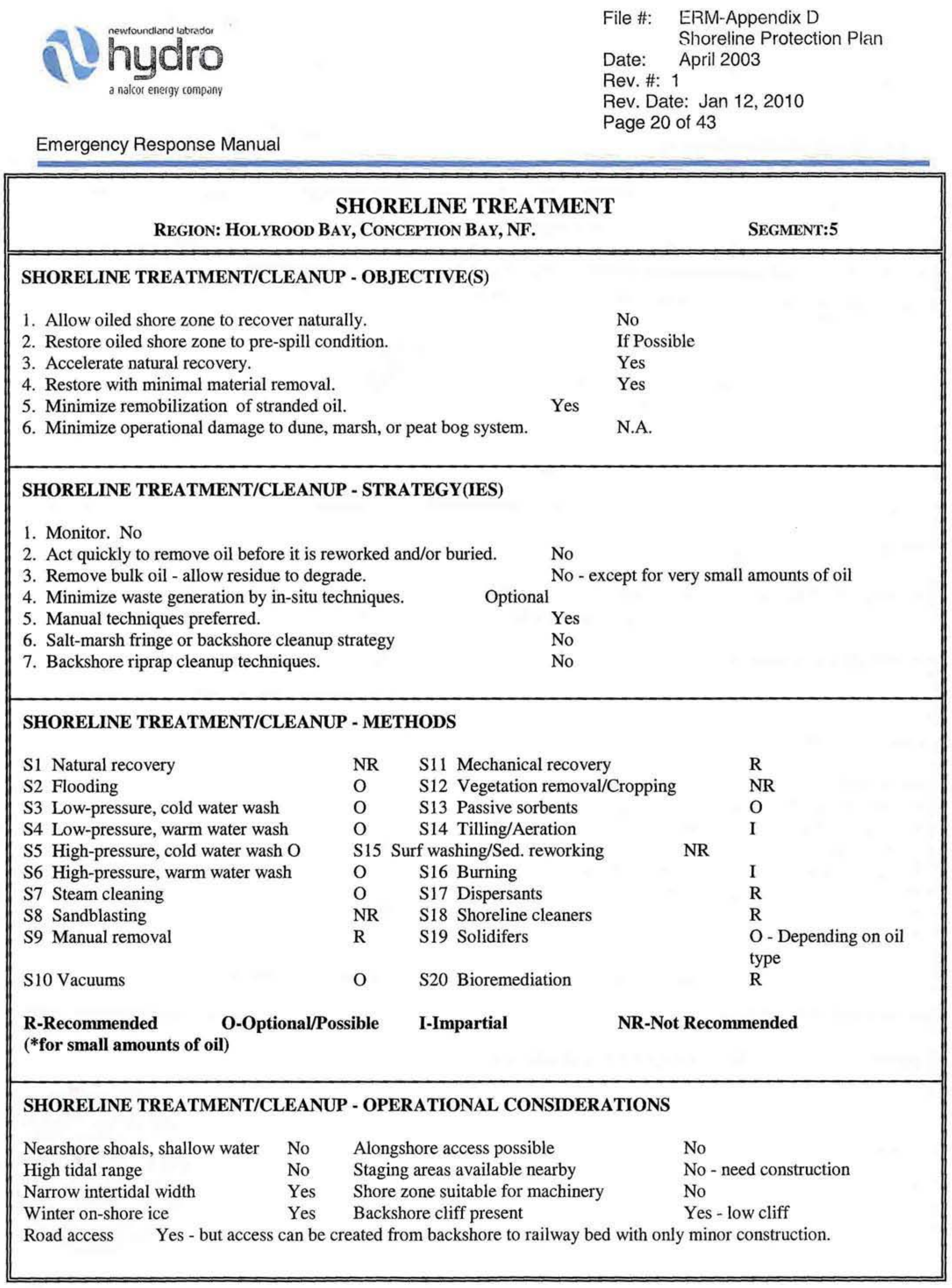
Marine Safety Sécurité Maritime
Canada
St. John's, NL



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SHORELINE TREATMENT

REGION: HOLYROOD BAY, CONCEPTION BAY, NF. **SEGMENT:5**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally.	No
2. Restore oiled shore zone to pre-spill condition.	If Possible
3. Accelerate natural recovery.	Yes
4. Restore with minimal material removal.	Yes
5. Minimize remobilization of stranded oil.	Yes
6. Minimize operational damage to dune, marsh, or peat bog system.	N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor. No	
2. Act quickly to remove oil before it is reworked and/or buried.	No
3. Remove bulk oil - allow residue to degrade.	No - except for very small amounts of oil
4. Minimize waste generation by in-situ techniques.	Optional
5. Manual techniques preferred.	Yes
6. Salt-marsh fringe or backshore cleanup strategy	No
7. Backshore riprap cleanup techniques.	No

SHORELINE TREATMENT/CLEANUP - METHODS

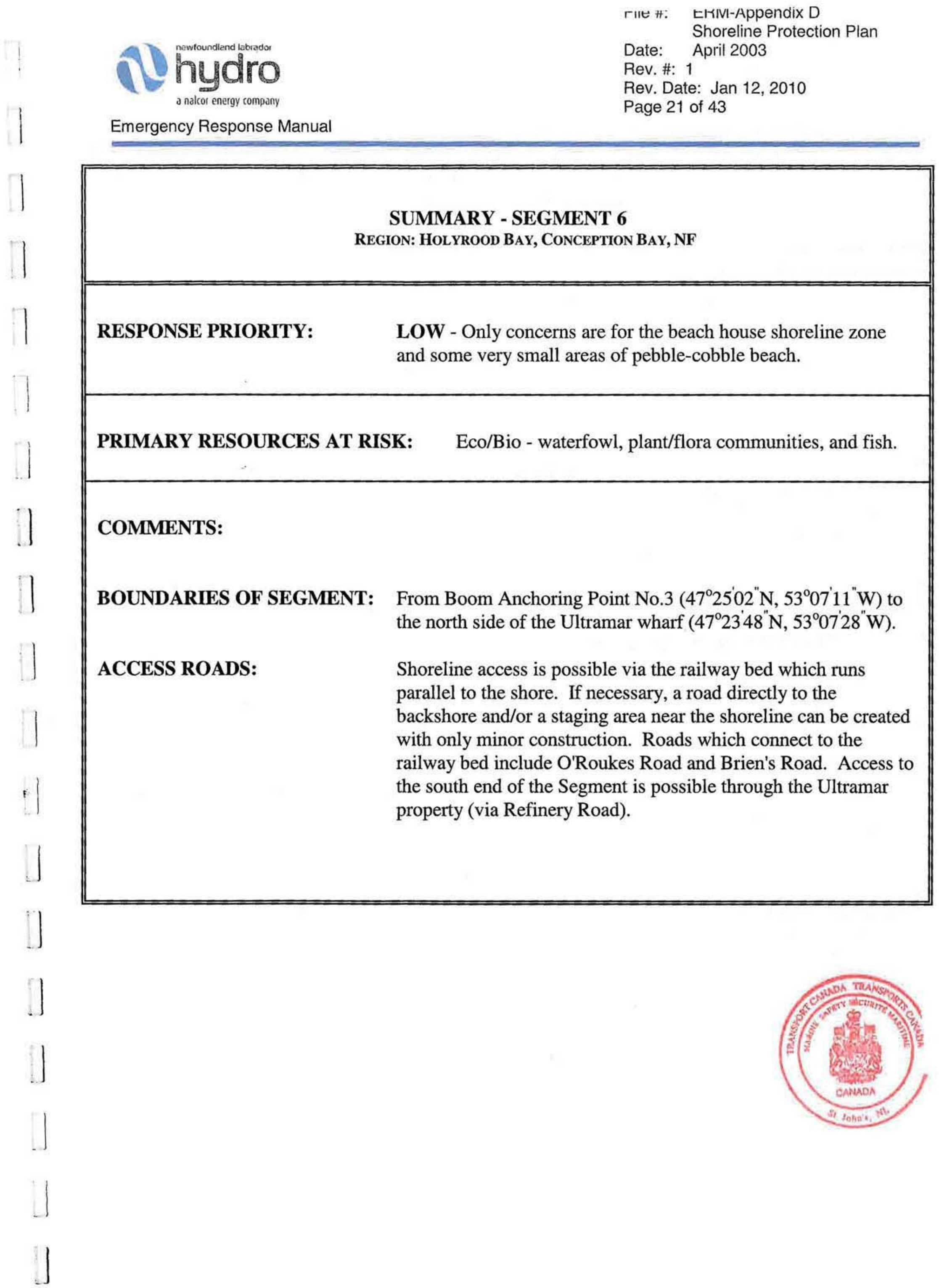
S1 Natural recovery	NR	S11 Mechanical recovery	R
S2 Flooding	O	S12 Vegetation removal/Cropping	NR
S3 Low-pressure, cold water wash	O	S13 Passive sorbents	O
S4 Low-pressure, warm water wash	O	S14 Tilling/Aeration	I
S5 High-pressure, cold water wash	O	S15 Surf washing/Sed. reworking	NR
S6 High-pressure, warm water wash	O	S16 Burning	I
S7 Steam cleaning	O	S17 Dispersants	R
S8 Sandblasting	NR	S18 Shoreline cleaners	R
S9 Manual removal	R	S19 Solidifers	O - Depending on oil type
S10 Vacuums	O	S20 Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	No
High tidal range	No	Staging areas available nearby	No - need construction
Narrow intertidal width	Yes	Shore zone suitable for machinery	No
Winter on-shore ice	Yes	Backshore cliff present	Yes - low cliff

Road access Yes - but access can be created from backshore to railway bed with only minor construction.



SUMMARY - SEGMENT 6

REGION: HOLYROOD BAY, CONCEPTION BAY, NF

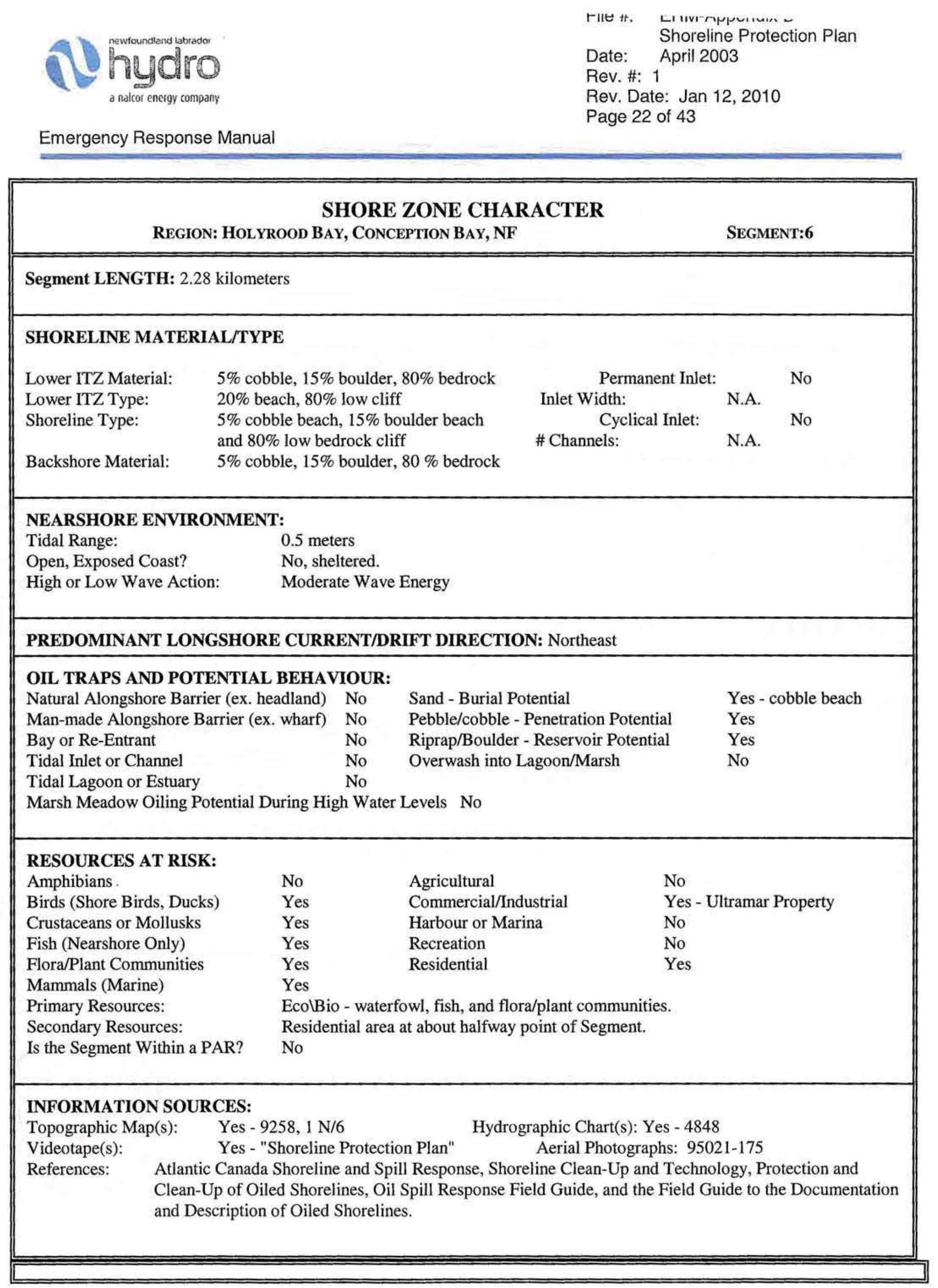
RESPONSE PRIORITY: **LOW** - Only concerns are for the beach house shoreline zone and some very small areas of pebble-cobble beach.

PRIMARY RESOURCES AT RISK: Eco/Bio - waterfowl, plant/flora communities, and fish.

COMMENTS:

BOUNDARIES OF SEGMENT: From Boom Anchoring Point No.3 (47°25'02"N, 53°07'11"W) to the north side of the Ultramar wharf (47°23'48"N, 53°07'28"W).

ACCESS ROADS: Shoreline access is possible via the railway bed which runs parallel to the shore. If necessary, a road directly to the backshore and/or a staging area near the shoreline can be created with only minor construction. Roads which connect to the railway bed include O'Roukes Road and Brien's Road. Access to the south end of the Segment is possible through the Ultramar property (via Refinery Road).



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SHORE ZONE CHARACTER

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:6**

Segment LENGTH: 2.28 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material:	5% cobble, 15% boulder, 80% bedrock	Permanent Inlet:	No
Lower ITZ Type:	20% beach, 80% low cliff	Inlet Width:	N.A.
Shoreline Type:	5% cobble beach, 15% boulder beach and 80% low bedrock cliff	Cyclical Inlet:	No
		# Channels:	N.A.
Backshore Material:	5% cobble, 15% boulder, 80 % bedrock		

NEARSHORE ENVIRONMENT:

Tidal Range:	0.5 meters
Open, Exposed Coast?	No, sheltered.
High or Low Wave Action:	Moderate Wave Energy

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION: Northeast

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (ex. headland)	No	Sand - Burial Potential	Yes - cobble beach
Man-made Alongshore Barrier (ex. wharf)	No	Pebble/cobble - Penetration Potential	Yes
Bay or Re-Entrant	No	Riprap/Boulder - Reservoir Potential	Yes
Tidal Inlet or Channel	No	Overwash into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		

Marsh Meadow Oiling Potential During High Water Levels No

RESOURCES AT RISK:

Amphibians	No	Agricultural	No
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	Yes - Ultramar Property
Crustaceans or Mollusks	Yes	Harbour or Marina	No
Fish (Nearshore Only)	Yes	Recreation	No
Flora/Plant Communities	Yes	Residential	Yes
Mammals (Marine)	Yes		

Primary Resources:	Eco\Bio - waterfowl, fish, and flora/plant communities.
Secondary Resources:	Residential area at about halfway point of Segment.
Is the Segment Within a PAR?	No

INFORMATION SOURCES:

Topographic Map(s):	Yes - 9258, 1 N/6	Hydrographic Chart(s):	Yes - 4848
Videotape(s):	Yes - "Shoreline Protection Plan"	Aerial Photographs:	95021-175

References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.

SHORELINE PROTECTION

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:6**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore resource(s) at risk within the Segment.	Yes - residential and pebble-cobble beach areas.
2. Minimize degree of contact with shore or resource (s) at risk.	No
3. Prevent contact with shore or resource (s) at risk in adjacent Segment(s).	No - except the pebble cobble beach in Segment 7 where waterfowl gather.
4. Contain stranded oil at the shoreline.	Yes
5. Prevent oil transport into inlet, estuary, or channel.	N.A.

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - toward shoreline
2. Prevent oil movement in channel(s) on flooding tides.	N.A.
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

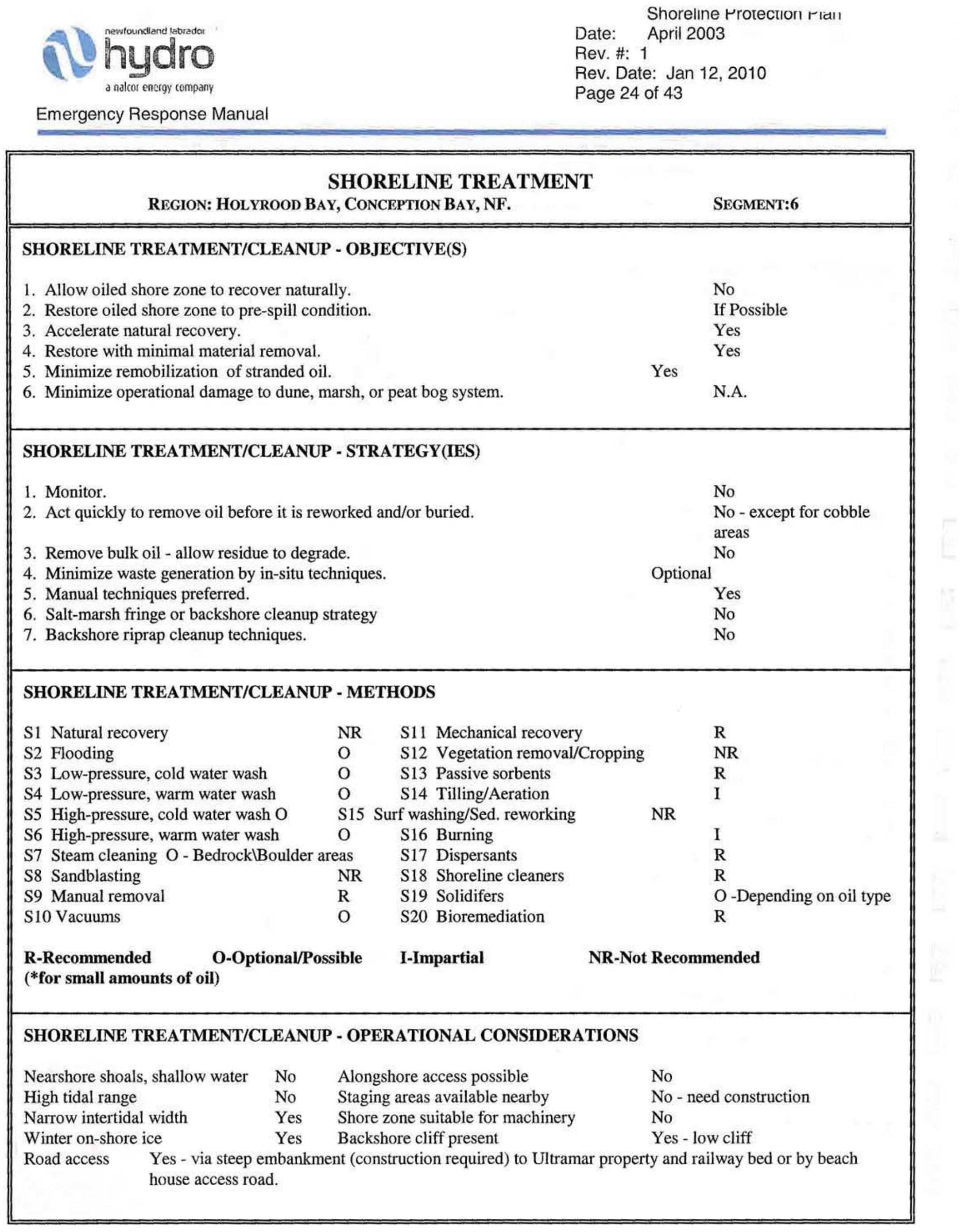
PROTECTION - METHODS:

P1 Nearshore (on-water) containment and recovery.	R
P2 Nearshore redirection away from shore/recovery.	NR
P3 Nearshore redirection towards shoreline containment/recovery.	R
P4 Exclusion booming.	NR
P5 Shoreline protection intertidal booming/recovery.	NR
P6 Shoreline barrier or berms/recovery.	NR
P7 Contact barriers.	NR
P8 Channel boom or barriers/recovery.	NR

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present in nearshore
Direct backshore or alongshore access.	No - except for access roads to beach - house or Ultramar property
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes



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SHORELINE TREATMENT

REGION: HOLYROOD BAY, CONCEPTION BAY, NF. **SEGMENT:6**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally.	No
2. Restore oiled shore zone to pre-spill condition.	If Possible
3. Accelerate natural recovery.	Yes
4. Restore with minimal material removal.	Yes
5. Minimize remobilization of stranded oil.	Yes
6. Minimize operational damage to dune, marsh, or peat bog system.	N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor.	No
2. Act quickly to remove oil before it is reworked and/or buried.	No - except for cobble areas
3. Remove bulk oil - allow residue to degrade.	No
4. Minimize waste generation by in-situ techniques.	Optional
5. Manual techniques preferred.	Yes
6. Salt-marsh fringe or backshore cleanup strategy	No
7. Backshore riprap cleanup techniques.	No

SHORELINE TREATMENT/CLEANUP - METHODS

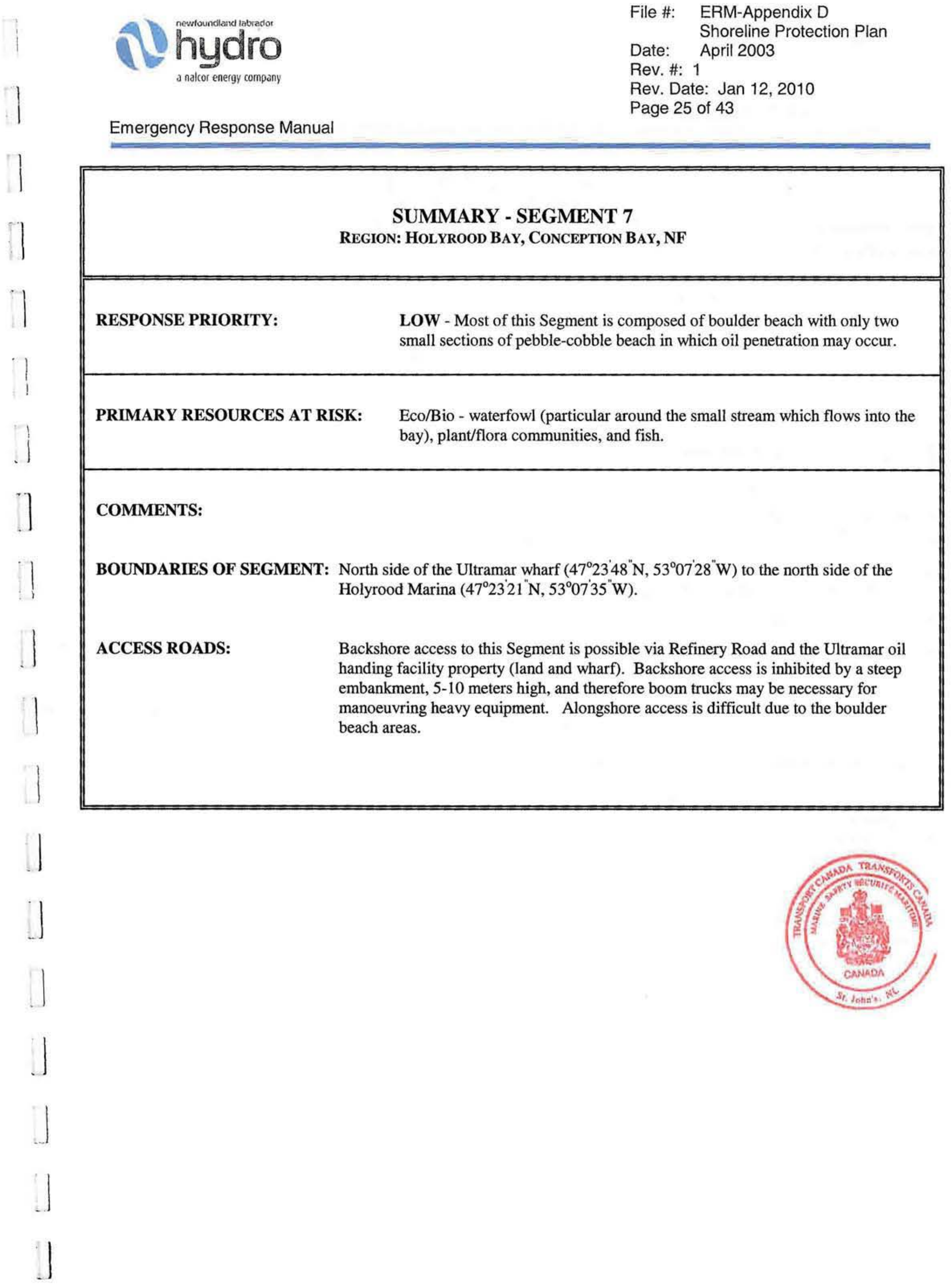
S1 Natural recovery	NR	S11 Mechanical recovery	R
S2 Flooding	O	S12 Vegetation removal/Cropping	NR
S3 Low-pressure, cold water wash	O	S13 Passive sorbents	R
S4 Low-pressure, warm water wash	O	S14 Tilling/Aeration	I
S5 High-pressure, cold water wash	O	S15 Surf washing/Sed. reworking	NR
S6 High-pressure, warm water wash	O	S16 Burning	I
S7 Steam cleaning	O - Bedrock\Boulder areas	S17 Dispersants	R
S8 Sandblasting	NR	S18 Shoreline cleaners	R
S9 Manual removal	R	S19 Solidifers	O -Depending on oil type
S10 Vacuums	O	S20 Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	No
High tidal range	No	Staging areas available nearby	No - need construction
Narrow intertidal width	Yes	Shore zone suitable for machinery	No
Winter on-shore ice	Yes	Backshore cliff present	Yes - low cliff

Road access Yes - via steep embankment (construction required) to Ultramar property and railway bed or by beach house access road.



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SUMMARY - SEGMENT 7
REGION: HOLYROOD BAY, CONCEPTION BAY, NF

RESPONSE PRIORITY:	**LOW** - Most of this Segment is composed of boulder beach with only two small sections of pebble-cobble beach in which oil penetration may occur.
PRIMARY RESOURCES AT RISK:	Eco/Bio - waterfowl (particular around the small stream which flows into the bay), plant/flora communities, and fish.

COMMENTS:

BOUNDARIES OF SEGMENT:	North side of the Ultramar wharf (47°23'48"N, 53°07'28"W) to the north side of the Holyrood Marina (47°23'21"N, 53°07'35"W).
ACCESS ROADS:	Backshore access to this Segment is possible via Refinery Road and the Ultramar oil handing facility property (land and wharf). Backshore access is inhibited by a steep embankment, 5-10 meters high, and therefore boom trucks may be necessary for manoeuvring heavy equipment. Alongshore access is difficult due to the boulder beach areas.

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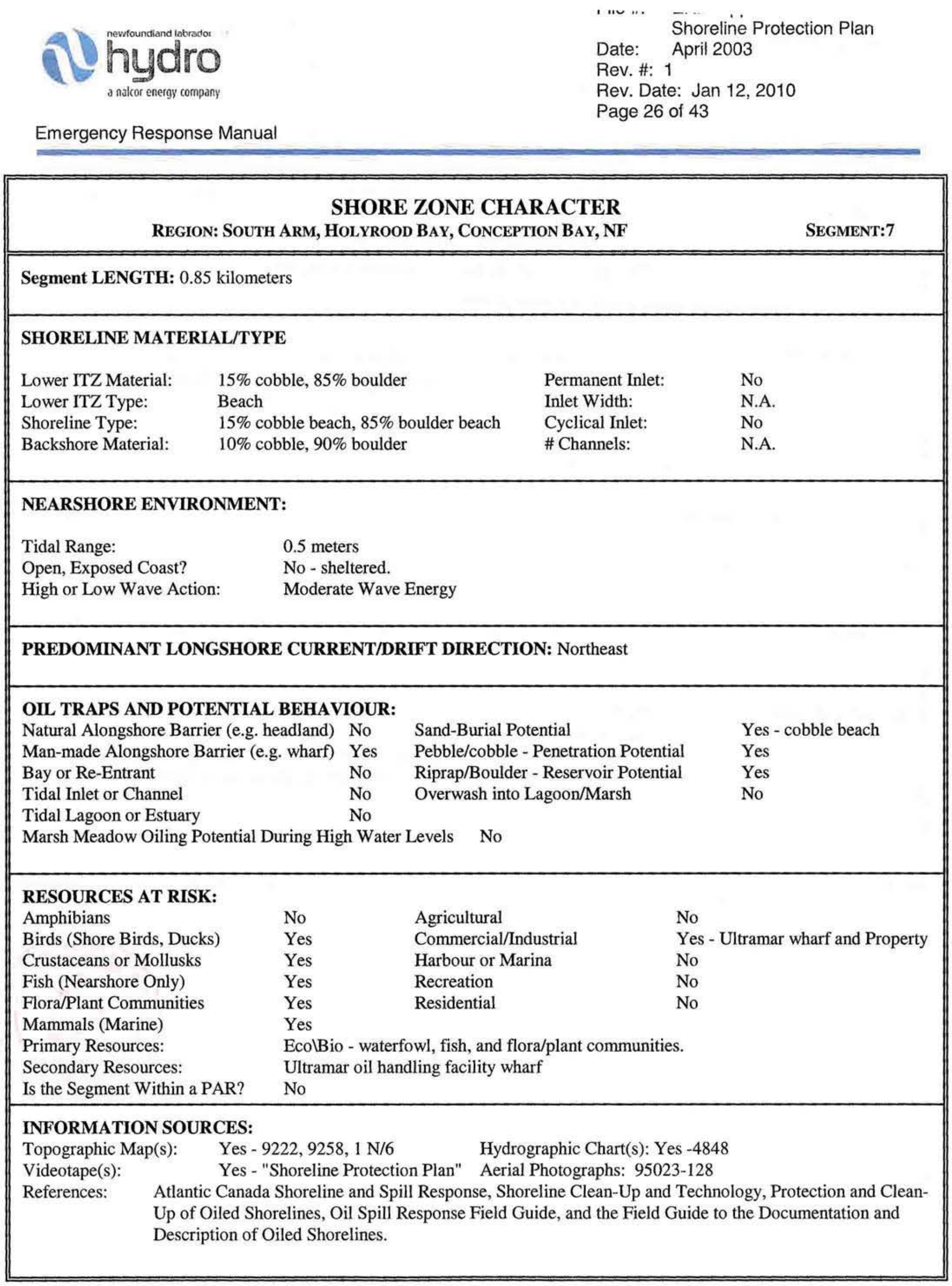
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL



SHORE ZONE CHARACTER

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:7**

Segment LENGTH: 0.85 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material:	15% cobble, 85% boulder	Permanent Inlet:	No
Lower ITZ Type:	Beach	Inlet Width:	N.A.
Shoreline Type:	15% cobble beach, 85% boulder beach	Cyclical Inlet:	No
Backshore Material:	10% cobble, 90% boulder	# Channels:	N.A.

NEARSHORE ENVIRONMENT:

Tidal Range:	0.5 meters
Open, Exposed Coast?	No - sheltered.
High or Low Wave Action:	Moderate Wave Energy

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION: Northeast

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (e.g. headland)	No	Sand-Burial Potential	Yes - cobble beach
Man-made Alongshore Barrier (e.g. wharf)	Yes	Pebble/cobble - Penetration Potential	Yes
Bay or Re-Entrant	No	Riprap/Boulder - Reservoir Potential	Yes
Tidal Inlet or Channel	No	Overwash into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		

Marsh Meadow Oiling Potential During High Water Levels No

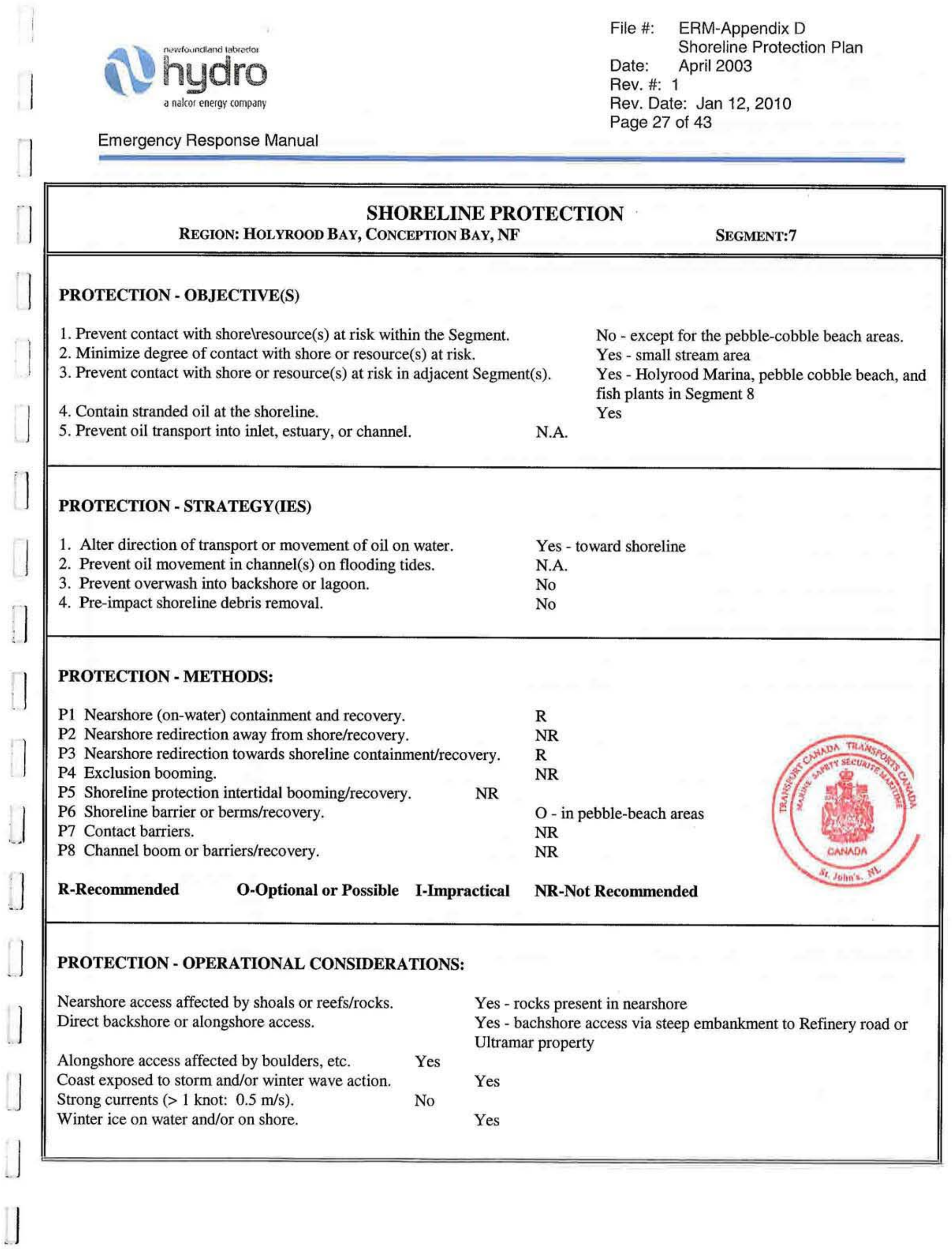
RESOURCES AT RISK:

Amphibians	No	Agricultural	No
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	Yes - Ultramar wharf and Property
Crustaceans or Mollusks	Yes	Harbour or Marina	No
Fish (Nearshore Only)	Yes	Recreation	No
Flora/Plant Communities	Yes	Residential	No
Mammals (Marine)	Yes		

Primary Resources:	Eco\Bio - waterfowl, fish, and flora/plant communities.
Secondary Resources:	Ultramar oil handling facility wharf
Is the Segment Within a PAR?	No

INFORMATION SOURCES:

Topographic Map(s): Yes - 9222, 9258, 1 N/6 Hydrographic Chart(s): Yes -4848
Videotape(s): Yes - "Shoreline Protection Plan" Aerial Photographs: 95023-128
References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.



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SHORELINE PROTECTION

REGION: HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:7**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore\resource(s) at risk within the Segment.	No - except for the pebble-cobble beach areas.
2. Minimize degree of contact with shore or resource(s) at risk.	Yes - small stream area
3. Prevent contact with shore or resource(s) at risk in adjacent Segment(s).	Yes - Holyrood Marina, pebble cobble beach, and fish plants in Segment 8
4. Contain stranded oil at the shoreline.	Yes
5. Prevent oil transport into inlet, estuary, or channel.	N.A.

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - toward shoreline
2. Prevent oil movement in channel(s) on flooding tides.	N.A.
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

PROTECTION - METHODS:

P1 Nearshore (on-water) containment and recovery.	R
P2 Nearshore redirection away from shore/recovery.	NR
P3 Nearshore redirection towards shoreline containment/recovery.	R
P4 Exclusion booming.	NR
P5 Shoreline protection intertidal booming/recovery.	NR
P6 Shoreline barrier or berms/recovery.	O - in pebble-beach areas
P7 Contact barriers.	NR
P8 Channel boom or barriers/recovery.	NR

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

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CANADA
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PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present in nearshore
Direct backshore or alongshore access.	Yes - bachshore access via steep embankment to Refinery road or Ultramar property
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes

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SHORELINE TREATMENT

REGION: HOLYROOD BAY, CONCEPTION BAY, NF. **SEGMENT:7**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally.	No
2. Restore oiled shore zone to pre-spill condition.	Yes
3. Accelerate natural recovery.	Yes
4. Restore with minimal material removal.	Yes
5. Minimize remobilization of stranded oil.	Yes
6. Minimize operational damage to dune, marsh, or peat bog system.	N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor.	Yes
2. Act quickly to remove oil before it is reworked and/or buried.	No - except for the pebble-cobble beach areas.
3. Remove bulk oil - allow residue to degrade.	No
4. Minimize waste generation by in-situ techniques.	No
5. Manual techniques preferred.	Yes
6. Salt-marsh fringe or backshore cleanup strategy	No
7. Backshore riprap cleanup techniques.	No

SHORELINE TREATMENT/CLEANUP - METHODS

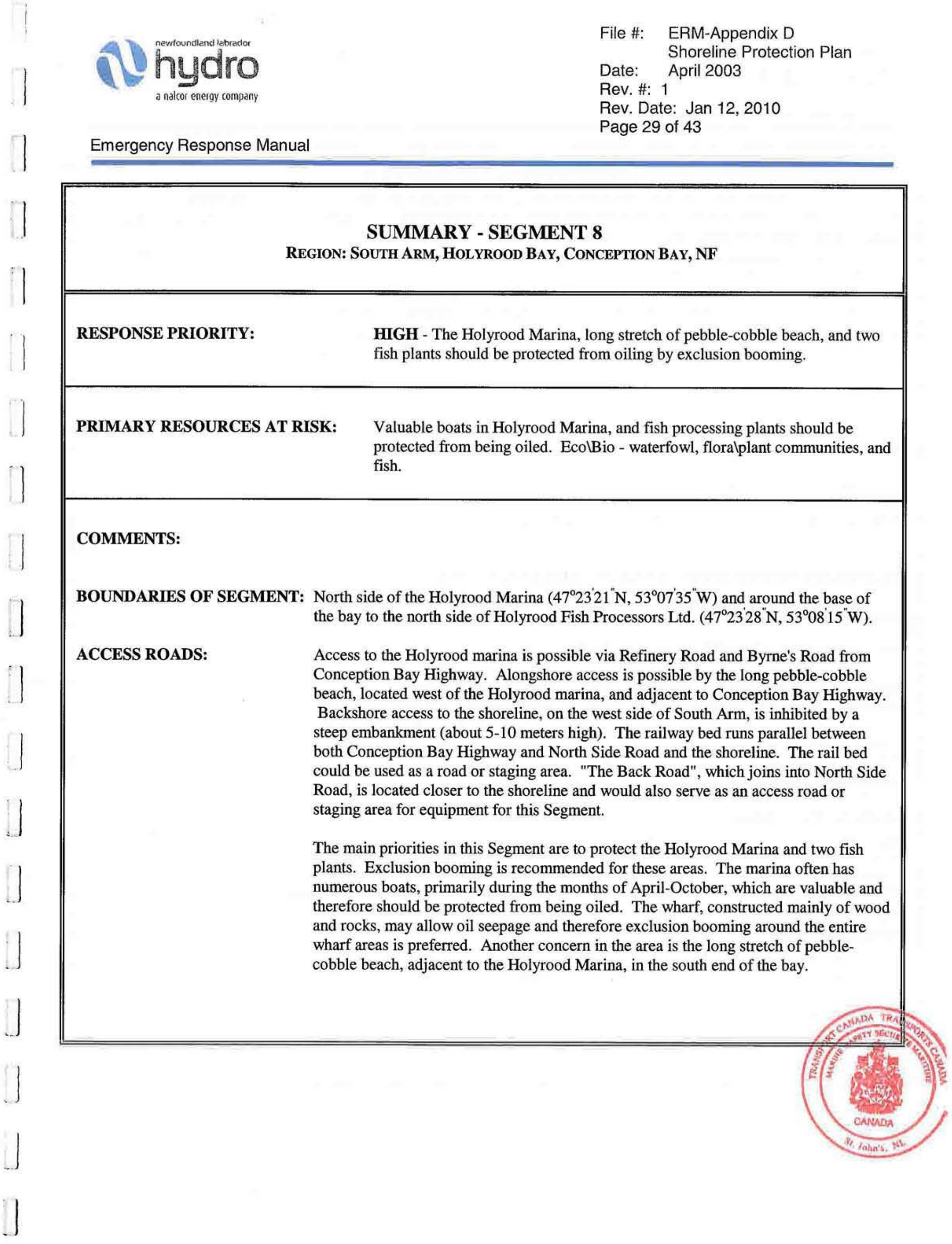
S1 Natural recovery	NR	S11 Mechanical recovery	R
S2 Flooding	NR	S12 Vegetation removal/Cropping	NR
S3 Low-pressure, cold water wash	O	S13 Passive sorbents	R
S4 Low-pressure, warm water wash	O	S14 Tilling/Aeration	NR
S5 High-pressure, cold water wash	O	S15 Surf washing/Sed. reworking	NR
S6 High-pressure, warm water wash	O	S16 Burning	I
S7 Steam cleaning	O	S17 Dispersants	R
S8 Sandblasting	NR	S18 Shoreline cleaners	R
S9 Manual removal	R	S19 Solidifers	O - Depending on oil type
S10 Vacuums	O	S20 Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	No
High tidal range	No	Staging areas available nearby	No - need construction
Narrow intertidal width	Yes	Shore zone suitable for machinery	No
Winter on-shore ice	Yes	Backshore cliff present	Yes - low cliff

Road access Yes - via steep embankment to Refinery Road or Ultramar property and by the Ultramar wharf access road.



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SUMMARY - SEGMENT 8

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF

RESPONSE PRIORITY: **HIGH** - The Holyrood Marina, long stretch of pebble-cobble beach, and two fish plants should be protected from oiling by exclusion booming.

PRIMARY RESOURCES AT RISK: Valuable boats in Holyrood Marina, and fish processing plants should be protected from being oiled. Eco\Bio - waterfowl, flora\plant communities, and fish.

COMMENTS:

BOUNDARIES OF SEGMENT: North side of the Holyrood Marina (47°23'21"N, 53°07'35"W) and around the base of the bay to the north side of Holyrood Fish Processors Ltd. (47°23'28"N, 53°08'15"W).

ACCESS ROADS: Access to the Holyrood marina is possible via Refinery Road and Byrne's Road from Conception Bay Highway. Alongshore access is possible by the long pebble-cobble beach, located west of the Holyrood marina, and adjacent to Conception Bay Highway. Backshore access to the shoreline, on the west side of South Arm, is inhibited by a steep embankment (about 5-10 meters high). The railway bed runs parallel between both Conception Bay Highway and North Side Road and the shoreline. The rail bed could be used as a road or staging area. "The Back Road", which joins into North Side Road, is located closer to the shoreline and would also serve as an access road or staging area for equipment for this Segment.

The main priorities in this Segment are to protect the Holyrood Marina and two fish plants. Exclusion booming is recommended for these areas. The marina often has numerous boats, primarily during the months of April-October, which are valuable and therefore should be protected from being oiled. The wharf, constructed mainly of wood and rocks, may allow oil seepage and therefore exclusion booming around the entire wharf areas is preferred. Another concern in the area is the long stretch of pebble-cobble beach, adjacent to the Holyrood Marina, in the south end of the bay.

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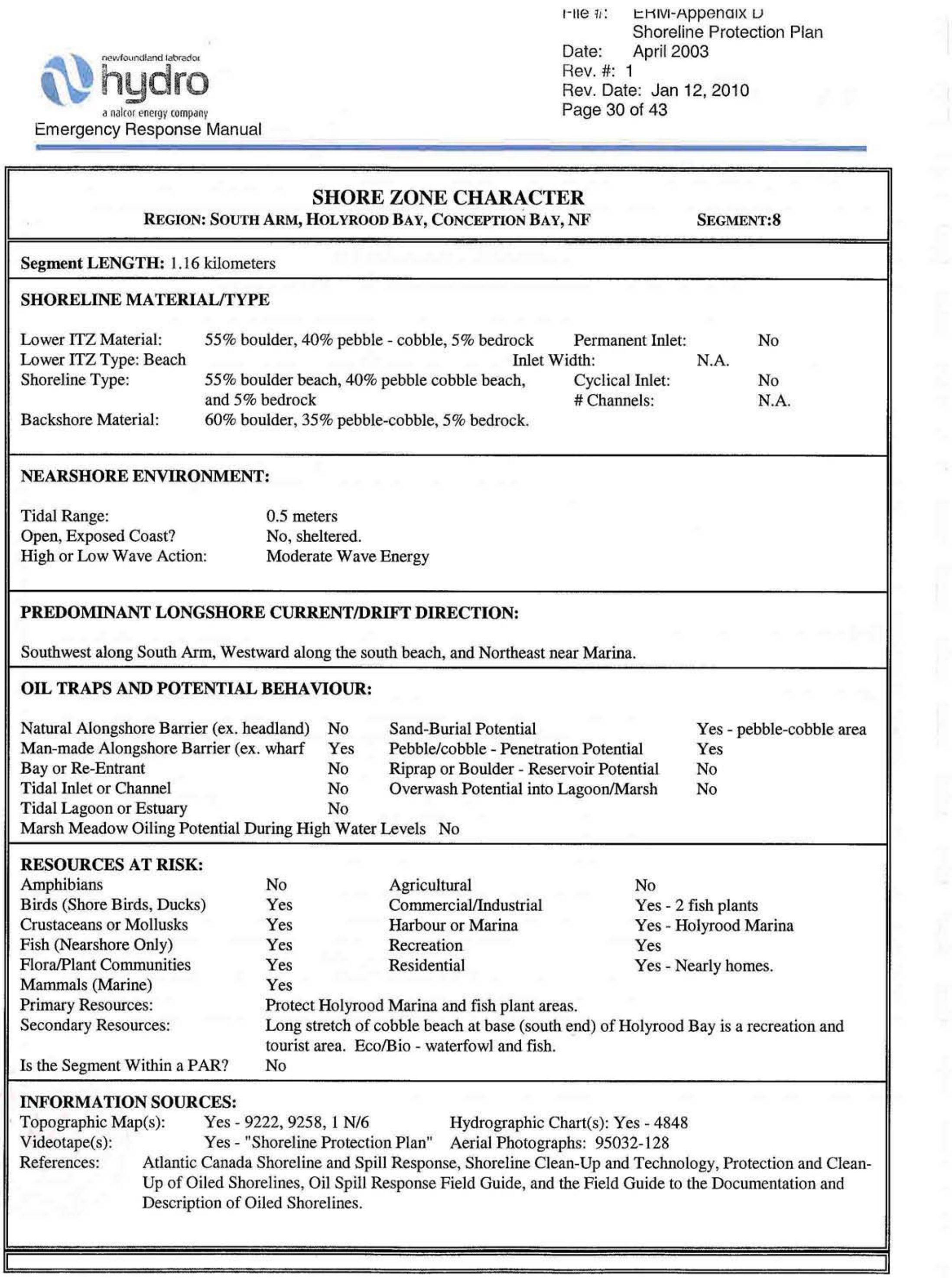
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL



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SHORE ZONE CHARACTER

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:8**

Segment LENGTH: 1.16 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material:	55% boulder, 40% pebble - cobble, 5% bedrock	Permanent Inlet:	No
Lower ITZ Type: Beach		Inlet Width:	N.A.
Shoreline Type:	55% boulder beach, 40% pebble cobble beach, and 5% bedrock	Cyclical Inlet:	No
		# Channels:	N.A.
Backshore Material:	60% boulder, 35% pebble-cobble, 5% bedrock.		

NEARSHORE ENVIRONMENT:

Tidal Range:	0.5 meters
Open, Exposed Coast?	No, sheltered.
High or Low Wave Action:	Moderate Wave Energy

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION:

Southwest along South Arm, Westward along the south beach, and Northeast near Marina.

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (ex. headland)	No	Sand-Burial Potential	Yes - pebble-cobble area
Man-made Alongshore Barrier (ex. wharf	Yes	Pebble/cobble - Penetration Potential	Yes
Bay or Re-Entrant	No	Riprap or Boulder - Reservoir Potential	No
Tidal Inlet or Channel	No	Overwash Potential into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		

Marsh Meadow Oiling Potential During High Water Levels No

RESOURCES AT RISK:

Amphibians	No	Agricultural	No
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	Yes - 2 fish plants
Crustaceans or Mollusks	Yes	Harbour or Marina	Yes - Holyrood Marina
Fish (Nearshore Only)	Yes	Recreation	Yes
Flora/Plant Communities	Yes	Residential	Yes - Nearly homes.
Mammals (Marine)	Yes		

Primary Resources: Protect Holyrood Marina and fish plant areas.
Secondary Resources: Long stretch of cobble beach at base (south end) of Holyrood Bay is a recreation and tourist area. Eco/Bio - waterfowl and fish.
Is the Segment Within a PAR? No

INFORMATION SOURCES:

Topographic Map(s): Yes - 9222, 9258, 1 N/6
Hydrographic Chart(s): Yes - 4848
Videotape(s): Yes - "Shoreline Protection Plan"
Aerial Photographs: 95032-128
References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.

SHORELINE PROTECTION

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT: 8**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore\resource(s) at risk within the Segment.	Yes
2. Minimize degree of contact with shore or resource(s) at risk.	Yes
3. Prevent contact with shore or resource(s) at risk in adjacent Segment(s).	No
4. Contain stranded oil at the shoreline.	No
5. Prevent oil transport into inlet, estuary, or channel.	No - but not into Marina area

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - away from shoreline
2. Prevent oil movement in channel(s) on flooding tides.	Yes - Marina area
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

PROTECTION - METHODS:

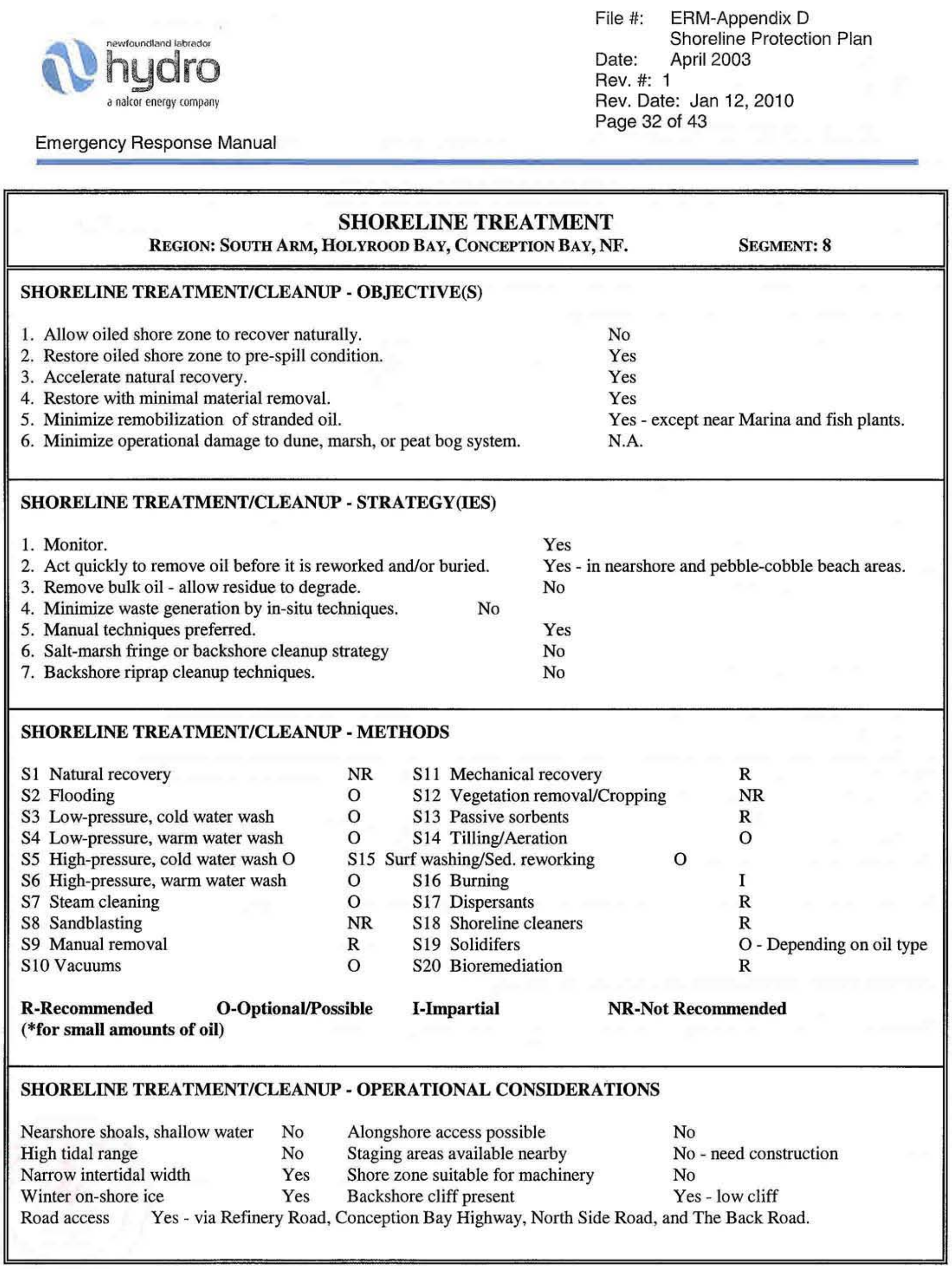
P1 Nearshore (on-water) containment and recovery.	O -near pebble-cobble beach area
P2 Nearshore redirection away from shore/recovery.	R - near fish plant and Marina areas
P3 Nearshore redirection towards shoreline containment/recovery.	O - away from Marina and fish plants
P4 Exclusion booming.	R - near fish plants and Marina areas
P5 Shoreline protection intertidal booming/recovery.	O
P6 Shoreline barrier or berms/recovery.	O - pebble-cobble beach
P7 Contact barriers.	O
P8 Channel boom or barriers/recovery.	NR

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present in nearshore
Direct backshore or alongshore access.	Yes - via Refinery Road, Conception Bay Highway, North side Road, and The Back Road.
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes

TRANSPORT CANADA TRANSPORTS CANADA MARINE SAFETY SÉCURITÉ MARITIME CANADA St. John's, NL



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SHORELINE TREATMENT

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF. **SEGMENT: 8**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally.	No
2. Restore oiled shore zone to pre-spill condition.	Yes
3. Accelerate natural recovery.	Yes
4. Restore with minimal material removal.	Yes
5. Minimize remobilization of stranded oil.	Yes - except near Marina and fish plants.
6. Minimize operational damage to dune, marsh, or peat bog system.	N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor.	Yes
2. Act quickly to remove oil before it is reworked and/or buried.	Yes - in nearshore and pebble-cobble beach areas.
3. Remove bulk oil - allow residue to degrade.	No
4. Minimize waste generation by in-situ techniques.	No
5. Manual techniques preferred.	Yes
6. Salt-marsh fringe or backshore cleanup strategy	No
7. Backshore riprap cleanup techniques.	No

SHORELINE TREATMENT/CLEANUP - METHODS

S1 Natural recovery	NR	S11 Mechanical recovery	R
S2 Flooding	O	S12 Vegetation removal/Cropping	NR
S3 Low-pressure, cold water wash	O	S13 Passive sorbents	R
S4 Low-pressure, warm water wash	O	S14 Tilling/Aeration	O
S5 High-pressure, cold water wash	O	S15 Surf washing/Sed. reworking	O
S6 High-pressure, warm water wash	O	S16 Burning	I
S7 Steam cleaning	O	S17 Dispersants	R
S8 Sandblasting	NR	S18 Shoreline cleaners	R
S9 Manual removal	R	S19 Solidifers	O - Depending on oil type
S10 Vacuums	O	S20 Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	No
High tidal range	No	Staging areas available nearby	No - need construction
Narrow intertidal width	Yes	Shore zone suitable for machinery	No
Winter on-shore ice	Yes	Backshore cliff present	Yes - low cliff

Road access Yes - via Refinery Road, Conception Bay Highway, North Side Road, and The Back Road.

SUMMARY - SEGMENT 9

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF

RESPONSE PRIORITY: LOW - Main concern is to prevent oiling of Segment 8 (Marina, pebble-cobble beach, and 2 fish plants) and to prohibit flow into North Arm.

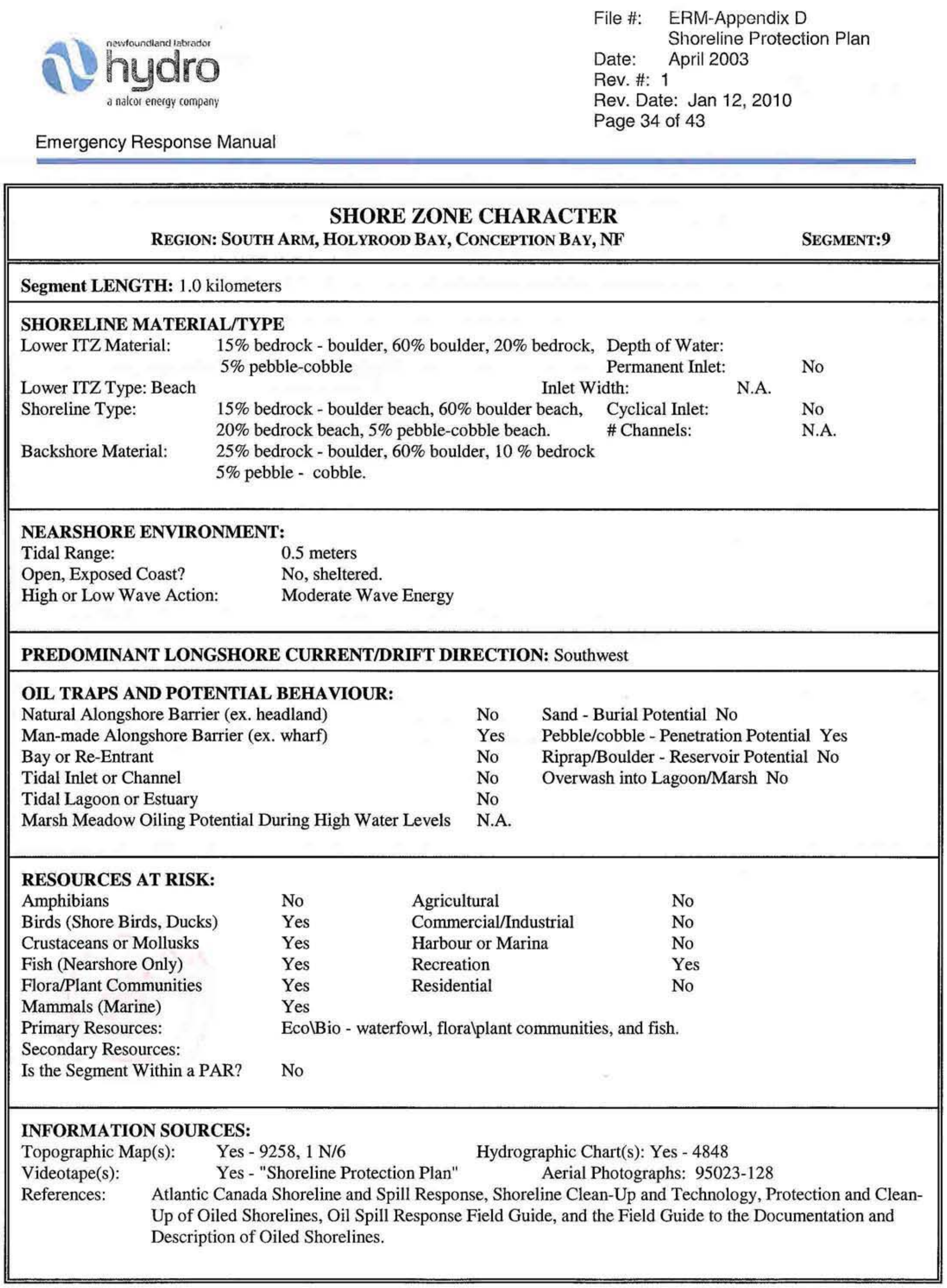
PRIMARY RESOURCES AT RISK: Eco\Bio - waterfowl, flora\plant communities, and fish.

COMMENTS:

BOUNDARIES OF SEGMENT: From the north side of Holyrood Fish Processors Ltd. (47°23'28"N, 53°08'15"W) and extends northward to Joy's Point (47°23'58"N, 53°08'25"W), the tip of South Arm

ACCESS ROADS: Shoreline access is possible via a steep embankment (5 meters) to North Side Road. The railway bed runs between North Side Road and the shoreline which can serve as an alternative road or equipment staging area. Alongshore access is difficult due to boulder and bedrock areas.

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL



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SHORE ZONE CHARACTER

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:9**

Segment LENGTH: 1.0 kilometers

SHORELINE MATERIAL/TYPE

Lower ITZ Material: 15% bedrock - boulder, 60% boulder, 20% bedrock, 5% pebble-cobble
Lower ITZ Type: Beach
Shoreline Type: 15% bedrock - boulder beach, 60% boulder beach, 20% bedrock beach, 5% pebble-cobble beach.
Backshore Material: 25% bedrock - boulder, 60% boulder, 10 % bedrock 5% pebble - cobble.

Depth of Water:
Permanent Inlet: No
Inlet Width: N.A.
Cyclical Inlet: No
Channels: N.A.

NEARSHORE ENVIRONMENT:

Tidal Range: 0.5 meters
Open, Exposed Coast? No, sheltered.
High or Low Wave Action: Moderate Wave Energy

PREDOMINANT LONGSHORE CURRENT/DRIFT DIRECTION: Southwest

OIL TRAPS AND POTENTIAL BEHAVIOUR:

Natural Alongshore Barrier (ex. headland)	No	Sand - Burial Potential	No
Man-made Alongshore Barrier (ex. wharf)	Yes	Pebble/cobble - Penetration Potential	Yes
Bay or Re-Entrant	No	Riprap/Boulder - Reservoir Potential	No
Tidal Inlet or Channel	No	Overwash into Lagoon/Marsh	No
Tidal Lagoon or Estuary	No		
Marsh Meadow Oiling Potential During High Water Levels	N.A.		

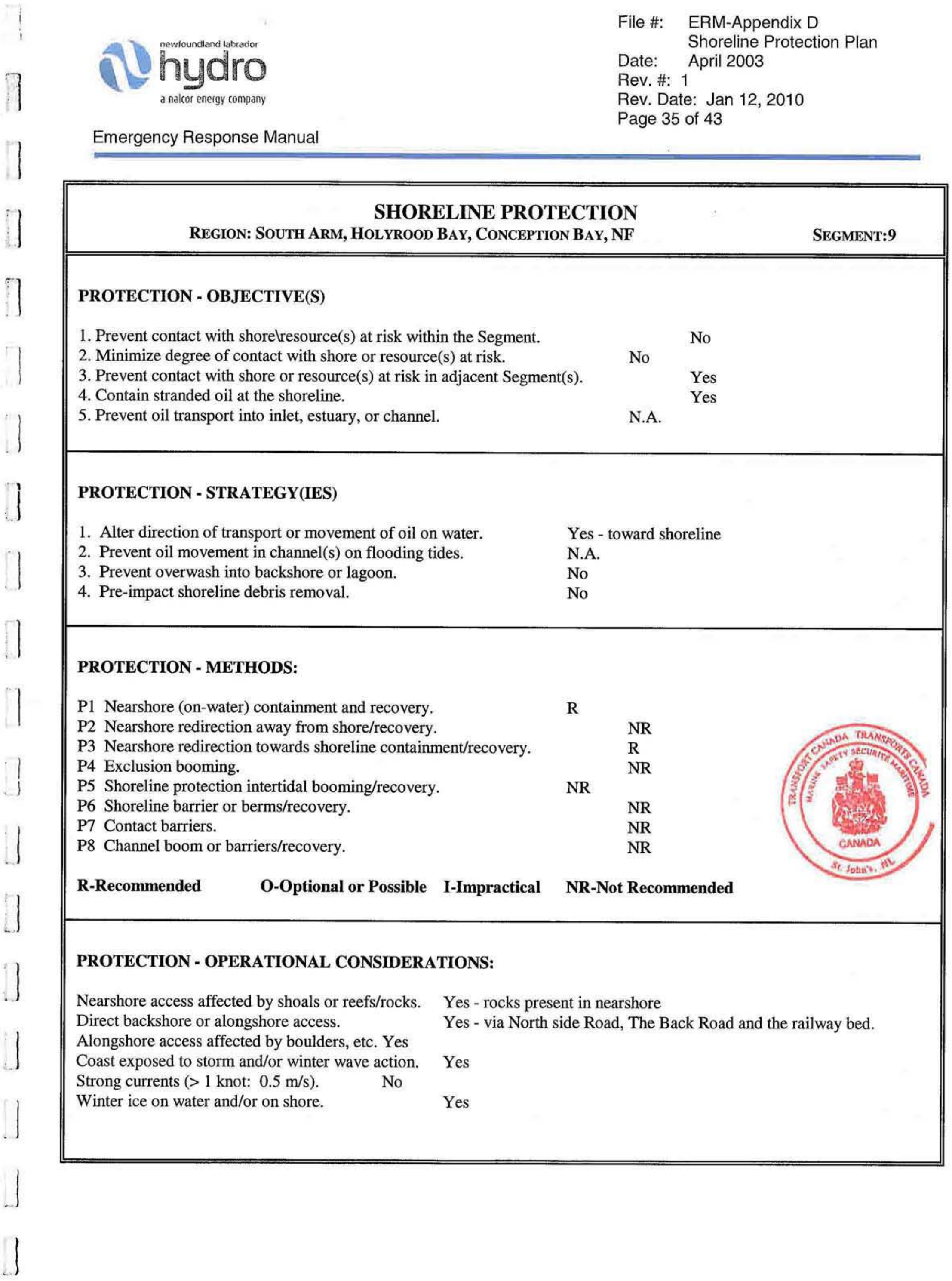
RESOURCES AT RISK:

Amphibians	No	Agricultural	No
Birds (Shore Birds, Ducks)	Yes	Commercial/Industrial	No
Crustaceans or Mollusks	Yes	Harbour or Marina	No
Fish (Nearshore Only)	Yes	Recreation	Yes
Flora/Plant Communities	Yes	Residential	No
Mammals (Marine)	Yes		

Primary Resources: Eco\Bio - waterfowl, flora\plant communities, and fish.
Secondary Resources:
Is the Segment Within a PAR? No

INFORMATION SOURCES:

Topographic Map(s): Yes - 9258, 1 N/6
Hydrographic Chart(s): Yes - 4848
Videotape(s): Yes - "Shoreline Protection Plan"
Aerial Photographs: 95023-128
References: Atlantic Canada Shoreline and Spill Response, Shoreline Clean-Up and Technology, Protection and Clean-Up of Oiled Shorelines, Oil Spill Response Field Guide, and the Field Guide to the Documentation and Description of Oiled Shorelines.



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SHORELINE PROTECTION

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF **SEGMENT:9**

PROTECTION - OBJECTIVE(S)

1. Prevent contact with shore\resource(s) at risk within the Segment.	No
2. Minimize degree of contact with shore or resource(s) at risk.	No
3. Prevent contact with shore or resource(s) at risk in adjacent Segment(s).	Yes
4. Contain stranded oil at the shoreline.	Yes
5. Prevent oil transport into inlet, estuary, or channel.	N.A.

PROTECTION - STRATEGY(IES)

1. Alter direction of transport or movement of oil on water.	Yes - toward shoreline
2. Prevent oil movement in channel(s) on flooding tides.	N.A.
3. Prevent overwash into backshore or lagoon.	No
4. Pre-impact shoreline debris removal.	No

PROTECTION - METHODS:

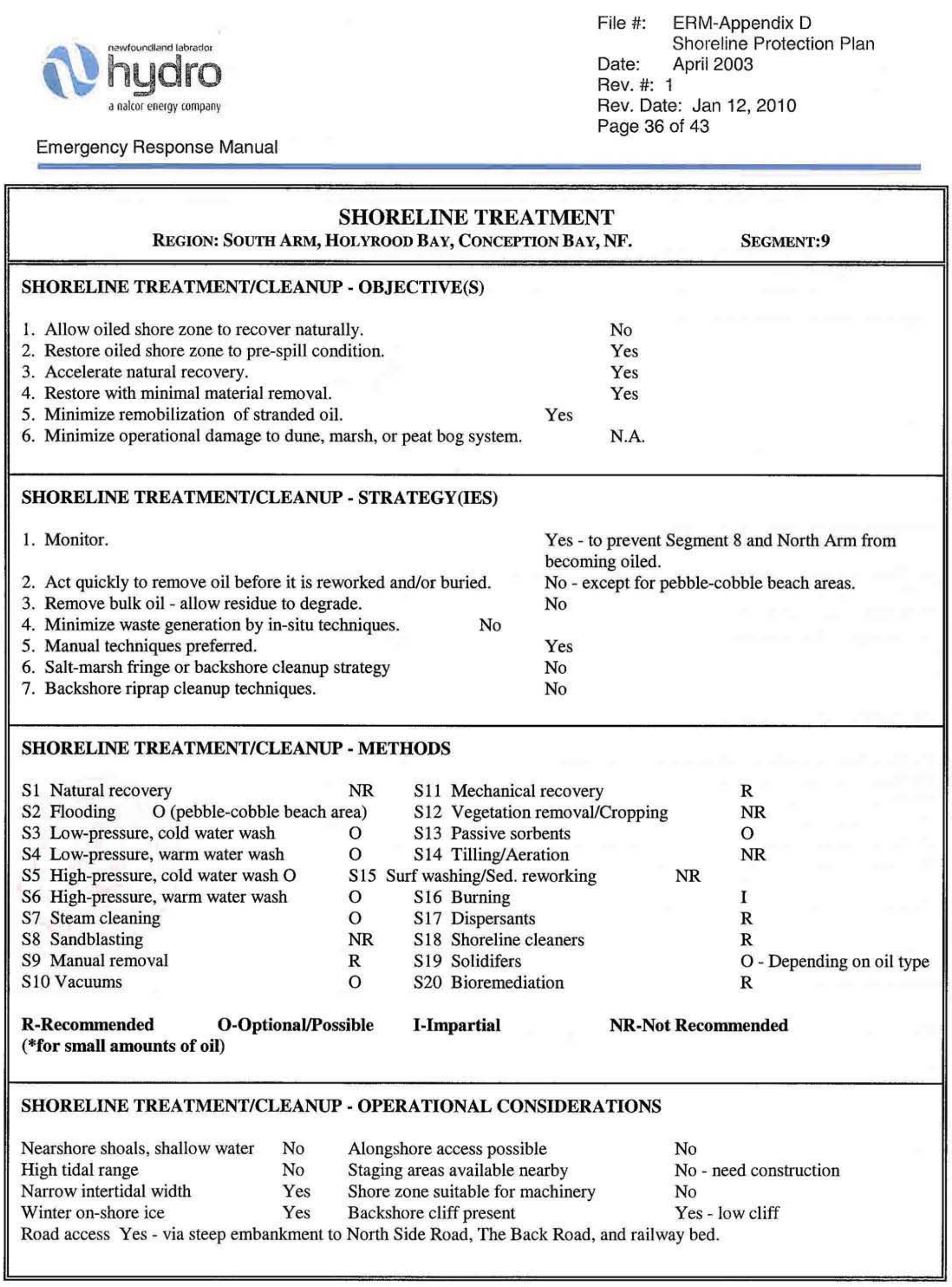
P1 Nearshore (on-water) containment and recovery.	R
P2 Nearshore redirection away from shore/recovery.	NR
P3 Nearshore redirection towards shoreline containment/recovery.	R
P4 Exclusion booming.	NR
P5 Shoreline protection intertidal booming/recovery.	NR
P6 Shoreline barrier or berms/recovery.	NR
P7 Contact barriers.	NR
P8 Channel boom or barriers/recovery.	NR

R-Recommended **O-Optional or Possible** **I-Impractical** **NR-Not Recommended**

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL

PROTECTION - OPERATIONAL CONSIDERATIONS:

Nearshore access affected by shoals or reefs/rocks.	Yes - rocks present in nearshore
Direct backshore or alongshore access.	Yes - via North side Road, The Back Road and the railway bed.
Alongshore access affected by boulders, etc.	Yes
Coast exposed to storm and/or winter wave action.	Yes
Strong currents (> 1 knot: 0.5 m/s).	No
Winter ice on water and/or on shore.	Yes



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SHORELINE TREATMENT

REGION: SOUTH ARM, HOLYROOD BAY, CONCEPTION BAY, NF. **SEGMENT:9**

SHORELINE TREATMENT/CLEANUP - OBJECTIVE(S)

1. Allow oiled shore zone to recover naturally.	No
2. Restore oiled shore zone to pre-spill condition.	Yes
3. Accelerate natural recovery.	Yes
4. Restore with minimal material removal.	Yes
5. Minimize remobilization of stranded oil.	Yes
6. Minimize operational damage to dune, marsh, or peat bog system.	N.A.

SHORELINE TREATMENT/CLEANUP - STRATEGY(IES)

1. Monitor.	Yes - to prevent Segment 8 and North Arm from becoming oiled.
2. Act quickly to remove oil before it is reworked and/or buried.	No - except for pebble-cobble beach areas.
3. Remove bulk oil - allow residue to degrade.	No
4. Minimize waste generation by in-situ techniques.	No
5. Manual techniques preferred.	Yes
6. Salt-marsh fringe or backshore cleanup strategy	No
7. Backshore riprap cleanup techniques.	No

SHORELINE TREATMENT/CLEANUP - METHODS

S1 Natural recovery	NR	S11 Mechanical recovery	R
S2 Flooding	O (pebble-cobble beach area)	S12 Vegetation removal/Cropping	NR
S3 Low-pressure, cold water wash	O	S13 Passive sorbents	O
S4 Low-pressure, warm water wash	O	S14 Tilling/Aeration	NR
S5 High-pressure, cold water wash	O	S15 Surf washing/Sed. reworking	NR
S6 High-pressure, warm water wash	O	S16 Burning	I
S7 Steam cleaning	O	S17 Dispersants	R
S8 Sandblasting	NR	S18 Shoreline cleaners	R
S9 Manual removal	R	S19 Solidifers	O - Depending on oil type
S10 Vacuums	O	S20 Bioremediation	R

R-Recommended **O-Optional/Possible** **I-Impartial** **NR-Not Recommended**
(*for small amounts of oil)

SHORELINE TREATMENT/CLEANUP - OPERATIONAL CONSIDERATIONS

Nearshore shoals, shallow water	No	Alongshore access possible	No
High tidal range	No	Staging areas available nearby	No - need construction
Narrow intertidal width	Yes	Shore zone suitable for machinery	No
Winter on-shore ice	Yes	Backshore cliff present	Yes - low cliff

Road access Yes - via steep embankment to North Side Road, The Back Road, and railway bed.

Shoreline Protection Plan For Holyrood Bay

This section of the Oil Pollution Emergency Plan is intended to describe a shoreline protection plan for the areas of Holyrood Bay which would likely be affected in the event of an oil spill from the Newfoundland and Labrador Hydro oil handling facility. The area described is from the Indian Pond inlet, along the east side and base of Holyrood Bay, to Joy's Point, the tip of South Arm. Following is some information on the priority areas for oil spill response.

To adequately describe the area of concern it has been divided into nine Segments. A map of Holyrood Bay and each individual segment is on page 42. These Segments were divided by permanent sites such as the Hydro and Ultramar wharfs, and points which are distinguishable when on water. Road access routes to these areas are important for quick response. These roads are therefore indicated on map No.2, titled "Road Access Routes to the Holyrood Bay Area", on page 43. A description of each of the nine segments, including access roads and boundaries, and an environmental description consisting of an overall segment summary and three description sheets, is included.

Summary of High Priority Areas

The main areas of concern for Holyrood Bay are the Indian Pond area, Holyrood Marina, and two fish plants located on the west side of South Arm. These areas are considered "High Priority Areas" due to the environmental and economic impacts that oiling would cause. It is recommended that exclusion booming be used in these areas to prevent them from being oiled. Each high priority area is further discussed in the Segment descriptions which follow.

Common Environmental Concerns for the Holyrood Bay Area

Environmental concerns for many of the nine Segments are essentially the same. For instance, the waterfowl for Holyrood Bay consist primarily of the herring gull, black guillemot, great black backed gull, ducks (black ducks, mallards, scoters, etc.), turrs, murrs, dovekies, puffins, razorbills, gannets, tetrels, and terns. Mammals in the area are mainly whales, seals, and porpoises. There is little threat to mammals since Holyrood Bay is not a breeding ground for the mammals mentioned, and they are not typically seen for most of the year. Plant/flora communities are found mainly near shore in bedrock/boulder areas in the upper intertidal zone. These flora/plant communities are usually kelps (cabbage kelp, finger kelp, ribbon kelp, and colander kelp), rockweeds (knotted rockweed), and red seaweeds (irish moss, dulse, laver, corraline algae, and redweed). Crustaceans/mollusks are also found along the rocky shorelines such as the boulder beaches and bedrock cliffs and consist mainly of mussels, clams, snails, and sea urchins. Many species of fish can be found at different locations along the shoreline in Holyrood Bay. The species of fish include lobster, capelin, squid, cod, herring, and salmon.

All the species mentioned, and those that are present but not mentioned, are environmental concerns for the Holyrood Bay area. Only the species most at risk will be mentioned in the following Segment descriptions.

Segment 1 - Indian Pond Inlet to Boom Anchoring Point A

The borders of Segment 1 are the north side of Indian Pond inlet (47°27'37"N, 53°05'21"W) and extends southward to the Boom Anchoring Point A located in front of the Hydro oil-tank farm at 47°27'05"N, 53°06'05"W. This Segment is approximately 1.4 kilometres in length and is classified as cobble-boulder beach, except for 1 small area of cobble beach. The backshore material consists of boulders, cobble, and gravel.

This area is considered a high priority area due to the Indian Pond inlet. Oil should be prevented from passing under the trussel and entering into Indian Pond, which contains fish and is a gathering site for waterfowl. The Indian Pond area is composed of about 80% pebble-cobble beach and 20% boulder beach. Some small boats are anchored in this area, during the summer months, and two small wooden wharfs are also present. Quarry Brook enters the inlet on the east side of the pond. Indian Pond is also the water intake site for condensers for the Hydro Thermal Generating Station. Other environmental concerns are for flora/plant and crustacean/mollusk communities. The most common fish species are lobster and cod.

The railway bed runs parallel, at about 10-20 meters, to the shoreline and serves as the main access road. The trussel at Indian Pond must be repaired, a road placed over the existing steel beams, before access from the north portion of the Segment is possible. The railway bed can be accessed at the north end of the Segment via Seal Cove Road, by the Hydro wharf access road at the south end, or if necessary a road could be constructed through the Hydro property to the middle of the Segment.

Segment 2 - Boom Anchoring Point to Hydro Wharf

The borders of Segment 2 are from Boom Anchoring Point A (47°27'05"N, 53°06'05"W), located in front of the Hydro oil tank farm, southward to the north side of the Hydro oil off-loading wharf (47°26'38"N, 53°06'21"W). This Segment is about 0.9 kilometres in length and consists of approximately 40% low bedrock cliff, 40% cobble-boulder beach, and 20% boulder beach. Backshore material is 5% cobble, 40% boulder, and 55% bedrock.

This area can be classified as a low priority area since there is no structure or area present which requires immediate attention. Environmental concerns for this area is mainly waterfowl and fish (lobster). Flora/plant communities, along with mussels, are also concerns in rocky areas.

The railway bed runs parallel, at about 15-30 meters, to the shoreline and serves as the main access road. Again, the trussel at Indian Pond inlet must undergo construction before it can be crossed to/from Seal Cove Road. Another access to the railway bed is the Hydro wharf access road, and if necessary a road can be constructed from the railway bed to the Hydro property at a desired location.

Segment 3 - Hydro Wharf to Boom Anchoring Point #1
Segment 4 - Boom Anchoring Point #1 to Boom Anchoring Point #2
Segment 5 - Boom Anchoring Point #2 to Boom Anchoring Point #3

The boundaries for Segment 3 are the north side of the Hydro oil off-loading wharf (47^{0}26'38"N, 53°6'21"W) to Boom Anchoring Point No.1 (47°26'10°N, 53°06'33"W). The borders of Segment 4 are the Boom Anchoring Point No.1 (47°26'10"N, 53°06'33"W) southward to Boom Anchoring Point No.2 (47°25'39"N, 53°06'50"W), while Segment 5 is from Boom Anchoring Point No.2 (47°25'39"N, 53^{0}06'50"W) southward to Boom Anchoring Point No.3 (47°25'02"N, 53°07'11"W). The shoreline lengths of Segments 3,4, and 5 are 0.9, 1.2, and 1.3 kilometres respectively. The shoreline type for these areas is low bedrock cliff with the backshore being composed of bedrock and boulder.

These areas can be classified as low priority areas since there are no structures or areas which require immediate attention. Environmental concerns for this area are mainly waterfowl and fish (capelin and lobster). Flora/plant communities, along with mussels, are also concerns in rocky areas.

The railway bed runs parallel, at about 15-40 meters, to the shoreline and serves as the main access road for these Segments. Easy access to the railway bed is possible via the Hydro oil off-loading wharf access road. Other possible roads to the railway bed from Conception Bay Highway include Duff's Crescent and O'Roukes Road. However, some construction would be needed to improve the latter portion of Duff's Crescent since only a trail presently exists adjacent to private property.

Direct backshore access to all these Segments is currently inhibited by a thick forested area and steep embankment between the shoreline and the railway bed. Construction, in the form of tree-cutting, landfill, and heavy equipment operation, would be required to provide an access road or staging area.

Segment 6 - Boom Anchoring Point #3 to the Ultramar Wharf

The borders of Segment 6 is from Hydro's most southerly Boom Anchoring Point (47°25'02"N, 53°07'11"W) and extends southward to the north side of the Ultramar oil off-loading wharf (47°23'48"N, 53°07'28"W). The shoreline length is about 2.23 kilometres. This area is composed of approximately 80% low bedrock cliff, 15% boulder beach, and 5% cobble beach. Backshore material has a similar ratio.

This area is considered a low priority area since the only structure present is a beach home located near in the northern portion of the Segment (47°24'46"N, 53°07'13"W). Due to the rocky shoreline, composed of bedrock and boulders, and narrow intertidal zone, there is essentially no threat to the residential area. Environmental concerns for this area are mainly waterfowl and fish (capelin and lobster). Flora/plant communities, along with mussels, are also concerns in rocky areas.

The railway bed runs parallel to this Segment, at about 15-50 meters away from the shoreline, and access to the railway bed is possible via O'Roukes Road, Brien's Road, and the Ultramar property (by Refinery Road). Direct backshore access is difficult, except at the residential area, in the northern portion of the Segment, since a thick forested area and steep embankment are present. Backshore access to the southern portion of the Segment is possible through the Ultramar property but a steep embankment, from 5-15 meters, exists in this area.

Segment 7 - Ultramar Wharf to North Side of Holyrood Marina

Segment 7 is from the north side of the Ultramar oil off-loading wharf (47°23'48"N,53°07'28"W) and extends southward to the north side of the Holyrood Marina (47°23'21"N,53°07'35"W). The shoreline is 0.85 kilometres in length and is composed of 85% boulder beach and 15% cobble beach. The backshore material consists of about 90% boulder and 10% cobble.

This Segment is considered a low priority area since there are no structures that require prompt attention. The Ultramar oil off-loading wharf is constructed of wooden logs and rock which oil can penetrate and exist for long periods of time. Therefore this area may require extra attention. The main environmental concern is for waterfowl, which gather near the small stream which runs into Holyrood Bay.

Access to this area is possible via Refinery Road and the Ultramar property and wharf access road. A steep embankment exists between the access roads and the shoreline and therefore boom trucks or cranes would be necessary if heavy equipment is to be mobilized. The access roads range from 8-15 meters from the shoreline.

Segment 8 - Holyrood Marina to North Side of Fish Plant (Holyrood Fish Processors Ltd.)

Segment 8 is from the north side of the Holyrood Marina (47°23'21"N,53°07'35"W) and extends to the north side of the Holyrood Fish Processor's Fish Plant (47°23'28"N, 53°08'15"W) on the west side of South Arm. The length of this Segment is about 1.61 kilometres with the shoreline consisting of approximately 55% boulder beach, 40% pebble-cobble beach, and 5% bedrock beach. The backshore material is made up of 60% boulder, 35% pebble-cobble, and 5% bedrock.

This area is classified as a high priority area due to the Holyrood Marina, two fish plants, and a long stretch of pebble-cobble beach at the south end of Holyrood Bay. The pebble-cobble beach is used for recreation and can be considered a tourist area. Maher's River runs into the Holyrood Marina and therefore an environmental concern is present for fresh water species (especially fish) in this area. The Marina often contains many valuable boats and the fish plants process food. Therefore these areas should be protected from oil contamination, preferably by exclusion booming. Environmental concerns are primarily to protect the waterfowl and harvesting areas of capelin and squid.

The wharfs for the Holyrood Marina and fish plants are wooden and filled with rocks. Oil can therefore penetrate the wharfs and exist for long periods of time. To prevent this potential problem, exclusion booming around the entire wharf areas is recommended.

Access to the Holyrood Marina is possible via Refinery Road and Brien's Road, the pebble-cobble beach at the base of South Arm by Conception Bay Highway, and the west side of South Arm by North Side Road. "The Back Road" branches from North Side Road and runs closer to the shoreline for a portion of this Segment. The railway bed also runs parallel to the shoreline and may be used as an equipment staging area or a possible access road.

Segment 9 - North Side of Fish Plant to Joy's Point

This Segment begins on the north side of the Holyrood Fish Processors Ltd. - Fish Plant (47°23'28"N, 53°08'15"W) and extends northward to include Joy's Point (47°23'58"N, 53°08'25"W), the tip of South Arm. This Segment is approximately 1 kilometer in length with the shoreline type consisting of 60% boulder beach, 20% bedrock beach, 15% bedrock-boulder beach, and 5% pebble-cobble beach. The backshore material is composed of 25% bedrock-boulder, 60% boulder, 10% bedrock and 5% pebble-cobble.

This is a low priority area since there are no areas or structures within this Segment which require prompt attention. The environmental concerns in this Segment are waterfowl and fish (cod and capelin). An effort should be made to contain oil on the south side of Joy's Point to prevent oil from flowing into North Arm.

The main access road to this Segment is North Side Road. The railway bed, which runs between 10-20 meters of the shoreline, can also be used as an access road or staging area.

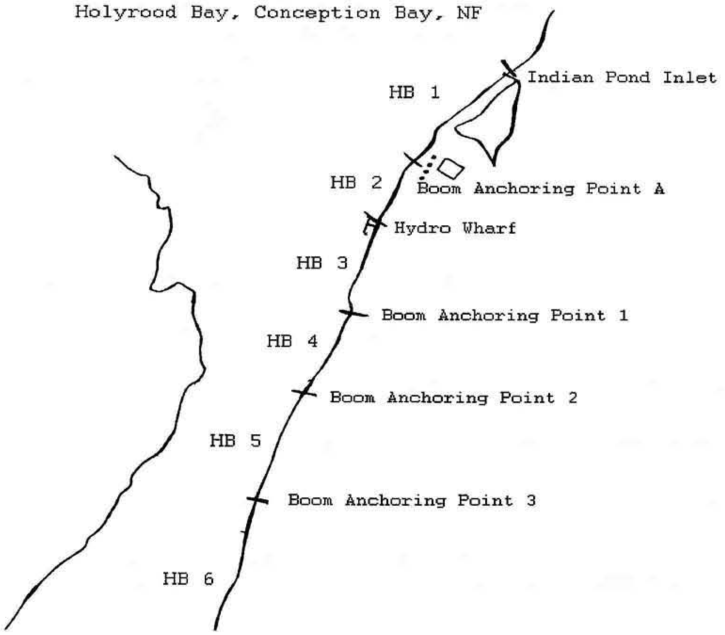
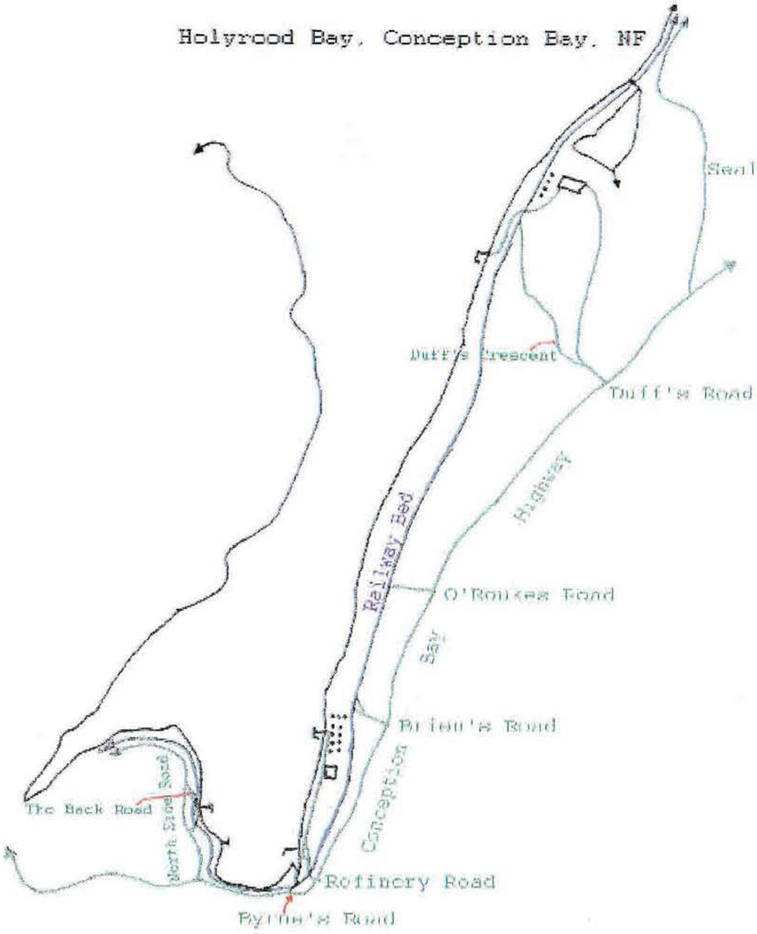


Figure 1 - Segment Boundaries

The figure above outlines how the area of concern, the most probable area of Holyrood Bay which would be affected in the event of an oil spill from the Hydro and Ultramar oil storage facilities, was divided into segments. Permanent sites (including latitudes and longitudes), such as the Hydro and Ultramar wharf, were chosen to be segment boundaries.



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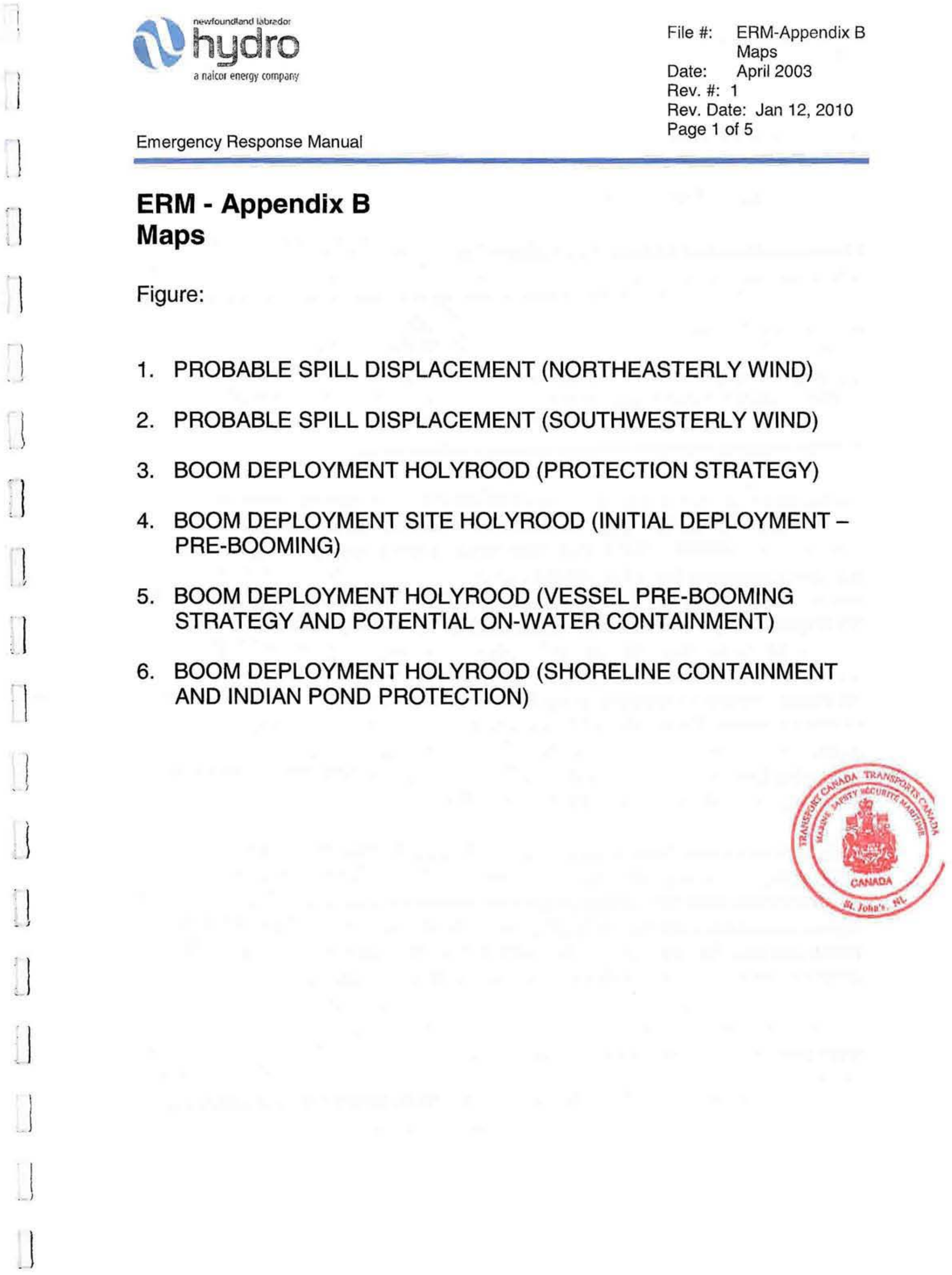
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL

Figure 2 - Road Access Routes to the Holyrood Bay Area

The figure above outlines the possible access roads for the various segments which were shown on the previous page.



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ERM - Appendix B
Maps

Figure:

1. PROBABLE SPILL DISPLACEMENT (NORTHEASTERLY WIND)
2. PROBABLE SPILL DISPLACEMENT (SOUTHWESTERLY WIND)
3. BOOM DEPLOYMENT HOLYROOD (PROTECTION STRATEGY)
4. BOOM DEPLOYMENT SITE HOLYROOD (INITIAL DEPLOYMENT – PRE-BOOMING)
5. BOOM DEPLOYMENT HOLYROOD (VESSEL PRE-BOOMING STRATEGY AND POTENTIAL ON-WATER CONTAINMENT)
6. BOOM DEPLOYMENT HOLYROOD (SHORELINE CONTAINMENT AND INDIAN POND PROTECTION)

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CANADA
St. John's, NL

Probable Spill Displacement

The two significant factors which affect the transport of spilled oil on the water surface are wind and surface current. The wind generates a current component directed 10° to the right of the wind in the northern hemisphere and having a magnitude of approximately 3.5% of the wind speed. In addition, the presence of a surface current displaces any point on the surface in the direction of the current at 100% of the current speed. The surface current itself is typically a super positioning of tidal, density driven, and long term periodic motions. The net transport is due to the sum of the surface current and wind-driven current components.

Winds at St. John's airport can be considered generally representative of winds over Conception Bay, although speeds over water can typically be 20% or more greater than those over land. Winds over Conception Bay are predominantly from the southwest in summer and from the west the remainder of the year. Northeasterly and easterly winds in the area occur most frequently in the fall and winter and are generally associated with storms. Monthly mean winds (at St. John's airport) range from 11 to 15 knots, with monthly maximum hourly speeds ranging from 36 to 74 knots. Winds - particularly southwest winds - near the Newfoundland Hydro Holyrood Generating Station are increased in speed due to funnelling which occurs in Holyrood Bay. Funnelling also occurs further down the bay, along the Bell Island Tickle, where winds can be 15 to 25 knots stronger than in other parts of the Bay.

Although work has been carried out to investigate the circulation in Conception Bay (e.g. deYoung and Sanderson, 1995) information for Holyrood Bay and nearshore in the immediate vicinity of the Newfoundland Hydro Holyrood Generating Station is minimal. A review of the work of deYoung and Sanderson (1995), which included data from 1988 to 1991, indicates that there is a relatively weak mean circulation pattern, and that there is much temporal and spatial variability within Conception Bay. Mean current velocities are less than 2 cm/s (0.04 knots) and the mean is less than the standard deviation of the surface currents, 2 - 11 cm/s (0.04 - 0.2 knots). Persistent outflowing currents on the eastern side of the Bay are as high as 20-30 cm/s (0.4 - 0.6 knots). Current direction data obtained from a current meter moored approximately 5 km offshore from

Seal Cove indicates a mean flow directed shorewards. Observations at other nearshore moorings indicated that flow is guided by the coastal topography and bathymetry in the bay and so runs parallel with the shore in a southwesterly direction in the area of the Holyrood Generating Station. These motions are consistent with other findings in the study that suggest an anticyclonic (clockwise) circulation at the head of Conception Bay. Tidal currents are weak in the bay.

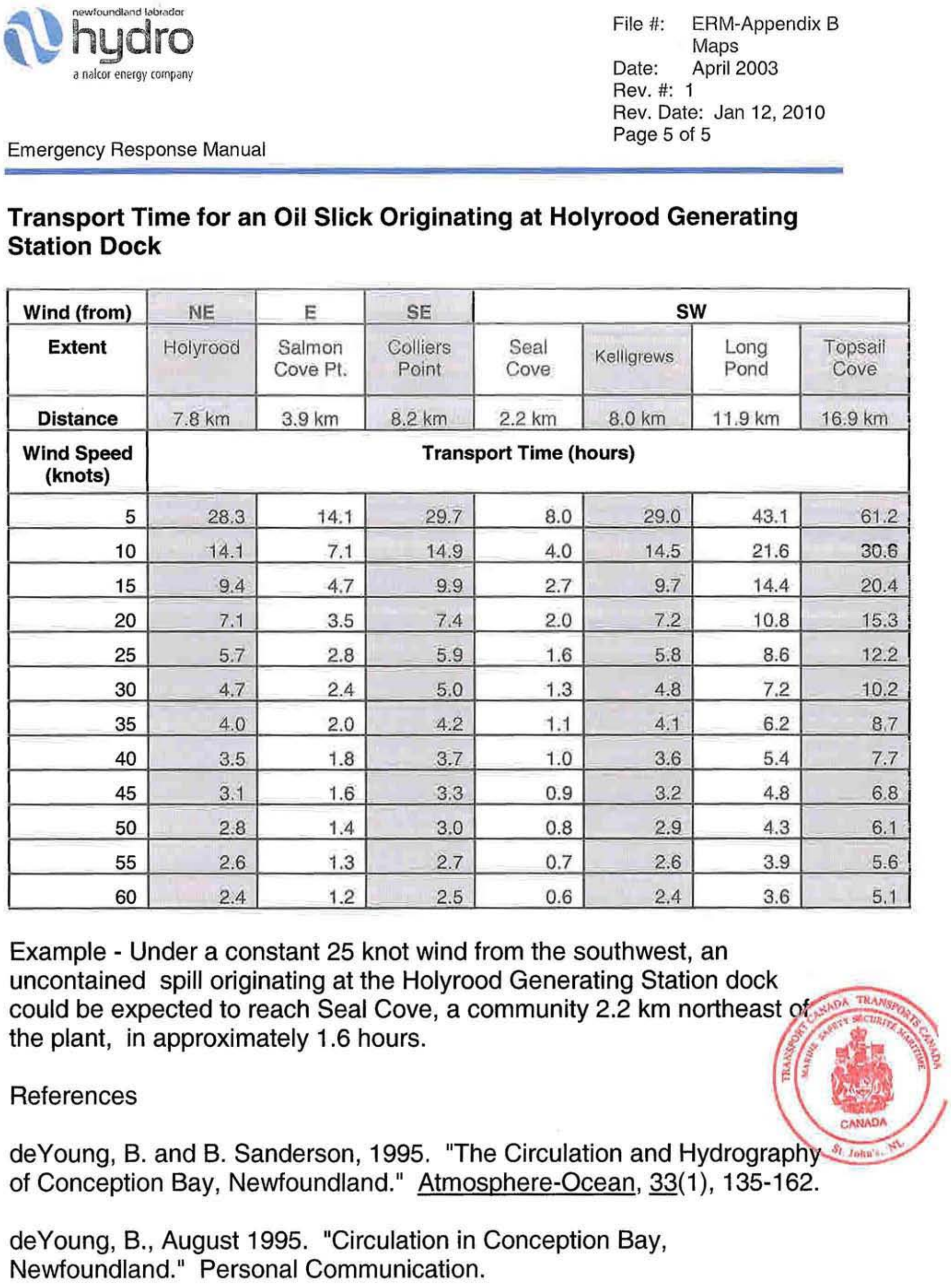
As a further indicator of displacement of oil pollution on the surface of the water, residence times can be used. As defined by deYoung and Sanderson (1995), the residence time is the point at which 50% of an initial mass has left Conception Bay. deYoung has suggested (1995) that residence times estimated at approximately 30 days in their original work (deYoung and Sanderson, 1995) should, in fact, be in the range of 10 to 15 days. Residence times nearer the mouth of the bay will certainly be less than this.

The movement of any marine oil spill at the Newfoundland Hydro Holyrood Generating Station can, therefore, be expected to be driven predominantly by local winds and, to a lesser extent, by surface currents. The most likely scenario is that at the time of a spill, the wind will be blowing from the west or southwest and will be moderate to strong. This wind will transport the oil northward along the eastern shore of Conception Bay towards the community of Conception Bay South and will keep the oil near shore. The weak surface currents acting in the opposite direction will tend to slow the wind driven motion and will also tend to keep the oil near shore. If the wind speed is very light (<15 knots), the surface current may be sufficient to move the oil slowly in the opposite direction toward the head of Holyrood Bay. If the wind is from the north or northeast, the oil can be expected to move quickly to the head of Holyrood Bay driven by both the wind and the surface current and to spread out into the Bay from the eastern shore.

A slick originating from a spill of Bunker C oil can also be expected to increase in density due to evaporation of light components and cooling over a period of hours to days which may result in its submerging below the surface of the water or even sinking to the ocean bottom. The rate at which this occurs depends heavily on the environmental conditions, particularly water and air temperature together with wind and wave action.

In general, this will occur more rapidly in cold, stormy winter conditions than in mild, calm summer conditions.

The following table estimates theoretical transport times for oil originating from a marine spill at the Holyrood Generating Station to reach landmarks or communities in the area under frequently occurring wind conditions. The values calculated in this table are based on the premise that the wind blows constantly from the same direction and at the same speed over the period and that the slick remains on the surface of the water. In reality, these conditions are not typical. Wind direction will normally vary to some degree under the same speed conditions with the result that the slick will take actually take longer to reach the destinations than the times calculated above. Furthermore, ocean currents will also affect oil slick transport. Appropriate judgment should be applied in using this information.



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Transport Time for an Oil Slick Originating at Holyrood Generating Station Dock

Wind (from)	NE	E	SE	**SW**			
Extent	Holyrood	Salmon Cove Pt.	Colliers Point	Seal Cove	Kelligrews	Long Pond	Topsail Cove
Distance	7.8 km	3.9 km	8.2 km	2.2 km	8.0 km	11.9 km	16.9 km
Wind Speed (knots)	**Transport Time (hours)**						
5	28.3	14.1	29.7	8.0	29.0	43.1	61.2
10	14.1	7.1	14.9	4.0	14.5	21.6	30.6
15	9.4	4.7	9.9	2.7	9.7	14.4	20.4
20	7.1	3.5	7.4	2.0	7.2	10.8	15.3
25	5.7	2.8	5.9	1.6	5.8	8.6	12.2
30	4.7	2.4	5.0	1.3	4.8	7.2	10.2
35	4.0	2.0	4.2	1.1	4.1	6.2	8.7
40	3.5	1.8	3.7	1.0	3.6	5.4	7.7
45	3.1	1.6	3.3	0.9	3.2	4.8	6.8
50	2.8	1.4	3.0	0.8	2.9	4.3	6.1
55	2.6	1.3	2.7	0.7	2.6	3.9	5.6
60	2.4	1.2	2.5	0.6	2.4	3.6	5.1

Example - Under a constant 25 knot wind from the southwest, an uncontained spill originating at the Holyrood Generating Station dock could be expected to reach Seal Cove, a community 2.2 km northeast of the plant, in approximately 1.6 hours.

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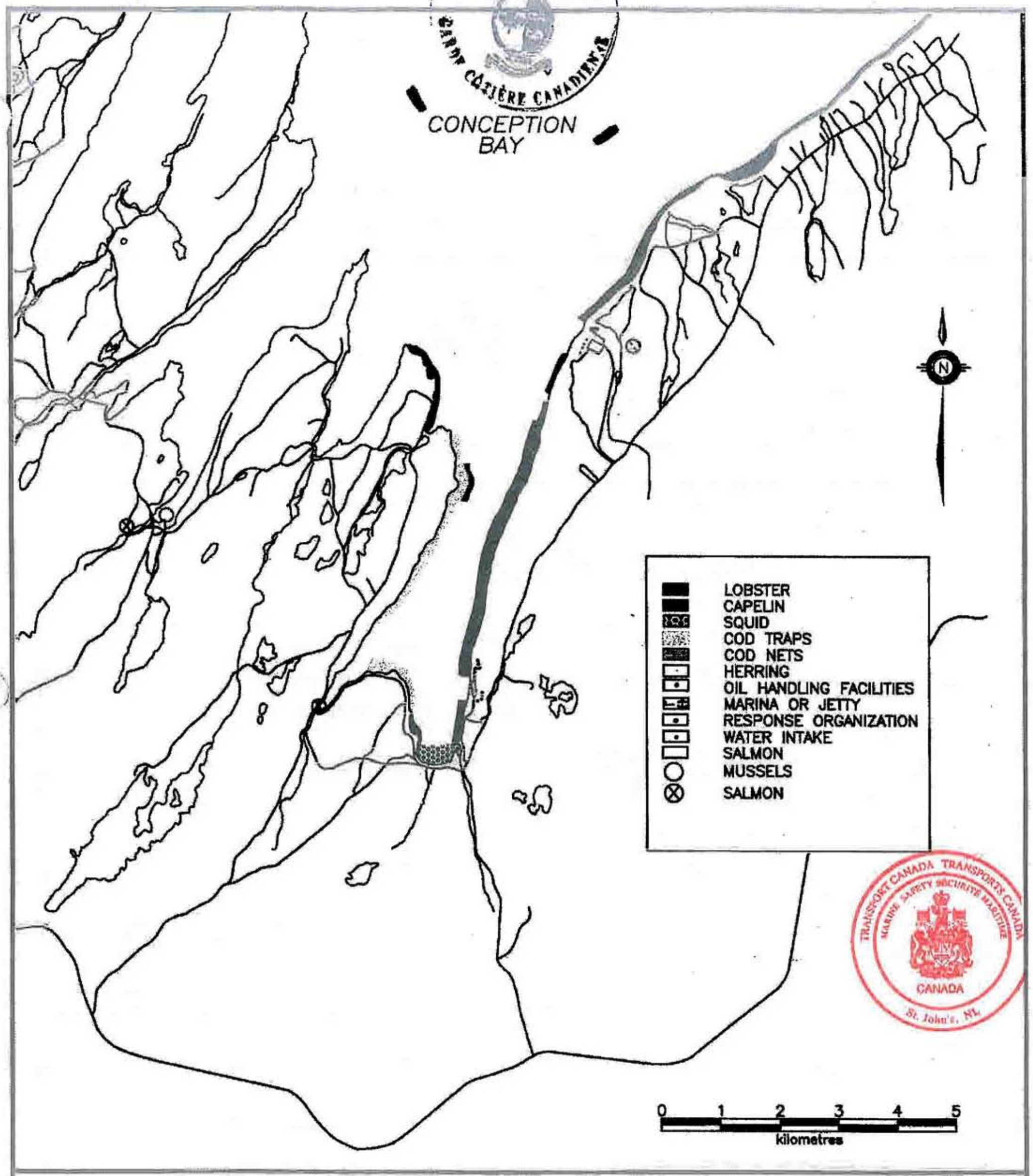
References

deYoung, B. and B. Sanderson, 1995. "The Circulation and Hydrography of Conception Bay, Newfoundland." Atmosphere-Ocean, 33(1), 135-162.

deYoung, B., August 1995. "Circulation in Conception Bay, Newfoundland." Personal Communication.



NEWFOUNDLAND AND LABRADOR HYDRO

SENSITIVE MARINE SPECIES
OIL POLLUTION EMERGENCY PLAN
HOLYROOD, CONCEPTION BAY

Date: 08 NOV 95
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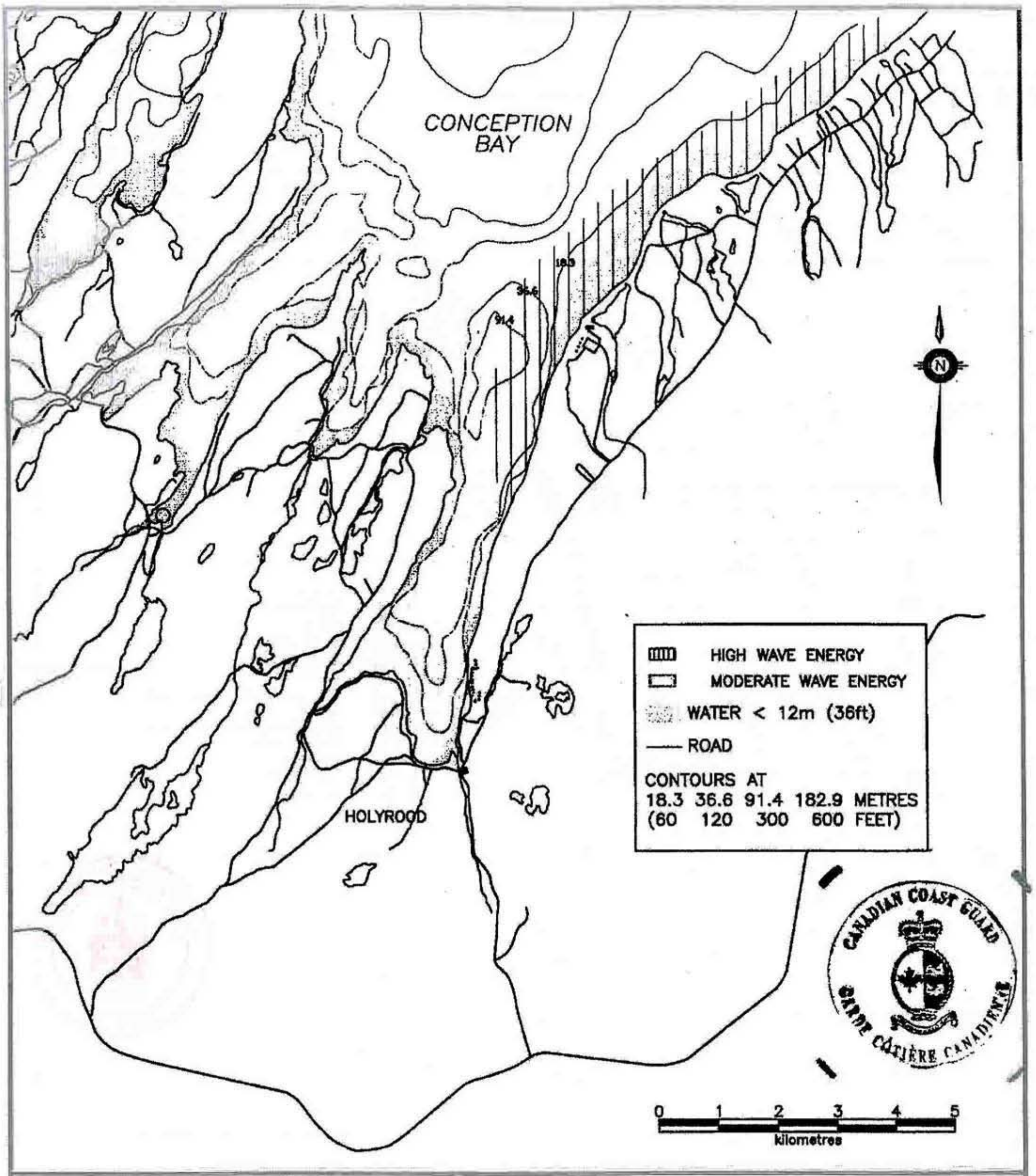
FIGURE No. 1



CANADIAN COAST GUARD GARDE CÔTIÈRE CANADIENNE

HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

WAVE ENERGY
OIL POLLUTION EMERGENCY PLAN
HOLYROOD, CONCEPTION BAY

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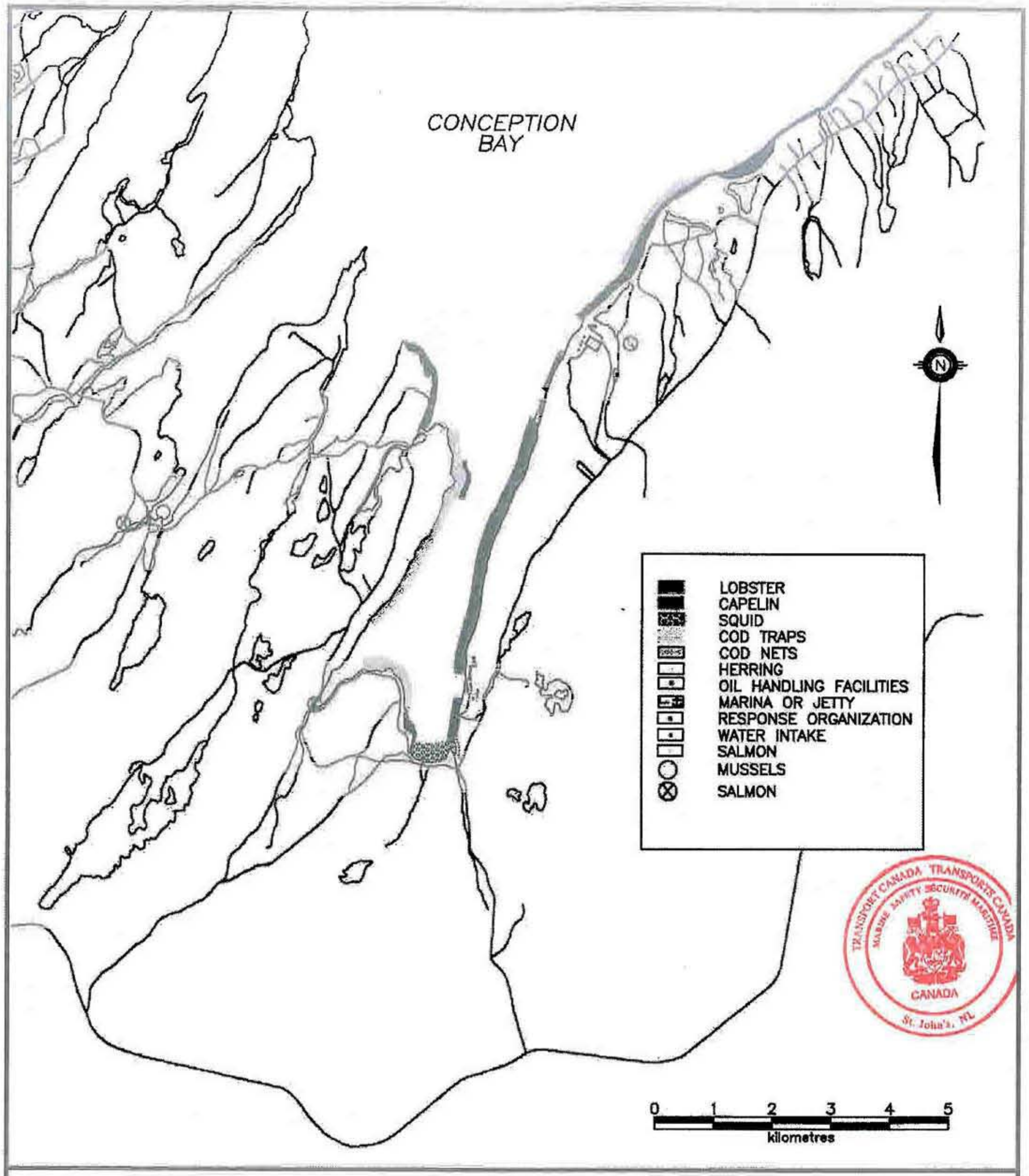

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL

HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

SENSITIVE MARINE SPECIES
OIL POLLUTION EMERGENCY PLAN
HOLYROOD, CONCEPTION BAY

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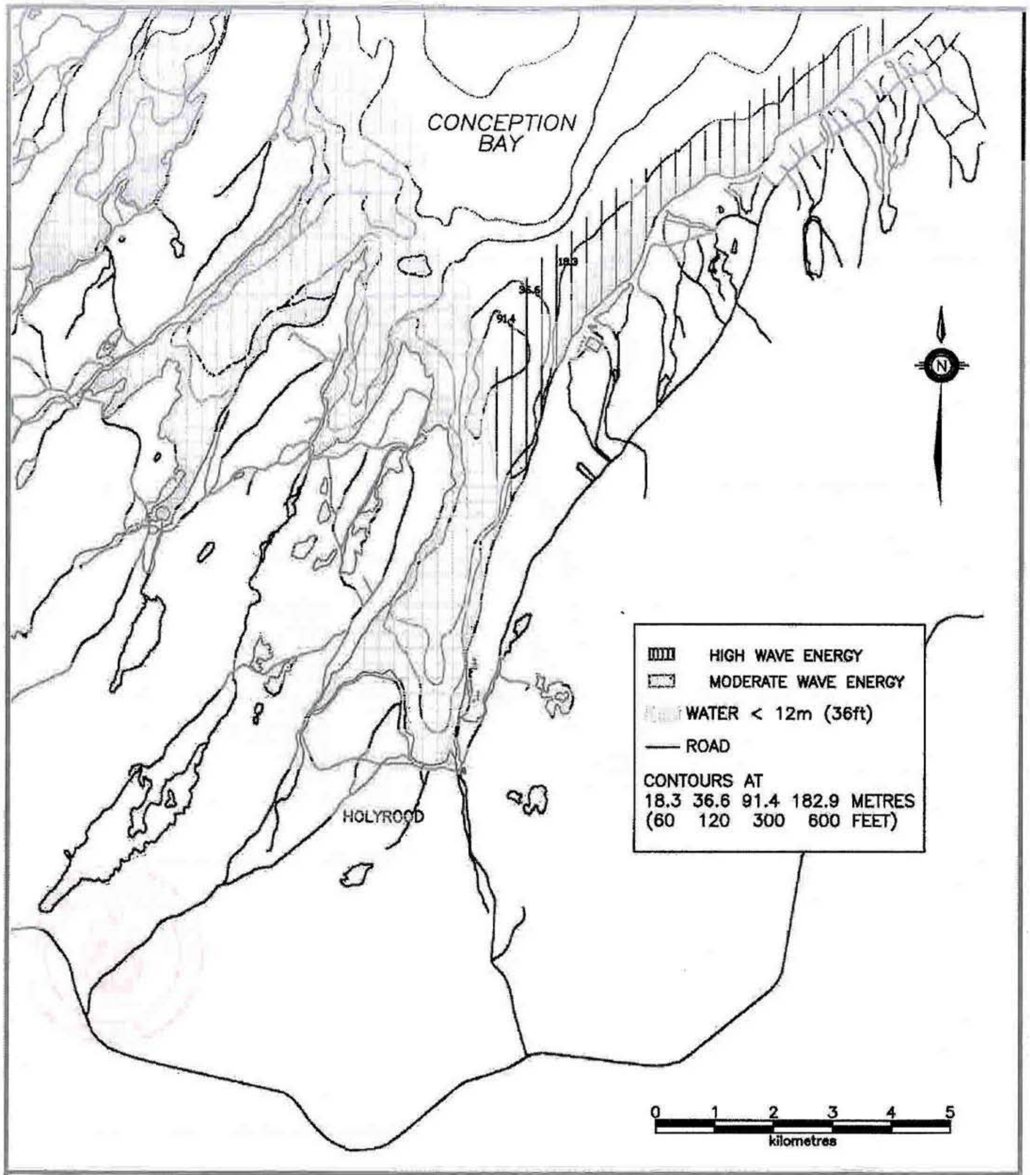

HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

WAVE ENERGY
OIL POLLUTION EMERGENCY PLAN
HOLYROOD, CONCEPTION BAY

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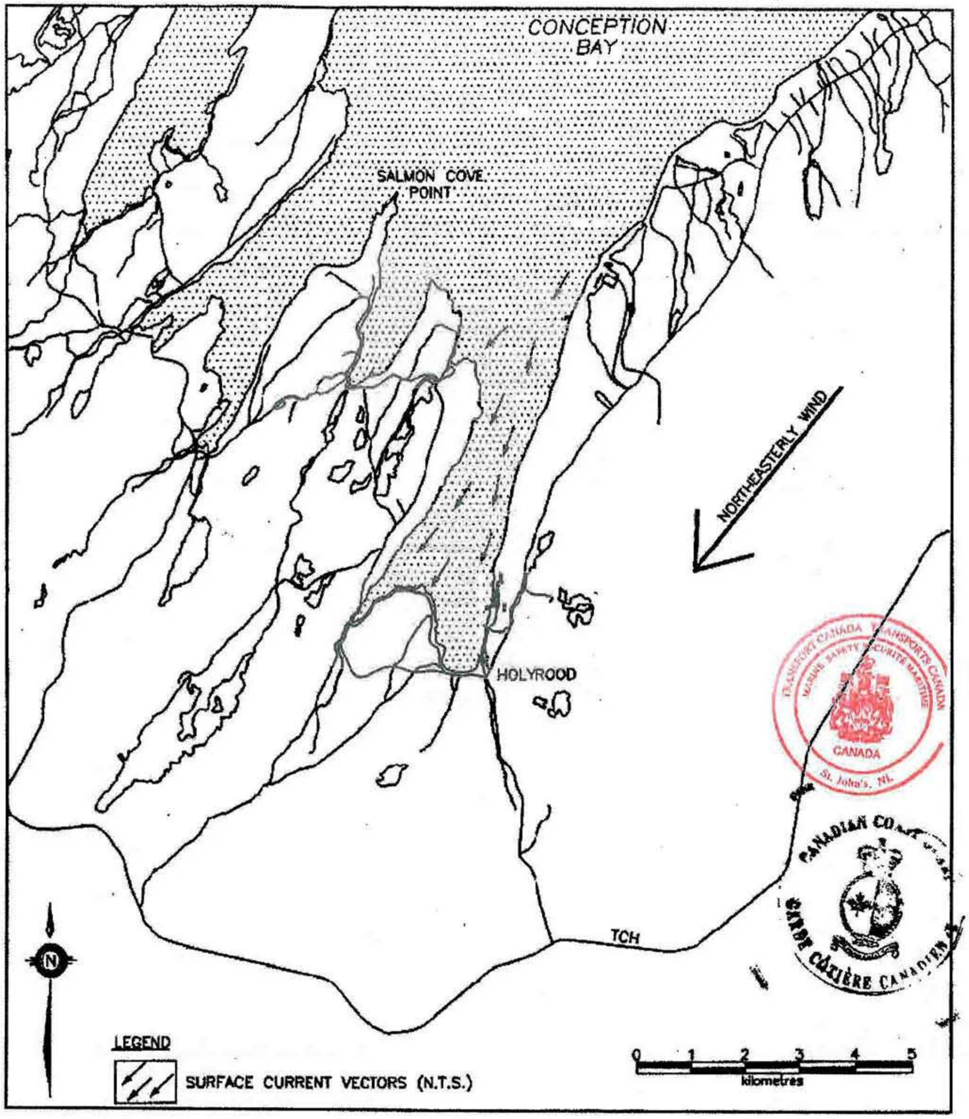

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MARINE SAFETY SECURITE MARITIME
CANADA
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CANADIAN COAST GUARD
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HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

PROBABLE SPILL DISPLACEMENT
UNDER NORTHEASTERLY WIND

Date: 08 NOV 95
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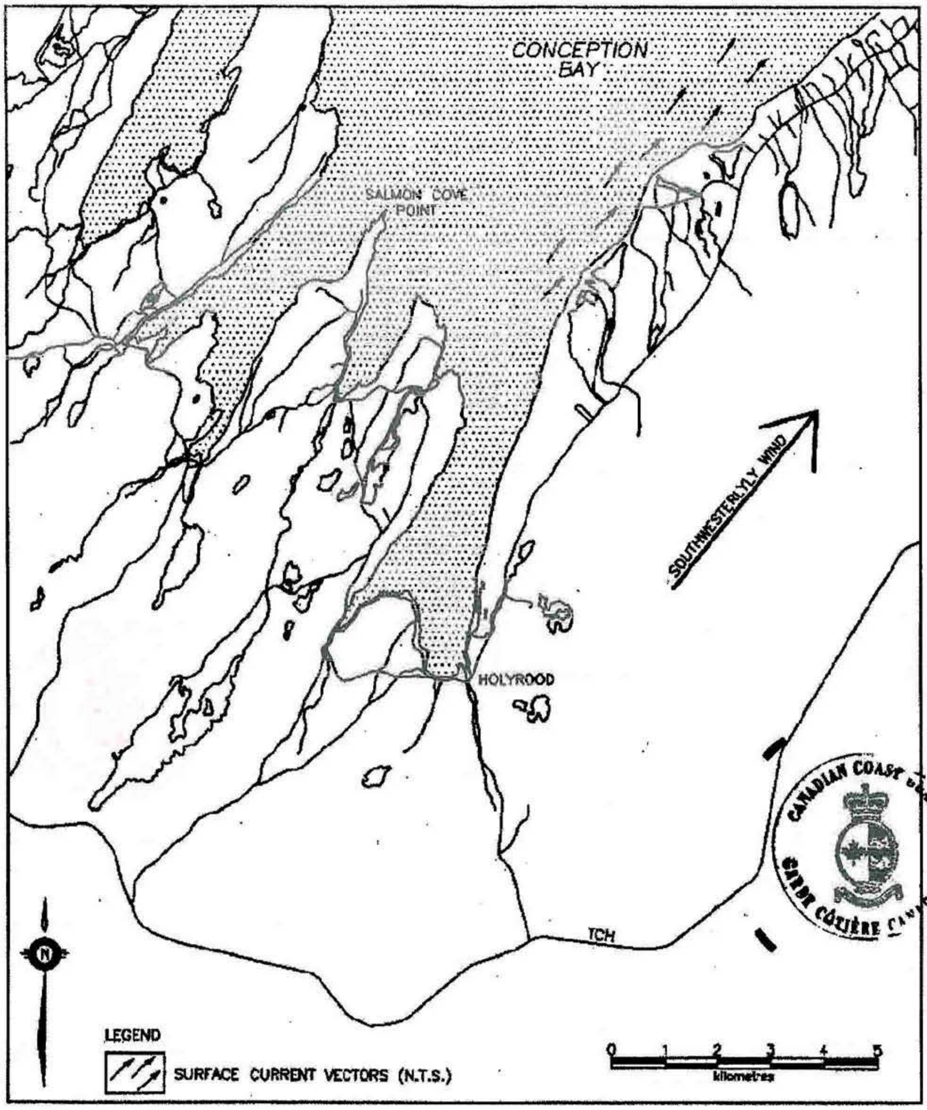

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GARDE CÔTIÈRE CANADIENNE

NEWFOUNDLAND AND LABRADOR HYDRO

PROBABLE SPILL DISPLACEMENT
UNDER SOUTHWESTERLY WIND

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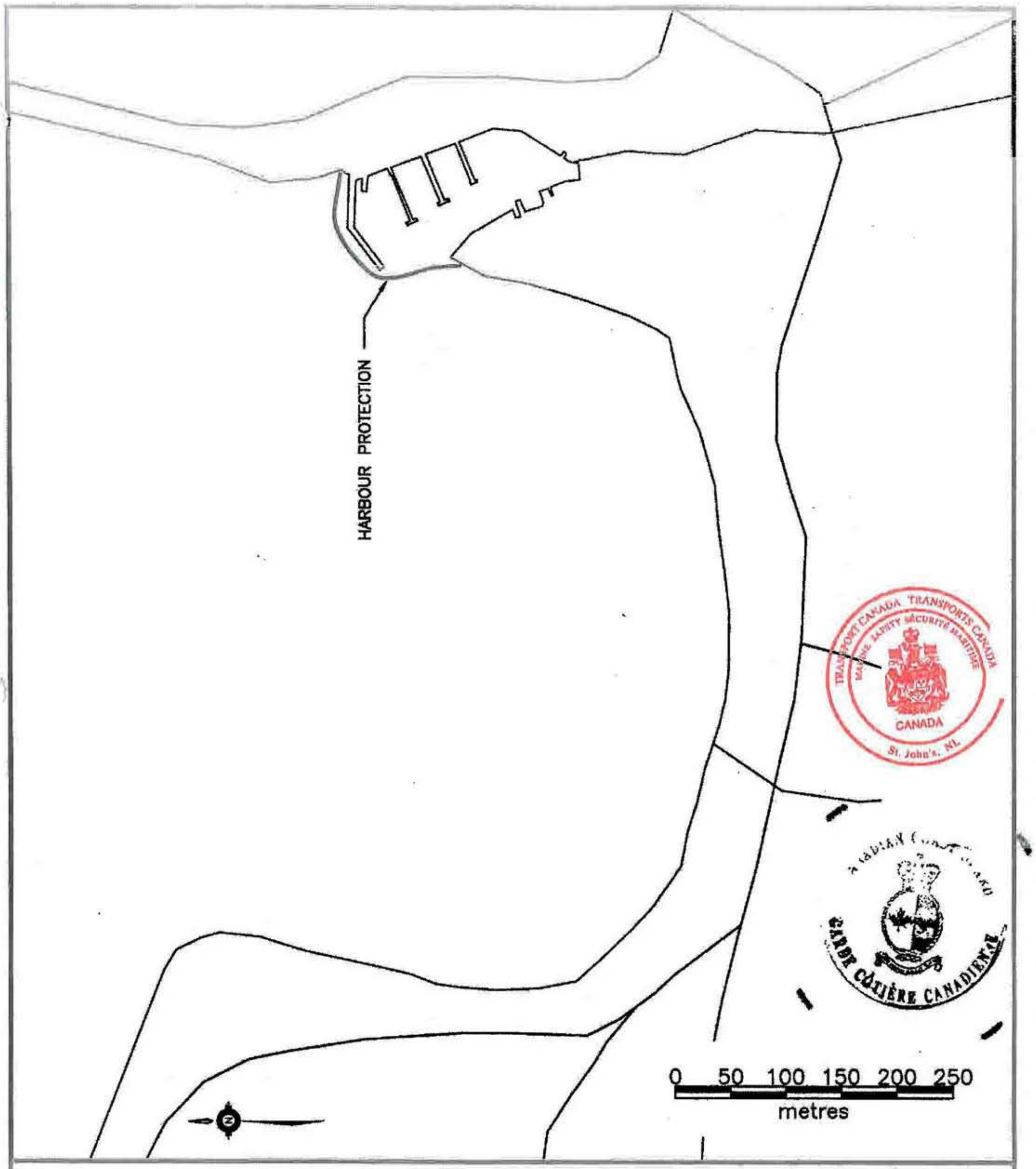

HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

PROTECTION STRATEGY
BOOM DEPLOYMENT
HOLYROOD, CONCEPTION BAY

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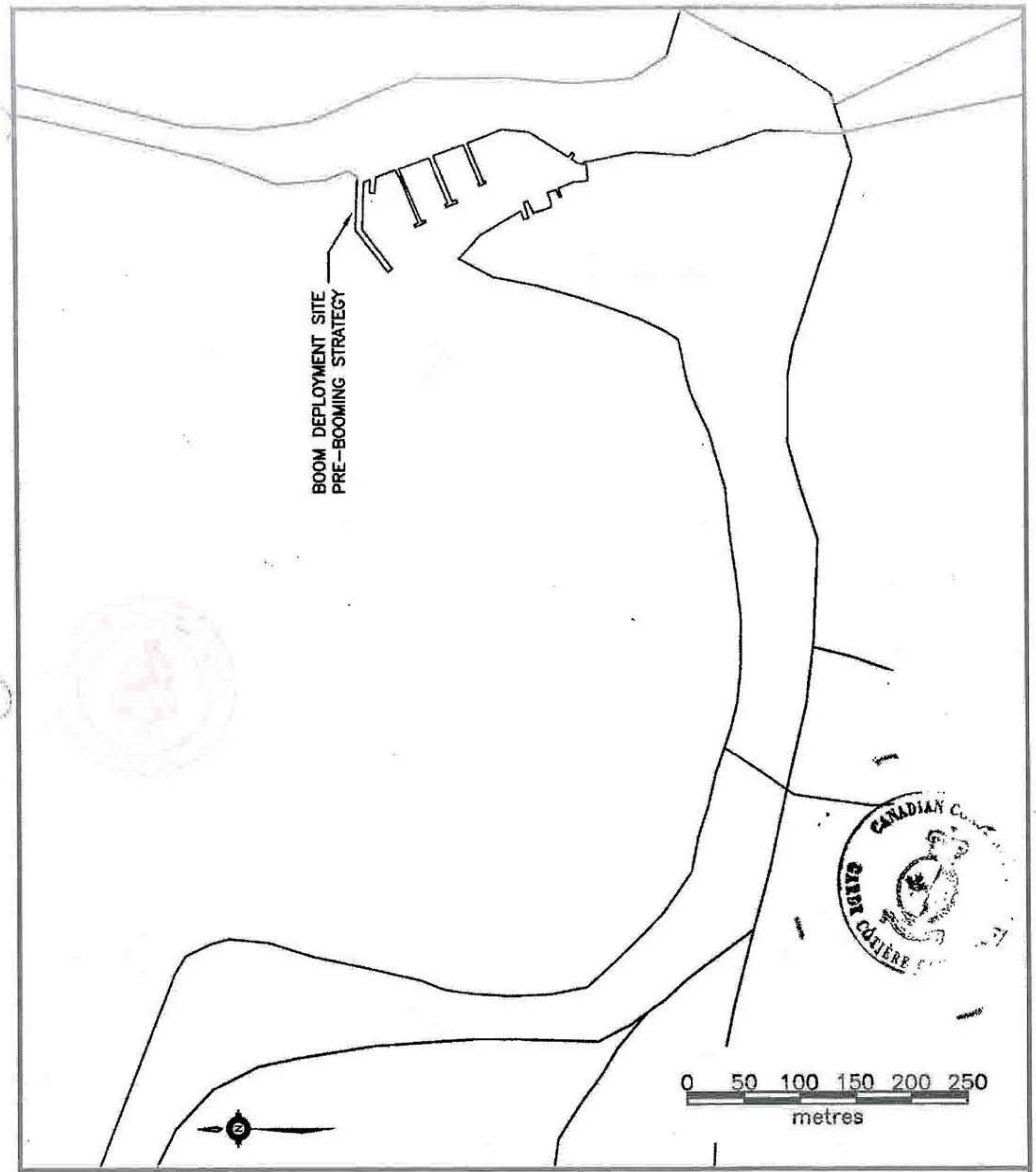

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INITIAL DEPLOYMENT
PRE-BOOMING
BOOM DEPLOYMENT SITE
HOLYROOD, CONCEPTION BAY

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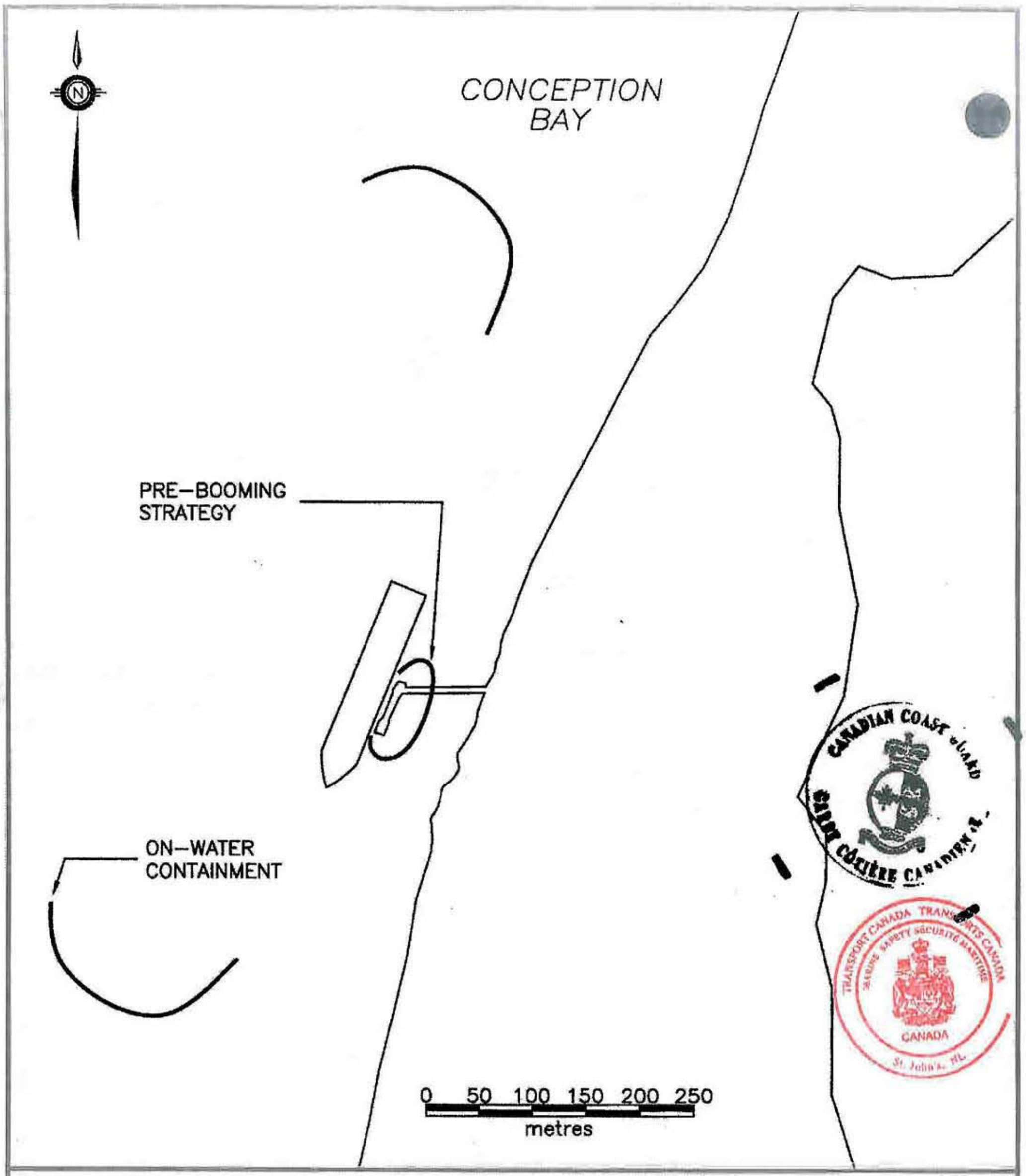

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HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

VESSEL PRE–BOOMING STRATEGY
& POTENTIAL ON – WATER CONTAINMENT
BOOM DEPLOYMENT SITE
HOLYROOD, CONCEPTION BAY

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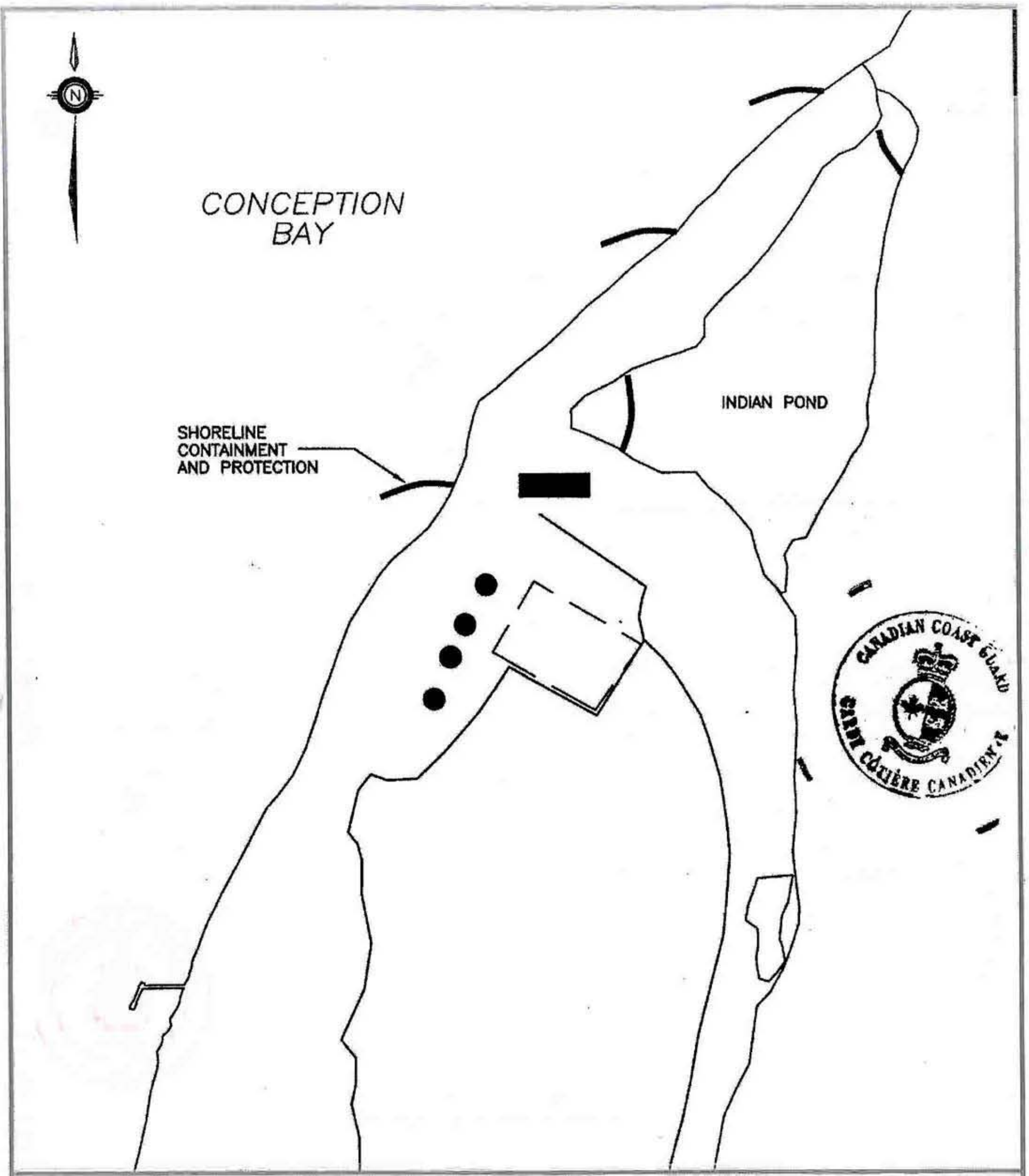

CANADIAN COAST GUARD
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HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

SHORE LINE CONTAINMENT
AND INDIAN POND PROTECTION
BOOM DEPLOYMENT SITE
HOLYROOD, CONCEPTION BAY

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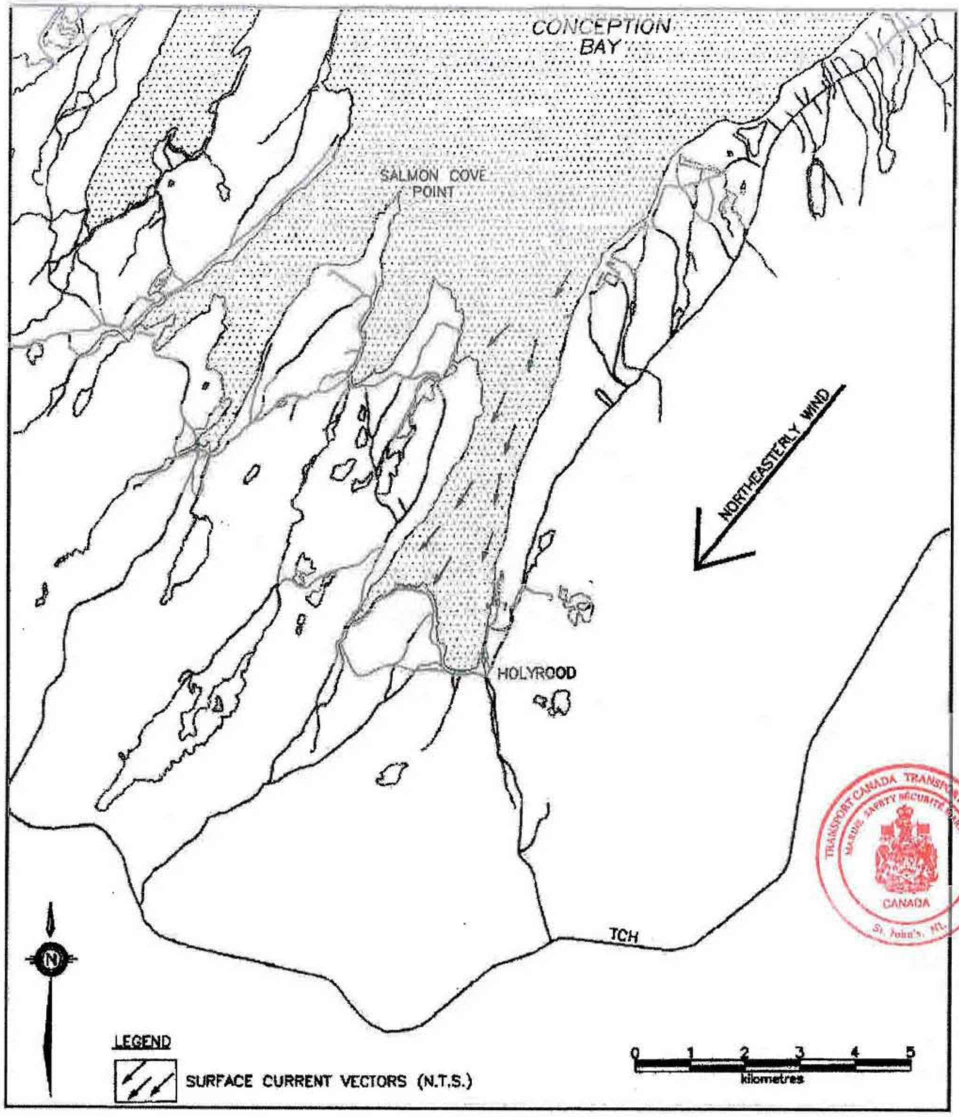

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HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

PROBABLE SPILL DISPLACEMENT
UNDER NORTHEASTERLY WIND

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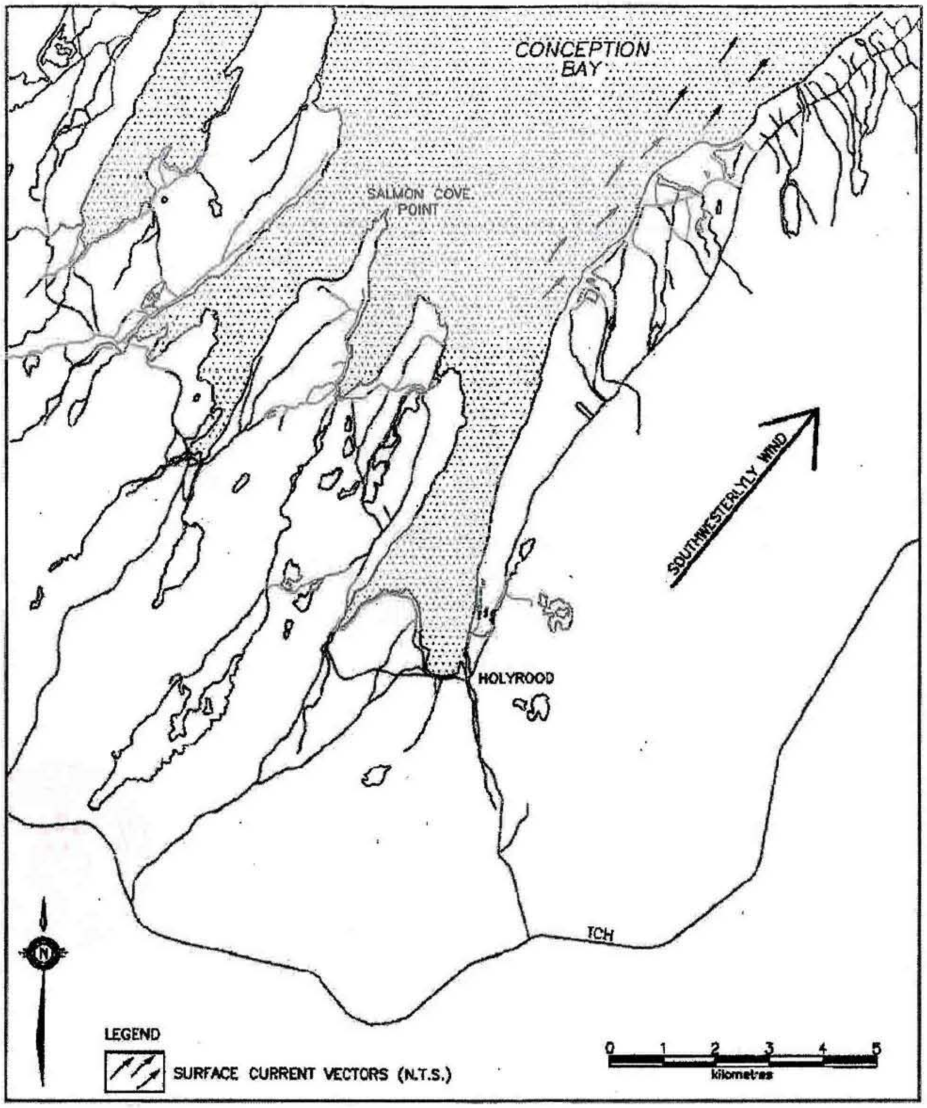

NEWFOUNDLAND AND LABRADOR HYDRO

PROBABLE SPILL DISPLACEMENT
UNDER SOUTHWESTERLY WIND

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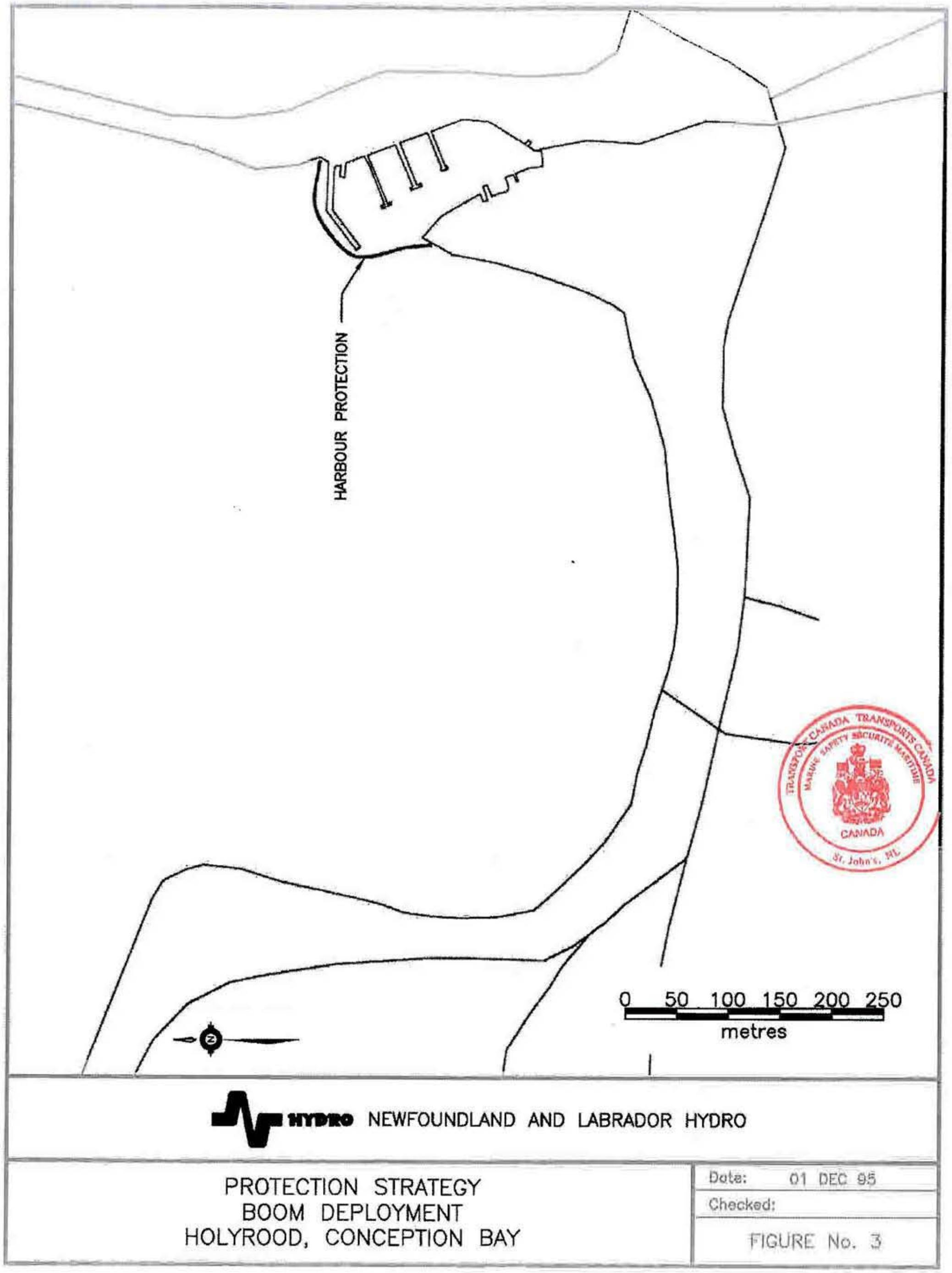

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PROTECTION STRATEGY
BOOM DEPLOYMENT
HOLYROOD, CONCEPTION BAY

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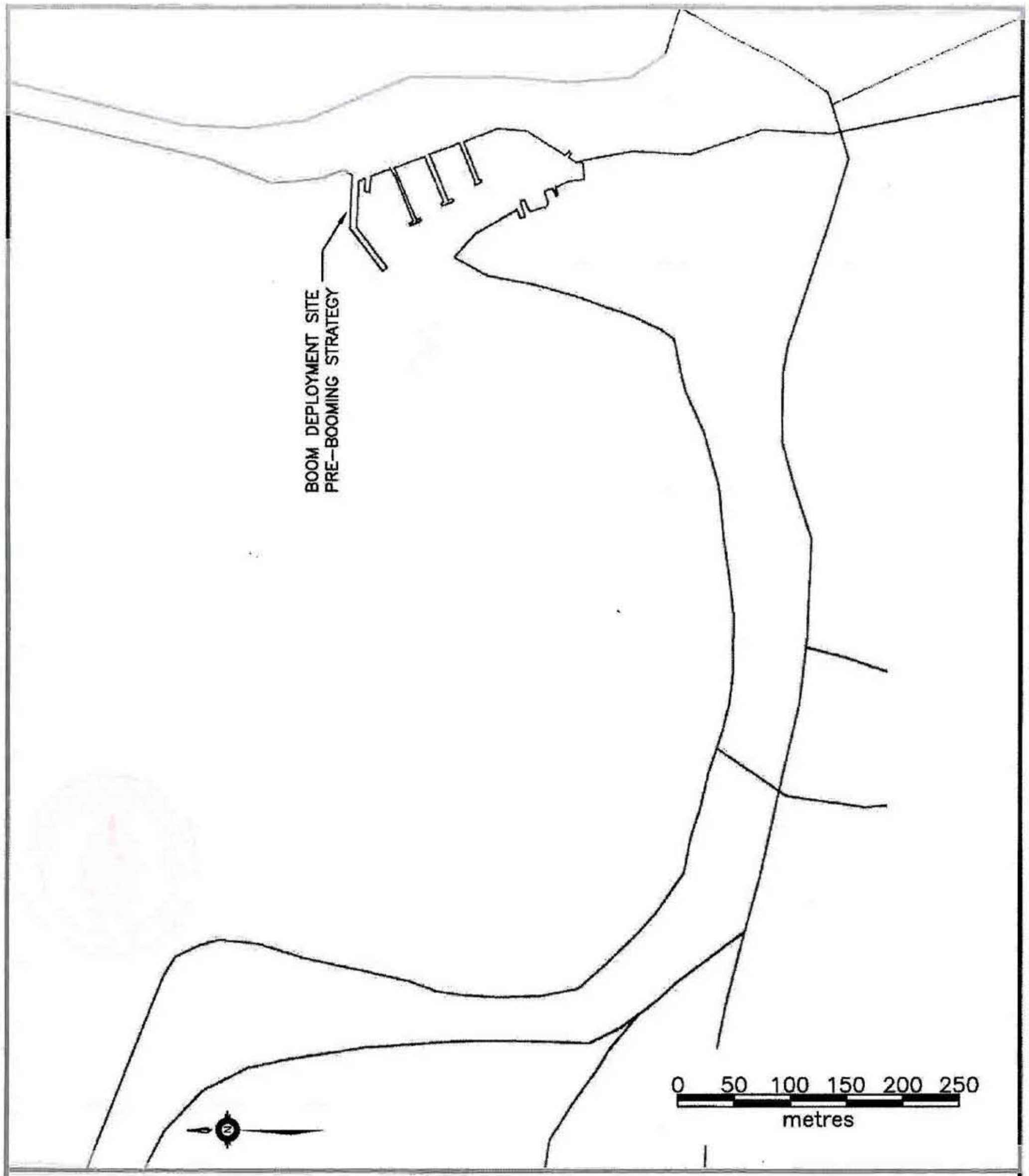

HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

INITIAL DEPLOYMENT
PRE-BOOMING
BOOM DEPLOYMENT SITE
HOLYROOD, CONCEPTION BAY

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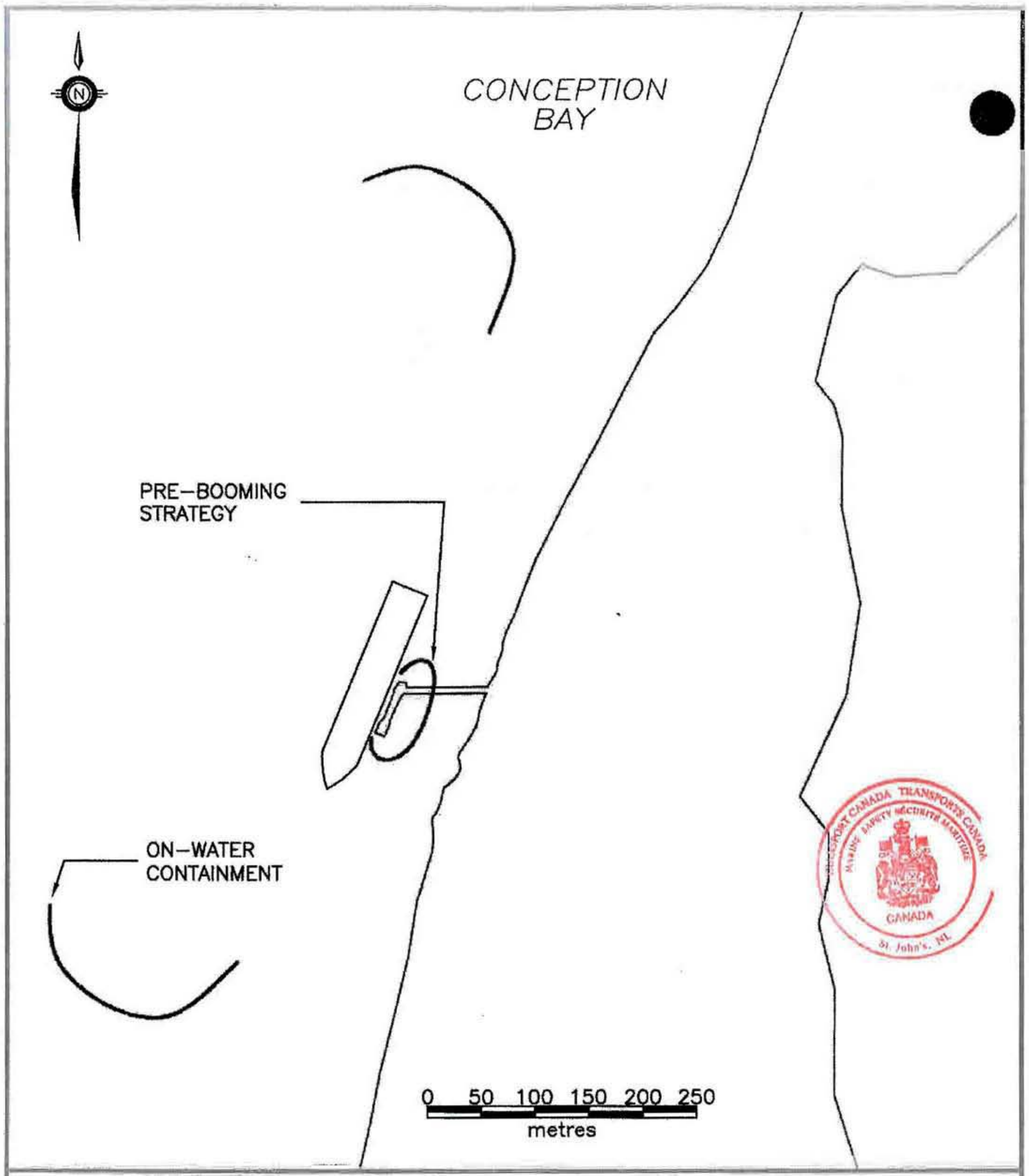

HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

VESSEL PRE-BOOMING STRATEGY
& POTENTIAL ON – WATER CONTAINMENT
BOOM DEPLOYMENT SITE
HOLYROOD, CONCEPTION BAY

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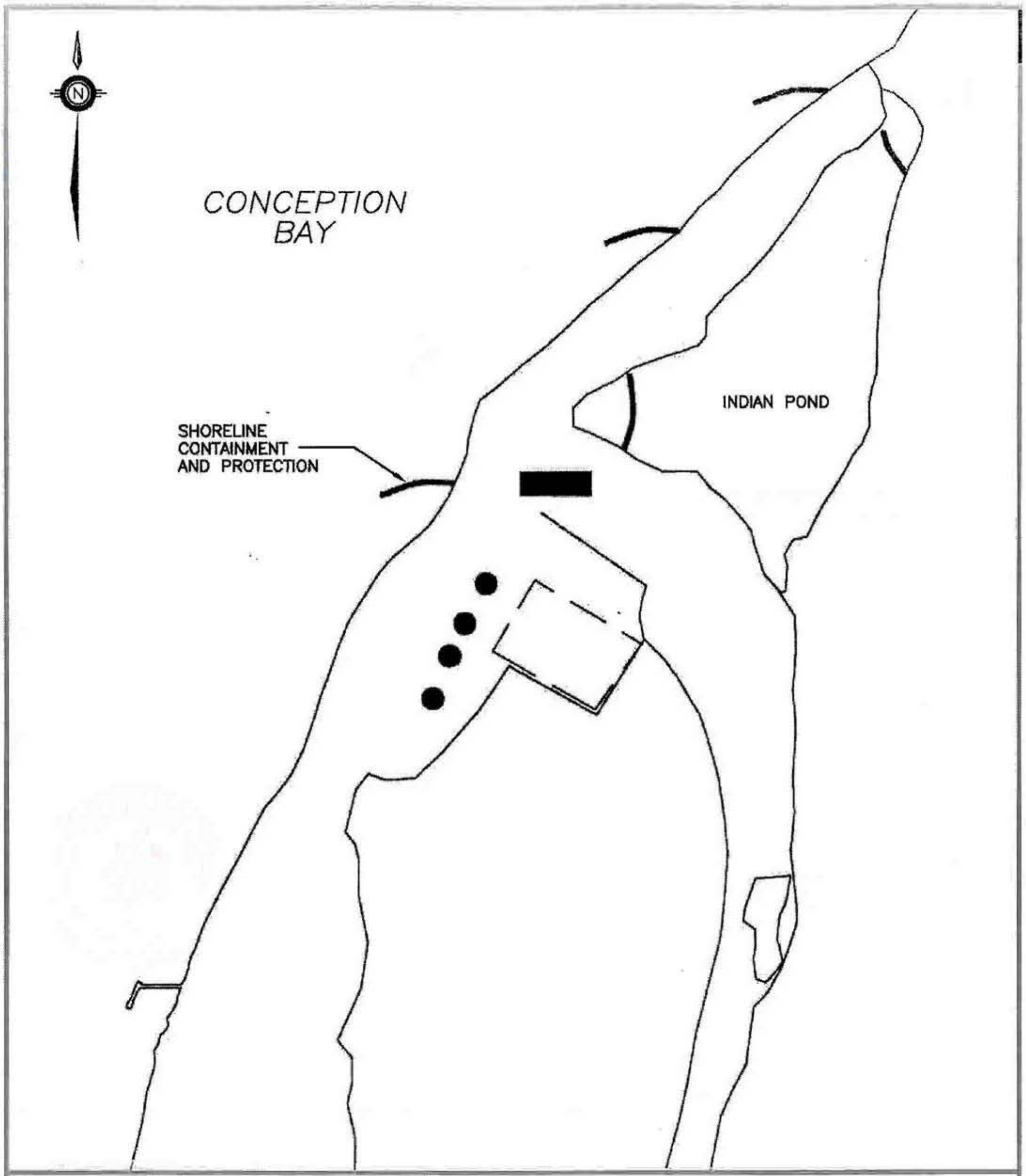

HYDRO NEWFOUNDLAND AND LABRADOR HYDRO

SHORE LINE CONTAINMENT
AND INDIAN POND PROTECTION
BOOM DEPLOYMENT SITE
HOLYROOD, CONCEPTION BAY

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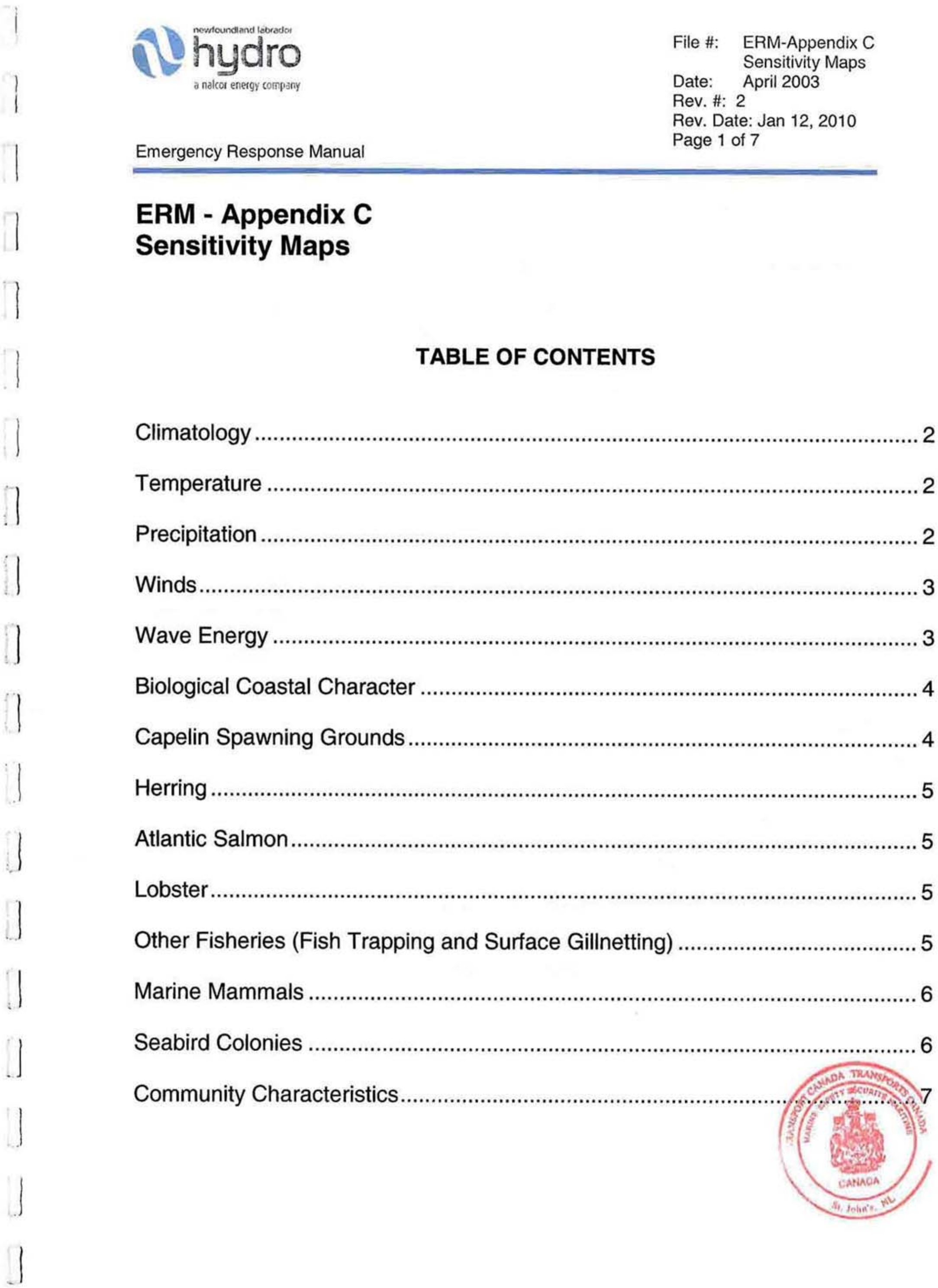

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Sensitivity Maps

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Climatology

A general overview of the climatology for the Holyrood region has been based on the climate normals for St. John's and Holyrood and the climatology surface station nearest to the OHF. The climate normals are estimates of the true mean, obtained in a 30 year sample record, 1951-1980 (Environment Canada, undated). Winters in the Holyrood area are long and mild, while spring tends to be late and cool, followed by a short cool summer. Average monthly temperatures are presented in the Table H-1 below:

Temperature

Table H-1
Mean Temperature °C

	Winter	Spring	Summer	Autumn	Extreme Maximum	Extreme Minimum
Holyrood	- 3.2	5.5	13.7	3.1	30.6	- 8.9
St. John's	- 3.6	5.8	14.1	2.9	30.6	- 23.3

(Source: AES Climate Normals 1951-1980, Vol. 2)

Precipitation

Total precipitation is relatively evenly distributed throughout the year. Total annual accumulations are:

Table H-2
Monthly Average Precipitation

	Winter	Spring	Summer	Autumn	Year
Holyrood Snow (cm)	140.2	15	0	31.9	187.1
Total Precipitation (mm)	316.5	183.3	212.4	316.7	1028.9

(Source: AES Climate Normals 1951-1980, Vol. 5)

Winds

Prevailing winds in the summer are west to west/southwest. Winds in January and February tend to be from west, while winds in March are an equal mix of west and east to east northeast. The following table provides information on seasonal wind direction for the Holyrood region.

Table H-3
Seasonal Winds

	Winter	Spring	Summer	Autumn	Year
St. John's (km/hr)	10.4	8.8	12.0	10.9	10.3

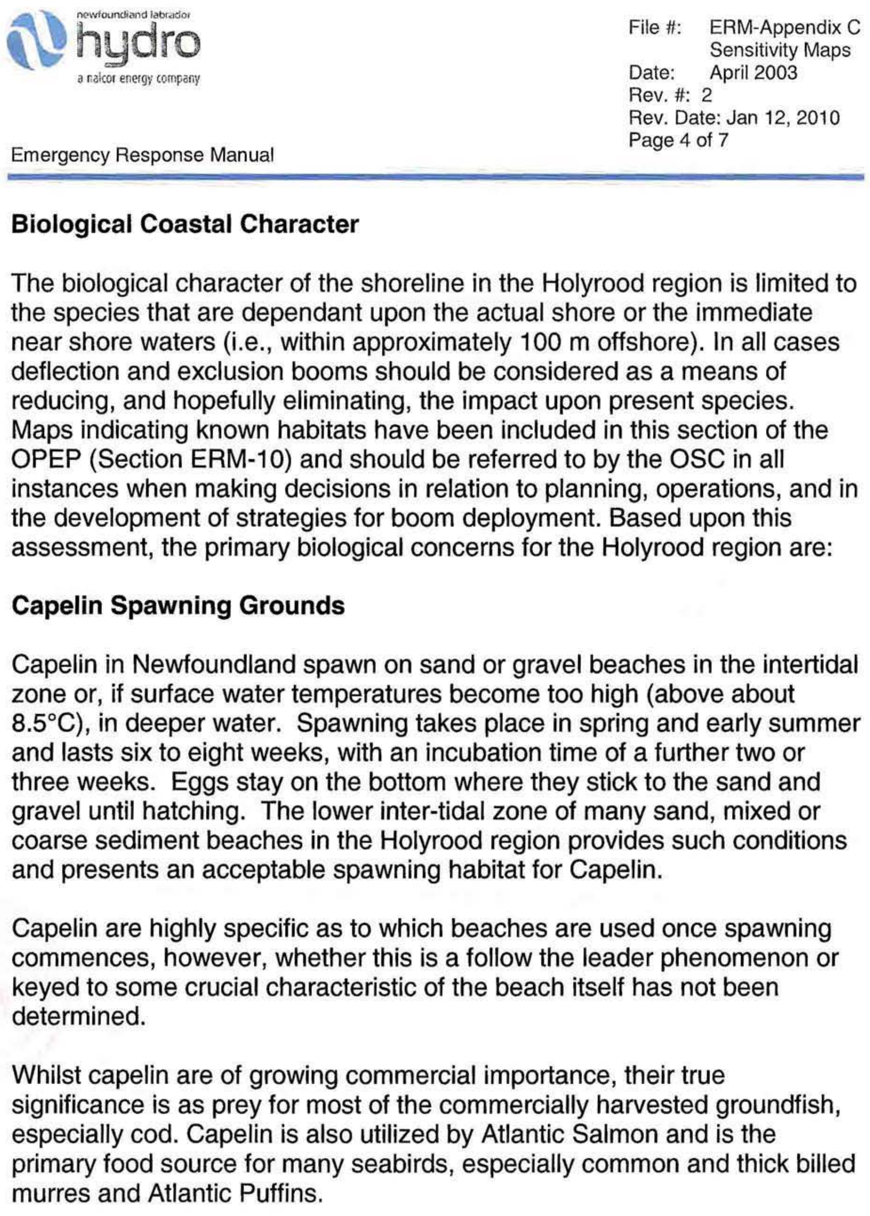
(Source: AES Climate Normals 1951-1980, Vol. 5)

Wave Energy

Classified as high, medium, or low, wave energy can be expressed as the force exerted by a wave impacting upon a section of shoreline. The importance of wave energy, in relation to an oiled shoreline, is that cleanup operations can be assisted due to action of the wave energy agitating oil on a shoreline and assisting in its breakup and removal. Based upon this occurrence, a responder could expect shorelines in regions of high wave energy to be cleaned quicker than those subject to low wave energy. A diagram demonstrating the wave energy in the Holyrood region has been included in this appendix.

Also taken in to account is the coastal geomorphology of the region. In particular, shorelines that permit penetration of oil (permeable) to the subsurface layers will take longer and require substantially different response techniques than those portions of shoreline that are non permeable. Therefore, shorelines exposed to high wave energy and consisting of non-permeable surfaces would, in theory, clean quicker than those exposed to low energy permeable surfaces.

A search for maps and documentation on the coastal geomorphology of Conception Bay failed to produce text or maps suitable for inclusion in this OPEP (Section ERM-10).



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Biological Coastal Character

The biological character of the shoreline in the Holyrood region is limited to the species that are dependant upon the actual shore or the immediate near shore waters (i.e., within approximately 100 m offshore). In all cases deflection and exclusion booms should be considered as a means of reducing, and hopefully eliminating, the impact upon present species. Maps indicating known habitats have been included in this section of the OPEP (Section ERM-10) and should be referred to by the OSC in all instances when making decisions in relation to planning, operations, and in the development of strategies for boom deployment. Based upon this assessment, the primary biological concerns for the Holyrood region are:

Capelin Spawning Grounds

Capelin in Newfoundland spawn on sand or gravel beaches in the intertidal zone or, if surface water temperatures become too high (above about 8.5°C), in deeper water. Spawning takes place in spring and early summer and lasts six to eight weeks, with an incubation time of a further two or three weeks. Eggs stay on the bottom where they stick to the sand and gravel until hatching. The lower inter-tidal zone of many sand, mixed or coarse sediment beaches in the Holyrood region provides such conditions and presents an acceptable spawning habitat for Capelin.

Capelin are highly specific as to which beaches are used once spawning commences, however, whether this is a follow the leader phenomenon or keyed to some crucial characteristic of the beach itself has not been determined.

Whilst capelin are of growing commercial importance, their true significance is as prey for most of the commercially harvested groundfish, especially cod. Capelin is also utilized by Atlantic Salmon and is the primary food source for many seabirds, especially common and thick billed murres and Atlantic Puffins.

Herring

Herring spawn in shallow (<2 m) near shore waters during spring. Their eggs settle on seaweed and would be vulnerable to oil damage during incubation and hatching, but only if the oil contained a significant portion of the lighter, more toxic fractions, and these had become dissolved in the water column.

Atlantic Salmon

Atlantic Salmon utilize (i.e. shelter and feed) in the estuarine environment during two periods in their life cycles. The young fish migrate downstream from the spawning grounds to the sea during early summer, feeding in the river mouths for a short period before moving offshore, while the adults move upstream in the summer and fall.

Lobster

Lobster are prevalent throughout most of the Holyrood region where they move inshore during the warmer months. Accordingly, lobster would be vulnerable to sinking oils in near shore regions whereas lobster pots, lines, and fishing boats would be vulnerable to oil due to there positioning and necessity of inshore fishermen to traverse near shore waters.

Other Fisheries (Fish Trapping and Surface Gillnetting)

The trapping (cod and capelin) and Gillnetting (salmon, herring, and mackerel) industries could be substantially affected by oil in near shore waters. Fish traps set for cod and capelin are complex net structures set in specific locations for the duration of a season and are not easily moved during a spill. Surface gillnets set perpendicular to the coast, reaching from the shore to 30-50 m offshore would also be impacted during a spill and like the trapping fishery would have to be completely curtailed for the time oil was present in the near shore zone.

Marine Mammals

There is little danger of serious disruption to any major marine mammal populations through oil reaching the coast as there are no known important breeding areas for marine mammals along this section of coast in the Holyrood region.

Seabird Colonies

Although seabirds spend most of their lives at sea, they breed on land in colonies. However, because their breeding sites (islands and cliffs) normally confer protection from predators and environmental hazards, seabirds are ill-adapted to intrusion and disturbance, and are vulnerable to physical and environmental disturbances.

Such populations are vulnerable to damage that can result from oil slicks in near shore waters, with the greatest mortality resulting from birds fouled by oil slicks during foraging activities. The most significant bird colonies within Conception Bay is located on Kelly's Island and Little Bell Island. Whilst both fall outside the immediate vicinity of the generating station, both warrant mention should there be a requirement to escalate the response. Breeding birds include:

Breeding Birds	
Kelly's Island	**Little Bell Island**
Herring Gull	Herring Gull
Black Guillemot	Black Guillemot
	Great Black Backed Gull

It is important to note that oil destroys the insulative and waterproof qualities of feathers, causing a heat drain and increasing the effective weight of the bird. The bird dies of hypothermia within hours or days after oiling.

Community Characteristics

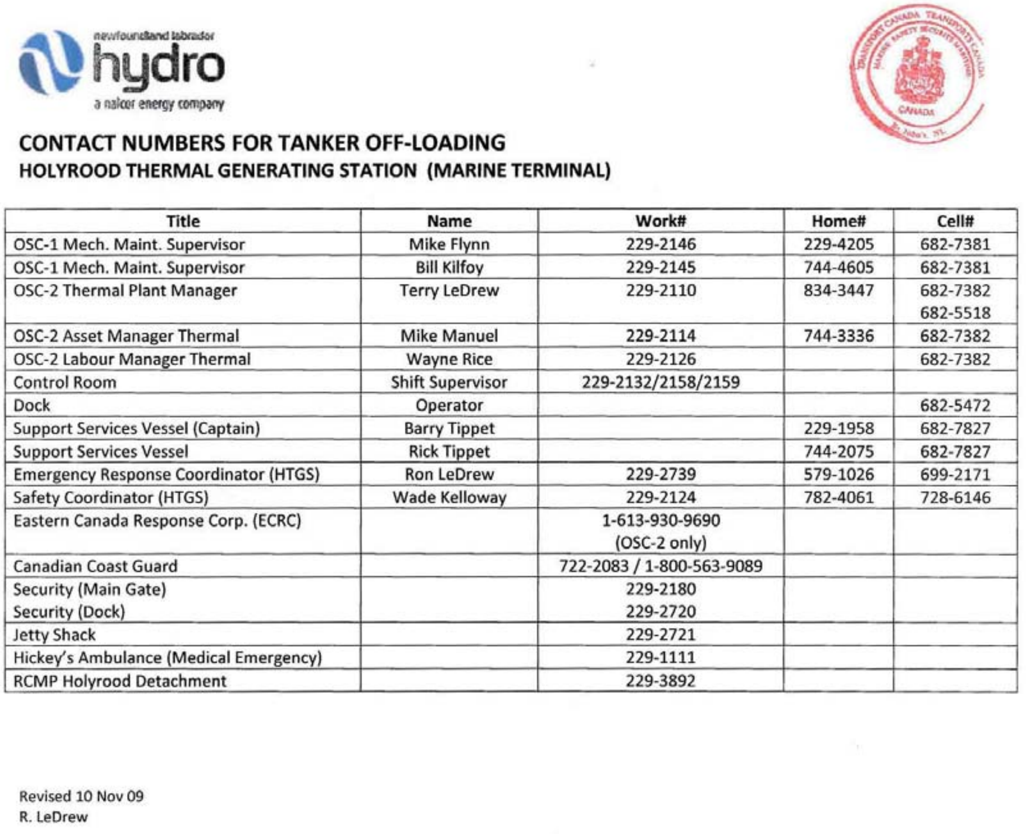
Within the Holyrood region there are fixed jetties at the generating station, Ultramar and in Holyrood Harbour, Holyrood. These fixed structures are constructed of wood, metal, rubble or other concrete materials, even within the same harbour area. Larger vessels are normally tied up at jetties (Holyrood Generating Station) and docks (Ultramar) whilst smaller craft are anchored in marinas in the near shore area (Holyrood Harbour).

The impact of oil on these fixtures can be determined from the material used for construction:

Cleanup Impact Assessment - Wharfs - Jetty - Docks - Marinas

Hydro Jetty	Low	Steel and Concrete
Ultramar Dock	Medium	Concrete
Holyrood Harbour	High	Wood, Rubble, Steel and Concrete

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL



newfoundland labrador hydro
a nalcor energy company

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL

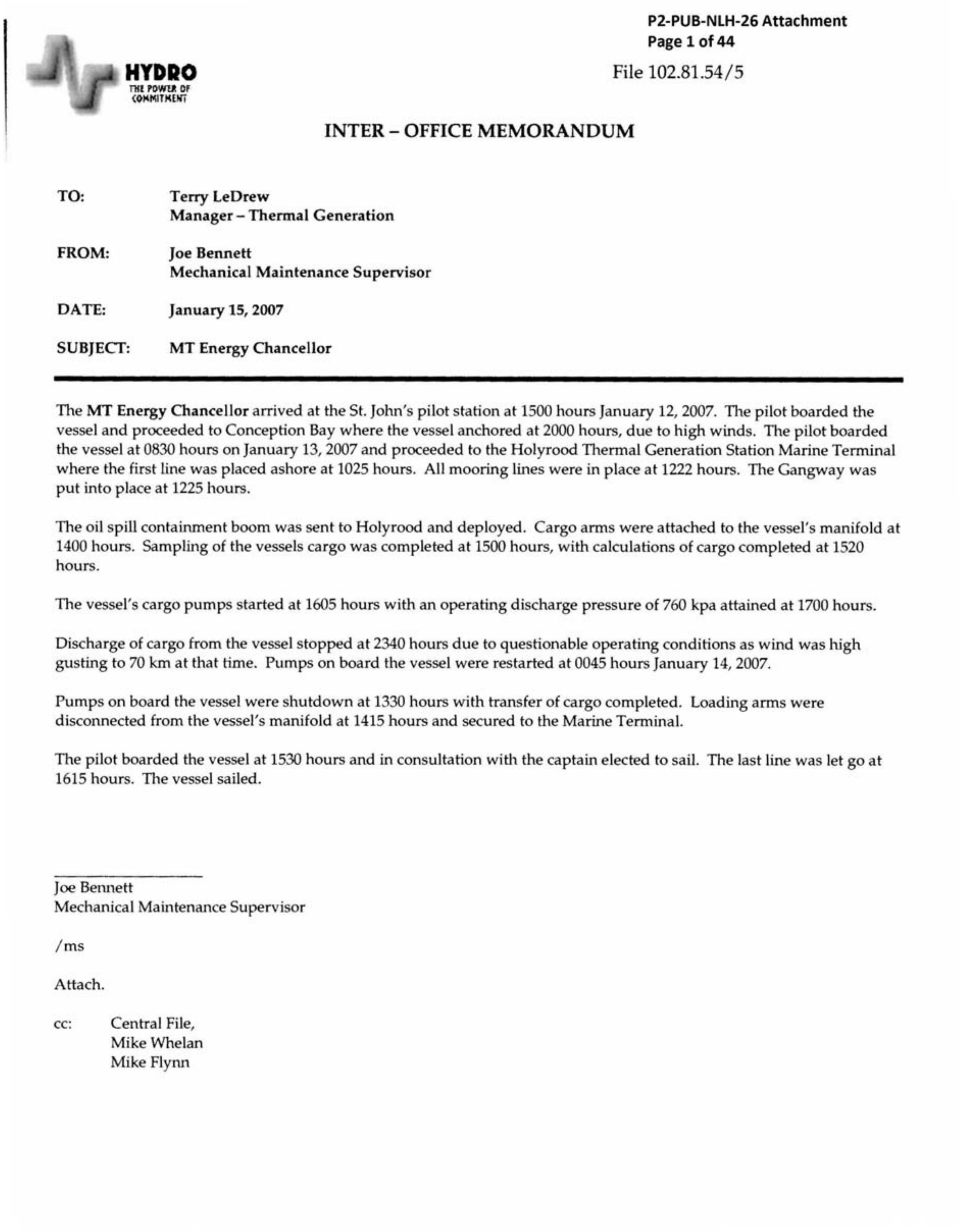
CONTACT NUMBERS FOR TANKER OFF-LOADING
HOLYROOD THERMAL GENERATING STATION (MARINE TERMINAL)

Title	Name	Work#	Home#	Cell#
OSC-1 Mech. Maint. Supervisor	Mike Flynn	229-2146	229-4205	682-7381
OSC-1 Mech. Maint. Supervisor	Bill Kilfoy	229-2145	744-4605	682-7381
OSC-2 Thermal Plant Manager	Terry LeDrew	229-2110	834-3447	682-7382 682-5518
OSC-2 Asset Manager Thermal	Mike Manuel	229-2114	744-3336	682-7382
OSC-2 Labour Manager Thermal	Wayne Rice	229-2126		682-7382
Control Room	Shift Supervisor	229-2132/2158/2159		
Dock	Operator			682-5472
Support Services Vessel (Captain)	Barry Tippet		229-1958	682-7827
Support Services Vessel	Rick Tippet		744-2075	682-7827
Emergency Response Coordinator (HTGS)	Ron LeDrew	229-2739	579-1026	699-2171
Safety Coordinator (HTGS)	Wade Kelloway	229-2124	782-4061	728-6146
Eastern Canada Response Corp. (ECRC)		1-613-930-9690 (OSC-2 only)		
Canadian Coast Guard		722-2083 / 1-800-563-9089		
Security (Main Gate) Security (Dock)		229-2180 229-2720		
Jetty Shack		229-2721		
Hickey's Ambulance (Medical Emergency)		229-1111		
RCMP Holyrood Detachment		229-3892		

Revised 10 Nov 09
R. LeDrew

APPENDIX E

Tanker Reports (2007 – 2011)



P2-PUB-NLH-26 Attachment
Page 1 of 44

HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO:	**Terry LeDrew** **Manager – Thermal Generation**
FROM:	**Joe Bennett** **Mechanical Maintenance Supervisor**
DATE:	**January 15, 2007**
SUBJECT:	**MT Energy Chancellor**

The **MT Energy Chancellor** arrived at the St. John's pilot station at 1500 hours January 12, 2007. The pilot boarded the vessel and proceeded to Conception Bay where the vessel anchored at 2000 hours, due to high winds. The pilot boarded the vessel at 0830 hours on January 13, 2007 and proceeded to the Holyrood Thermal Generation Station Marine Terminal where the first line was placed ashore at 1025 hours. All mooring lines were in place at 1222 hours. The Gangway was put into place at 1225 hours.

The oil spill containment boom was sent to Holyrood and deployed. Cargo arms were attached to the vessel's manifold at 1400 hours. Sampling of the vessels cargo was completed at 1500 hours, with calculations of cargo completed at 1520 hours.

The vessel's cargo pumps started at 1605 hours with an operating discharge pressure of 760 kpa attained at 1700 hours.

Discharge of cargo from the vessel stopped at 2340 hours due to questionable operating conditions as wind was high gusting to 70 km at that time. Pumps on board the vessel were restarted at 0045 hours January 14, 2007.

Pumps on board the vessel were shutdown at 1330 hours with transfer of cargo completed. Loading arms were disconnected from the vessel's manifold at 1415 hours and secured to the Marine Terminal.

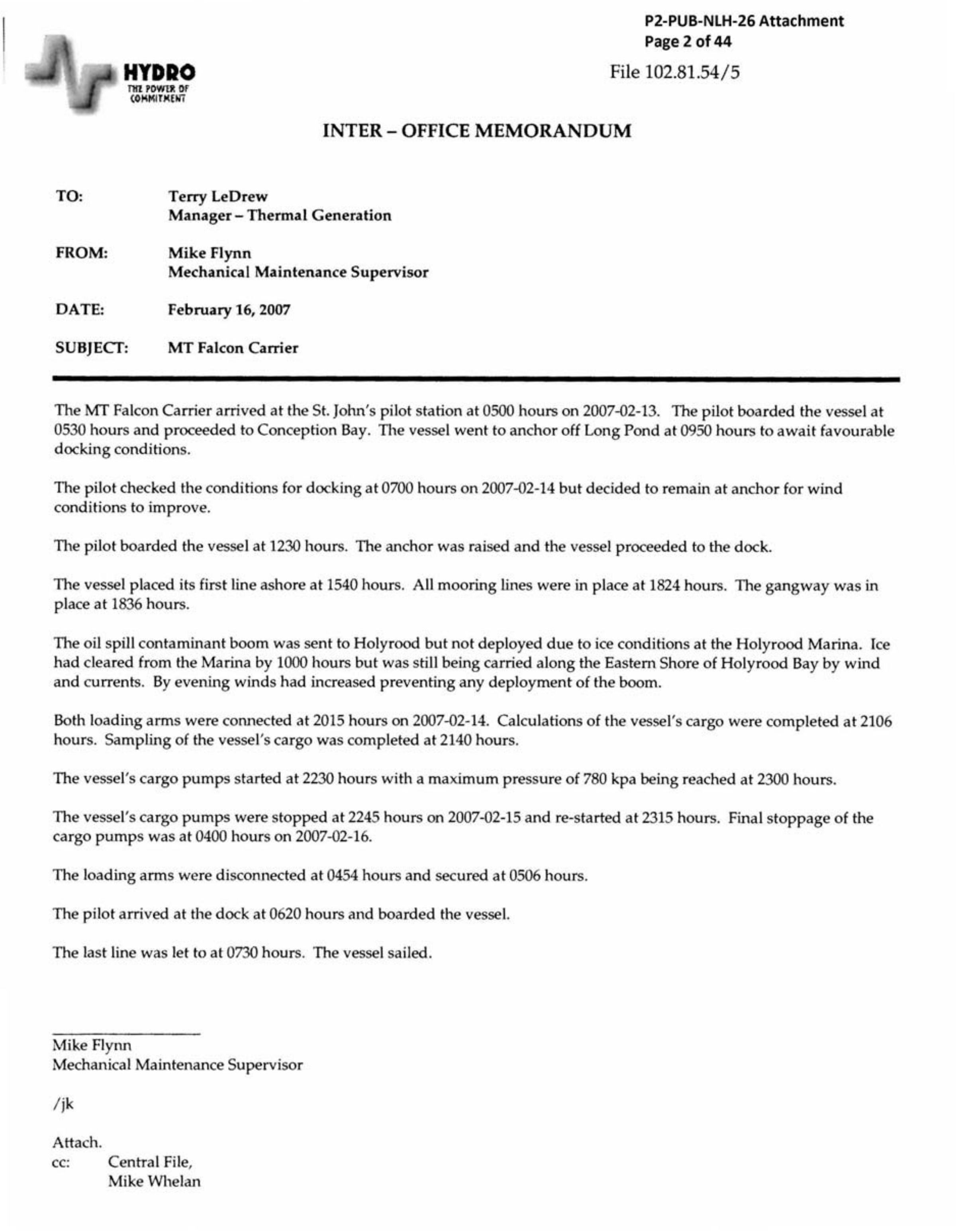
The pilot boarded the vessel at 1530 hours and in consultation with the captain elected to sail. The last line was let go at 1615 hours. The vessel sailed.

Joe Bennett
Mechanical Maintenance Supervisor

/ms

Attach.

cc: Central File,
Mike Whelan
Mike Flynn



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Page 2 of 44

File 102.81.54/5

HYDRO
THE POWER OF COMMITMENT

INTER – OFFICE MEMORANDUM

TO:	**Terry LeDrew** **Manager – Thermal Generation**
FROM:	**Mike Flynn** **Mechanical Maintenance Supervisor**
DATE:	**February 16, 2007**
SUBJECT:	**MT Falcon Carrier**

The MT Falcon Carrier arrived at the St. John's pilot station at 0500 hours on 2007-02-13. The pilot boarded the vessel at 0530 hours and proceeded to Conception Bay. The vessel went to anchor off Long Pond at 0950 hours to await favourable docking conditions.

The pilot checked the conditions for docking at 0700 hours on 2007-02-14 but decided to remain at anchor for wind conditions to improve.

The pilot boarded the vessel at 1230 hours. The anchor was raised and the vessel proceeded to the dock.

The vessel placed its first line ashore at 1540 hours. All mooring lines were in place at 1824 hours. The gangway was in place at 1836 hours.

The oil spill contaminant boom was sent to Holyrood but not deployed due to ice conditions at the Holyrood Marina. Ice had cleared from the Marina by 1000 hours but was still being carried along the Eastern Shore of Holyrood Bay by wind and currents. By evening winds had increased preventing any deployment of the boom.

Both loading arms were connected at 2015 hours on 2007-02-14. Calculations of the vessel's cargo were completed at 2106 hours. Sampling of the vessel's cargo was completed at 2140 hours.

The vessel's cargo pumps started at 2230 hours with a maximum pressure of 780 kpa being reached at 2300 hours.

The vessel's cargo pumps were stopped at 2245 hours on 2007-02-15 and re-started at 2315 hours. Final stoppage of the cargo pumps was at 0400 hours on 2007-02-16.

The loading arms were disconnected at 0454 hours and secured at 0506 hours.

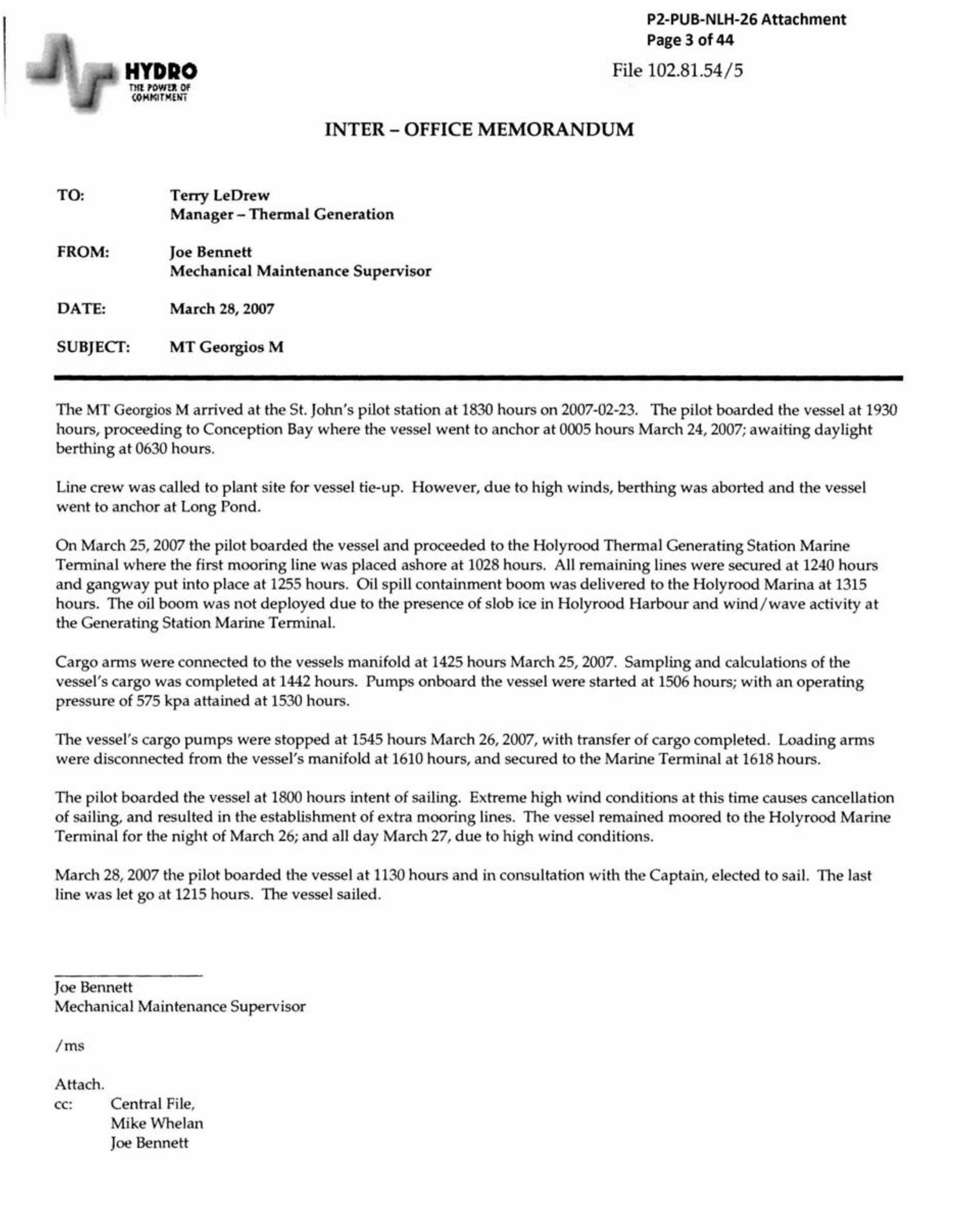
The pilot arrived at the dock at 0620 hours and boarded the vessel.

The last line was let to at 0730 hours. The vessel sailed.

____
Mike Flynn
Mechanical Maintenance Supervisor

/jk

Attach.
cc: Central File,
Mike Whelan



P2-PUB-NLH-26 Attachment
Page 3 of 44

HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO:	**Terry LeDrew** **Manager – Thermal Generation**
FROM:	**Joe Bennett** **Mechanical Maintenance Supervisor**
DATE:	**March 28, 2007**
SUBJECT:	**MT Georgios M**

The MT Georgios M arrived at the St. John's pilot station at 1830 hours on 2007-02-23. The pilot boarded the vessel at 1930 hours, proceeding to Conception Bay where the vessel went to anchor at 0005 hours March 24, 2007; awaiting daylight berthing at 0630 hours.

Line crew was called to plant site for vessel tie-up. However, due to high winds, berthing was aborted and the vessel went to anchor at Long Pond.

On March 25, 2007 the pilot boarded the vessel and proceeded to the Holyrood Thermal Generating Station Marine Terminal where the first mooring line was placed ashore at 1028 hours. All remaining lines were secured at 1240 hours and gangway put into place at 1255 hours. Oil spill containment boom was delivered to the Holyrood Marina at 1315 hours. The oil boom was not deployed due to the presence of slob ice in Holyrood Harbour and wind/wave activity at the Generating Station Marine Terminal.

Cargo arms were connected to the vessels manifold at 1425 hours March 25, 2007. Sampling and calculations of the vessel's cargo was completed at 1442 hours. Pumps onboard the vessel were started at 1506 hours; with an operating pressure of 575 kpa attained at 1530 hours.

The vessel's cargo pumps were stopped at 1545 hours March 26, 2007, with transfer of cargo completed. Loading arms were disconnected from the vessel's manifold at 1610 hours, and secured to the Marine Terminal at 1618 hours.

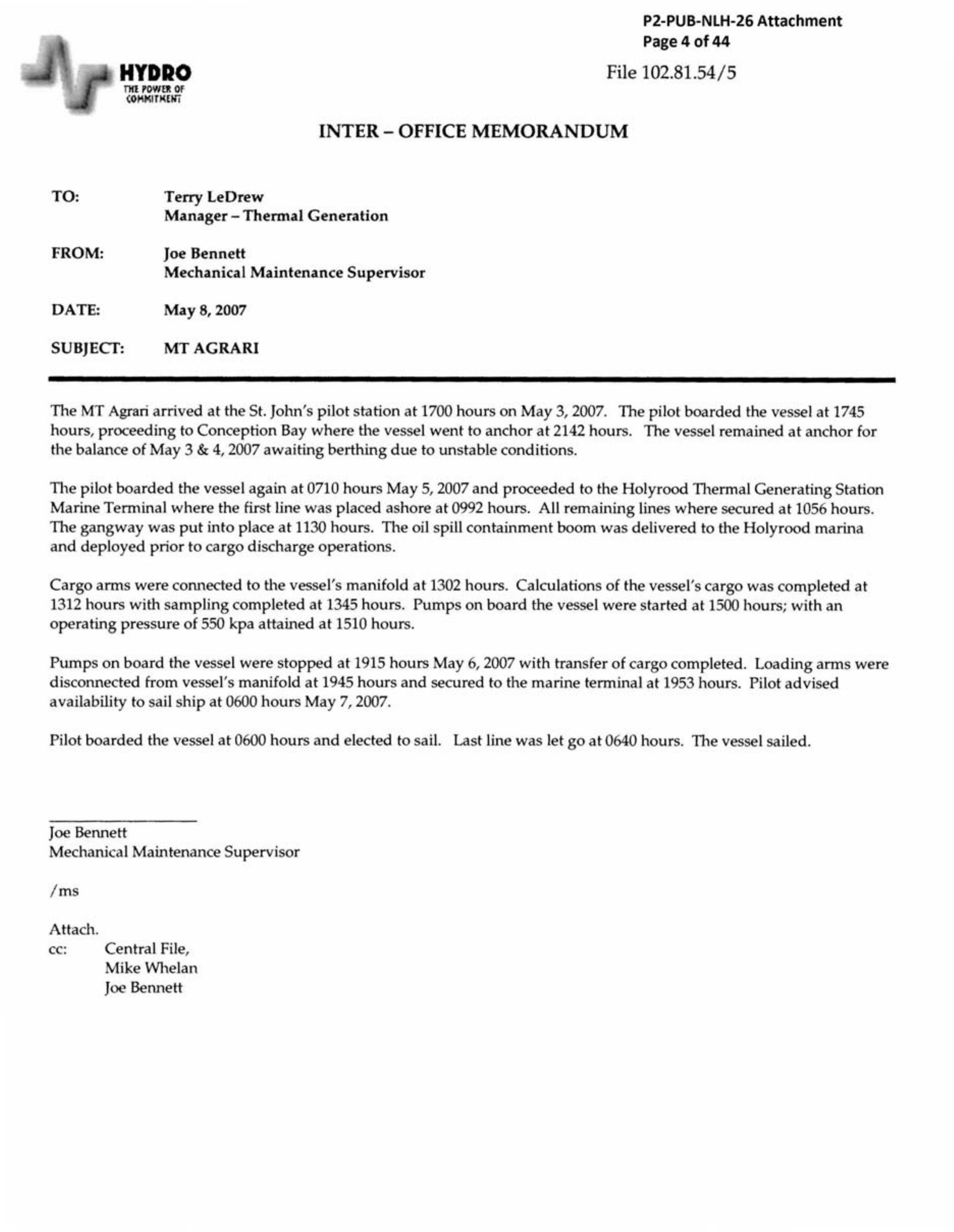
The pilot boarded the vessel at 1800 hours intent of sailing. Extreme high wind conditions at this time causes cancellation of sailing, and resulted in the establishment of extra mooring lines. The vessel remained moored to the Holyrood Marine Terminal for the night of March 26; and all day March 27, due to high wind conditions.

March 28, 2007 the pilot boarded the vessel at 1130 hours and in consultation with the Captain, elected to sail. The last line was let go at 1215 hours. The vessel sailed.

____
Joe Bennett
Mechanical Maintenance Supervisor

/ms

Attach.
cc: Central File,
Mike Whelan
Joe Bennett



HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Joe Bennett**
Mechanical Maintenance Supervisor

DATE: **May 8, 2007**

SUBJECT: **MT AGRARI**

The MT Agrari arrived at the St. John's pilot station at 1700 hours on May 3, 2007. The pilot boarded the vessel at 1745 hours, proceeding to Conception Bay where the vessel went to anchor at 2142 hours. The vessel remained at anchor for the balance of May 3 & 4, 2007 awaiting berthing due to unstable conditions.

The pilot boarded the vessel again at 0710 hours May 5, 2007 and proceeded to the Holyrood Thermal Generating Station Marine Terminal where the first line was placed ashore at 0992 hours. All remaining lines where secured at 1056 hours. The gangway was put into place at 1130 hours. The oil spill containment boom was delivered to the Holyrood marina and deployed prior to cargo discharge operations.

Cargo arms were connected to the vessel's manifold at 1302 hours. Calculations of the vessel's cargo was completed at 1312 hours with sampling completed at 1345 hours. Pumps on board the vessel were started at 1500 hours; with an operating pressure of 550 kpa attained at 1510 hours.

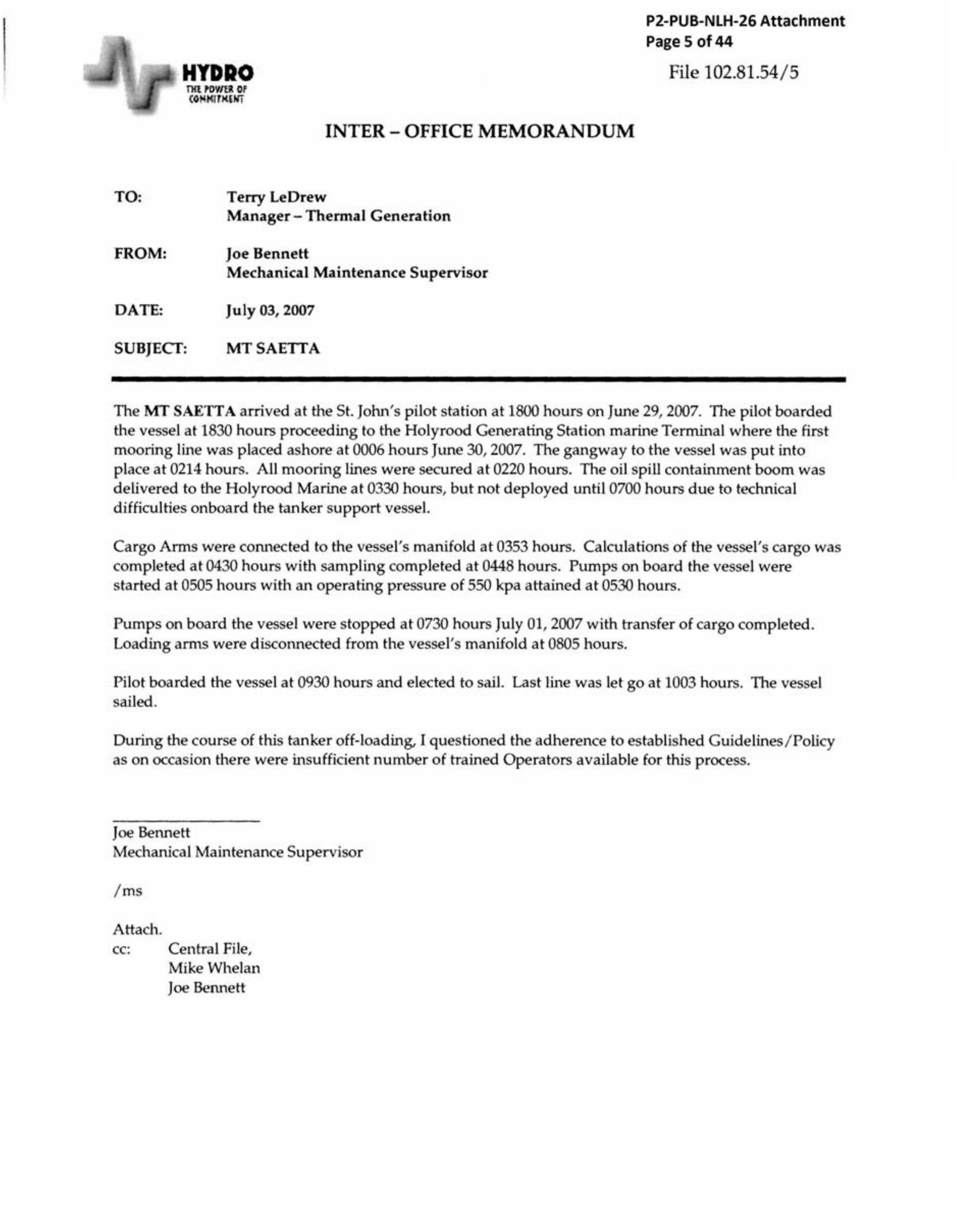
Pumps on board the vessel were stopped at 1915 hours May 6, 2007 with transfer of cargo completed. Loading arms were disconnected from vessel's manifold at 1945 hours and secured to the marine terminal at 1953 hours. Pilot advised availability to sail ship at 0600 hours May 7, 2007.

Pilot boarded the vessel at 0600 hours and elected to sail. Last line was let go at 0640 hours. The vessel sailed.

Joe Bennett
Mechanical Maintenance Supervisor

/ms

Attach.
cc: Central File,
Mike Whelan
Joe Bennett



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Page 5 of 44

HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Joe Bennett**
Mechanical Maintenance Supervisor

DATE: **July 03, 2007**

SUBJECT: **MT SAETTA**

The **MT SAETTA** arrived at the St. John's pilot station at 1800 hours on June 29, 2007. The pilot boarded the vessel at 1830 hours proceeding to the Holyrood Generating Station marine Terminal where the first mooring line was placed ashore at 0006 hours June 30, 2007. The gangway to the vessel was put into place at 0214 hours. All mooring lines were secured at 0220 hours. The oil spill containment boom was delivered to the Holyrood Marine at 0330 hours, but not deployed until 0700 hours due to technical difficulties onboard the tanker support vessel.

Cargo Arms were connected to the vessel's manifold at 0353 hours. Calculations of the vessel's cargo was completed at 0430 hours with sampling completed at 0448 hours. Pumps on board the vessel were started at 0505 hours with an operating pressure of 550 kpa attained at 0530 hours.

Pumps on board the vessel were stopped at 0730 hours July 01, 2007 with transfer of cargo completed. Loading arms were disconnected from the vessel's manifold at 0805 hours.

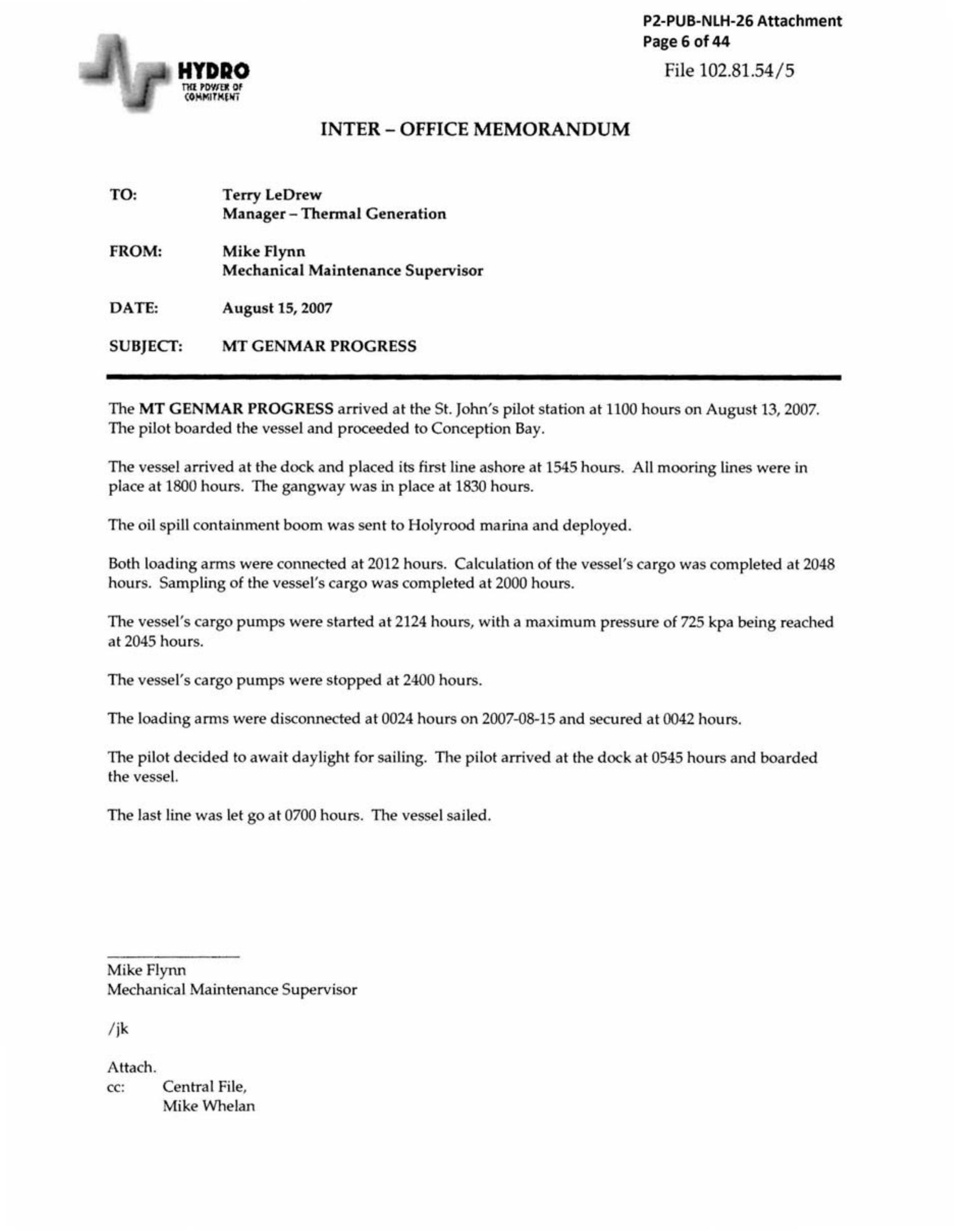
Pilot boarded the vessel at 0930 hours and elected to sail. Last line was let go at 1003 hours. The vessel sailed.

During the course of this tanker off-loading, I questioned the adherence to established Guidelines/Policy as on occasion there were insufficient number of trained Operators available for this process.

Joe Bennett
Mechanical Maintenance Supervisor

/ms

Attach.
cc: Central File,
Mike Whelan
Joe Bennett



File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **August 15, 2007**

SUBJECT: **MT GENMAR PROGRESS**

The **MT GENMAR PROGRESS** arrived at the St. John's pilot station at 1100 hours on August 13, 2007. The pilot boarded the vessel and proceeded to Conception Bay.

The vessel arrived at the dock and placed its first line ashore at 1545 hours. All mooring lines were in place at 1800 hours. The gangway was in place at 1830 hours.

The oil spill containment boom was sent to Holyrood marina and deployed.

Both loading arms were connected at 2012 hours. Calculation of the vessel's cargo was completed at 2048 hours. Sampling of the vessel's cargo was completed at 2000 hours.

The vessel's cargo pumps were started at 2124 hours, with a maximum pressure of 725 kpa being reached at 2045 hours.

The vessel's cargo pumps were stopped at 2400 hours.

The loading arms were disconnected at 0024 hours on 2007-08-15 and secured at 0042 hours.

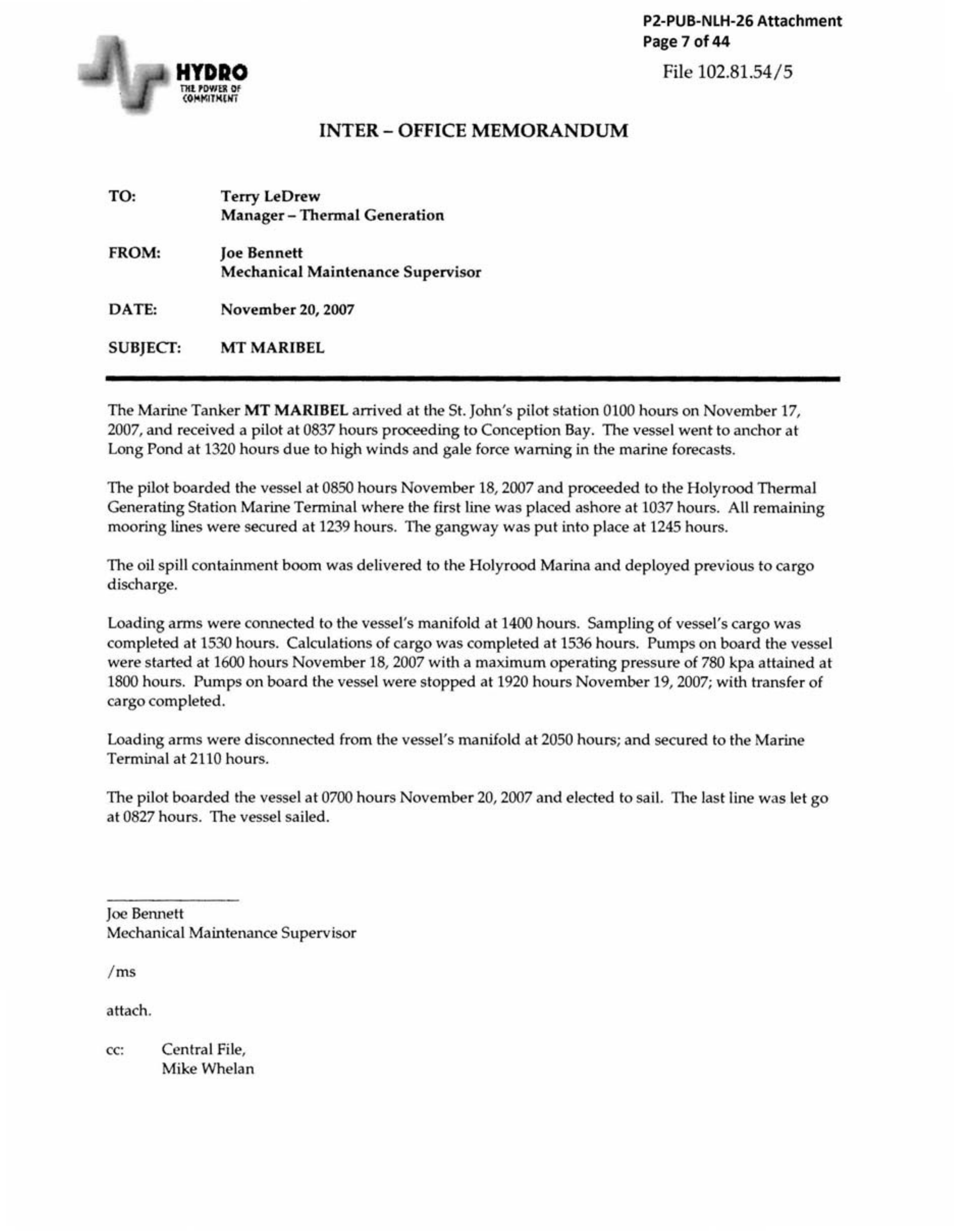
The pilot decided to await daylight for sailing. The pilot arrived at the dock at 0545 hours and boarded the vessel.

The last line was let go at 0700 hours. The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor

/jk

Attach.
cc: Central File,
Mike Whelan



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HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: Terry LeDrew
Manager – Thermal Generation

FROM: Joe Bennett
Mechanical Maintenance Supervisor

DATE: November 20, 2007

SUBJECT: MT MARIBEL

The Marine Tanker **MT MARIBEL** arrived at the St. John's pilot station 0100 hours on November 17, 2007, and received a pilot at 0837 hours proceeding to Conception Bay. The vessel went to anchor at Long Pond at 1320 hours due to high winds and gale force warning in the marine forecasts.

The pilot boarded the vessel at 0850 hours November 18, 2007 and proceeded to the Holyrood Thermal Generating Station Marine Terminal where the first line was placed ashore at 1037 hours. All remaining mooring lines were secured at 1239 hours. The gangway was put into place at 1245 hours.

The oil spill containment boom was delivered to the Holyrood Marina and deployed previous to cargo discharge.

Loading arms were connected to the vessel's manifold at 1400 hours. Sampling of vessel's cargo was completed at 1530 hours. Calculations of cargo was completed at 1536 hours. Pumps on board the vessel were started at 1600 hours November 18, 2007 with a maximum operating pressure of 780 kpa attained at 1800 hours. Pumps on board the vessel were stopped at 1920 hours November 19, 2007; with transfer of cargo completed.

Loading arms were disconnected from the vessel's manifold at 2050 hours; and secured to the Marine Terminal at 2110 hours.

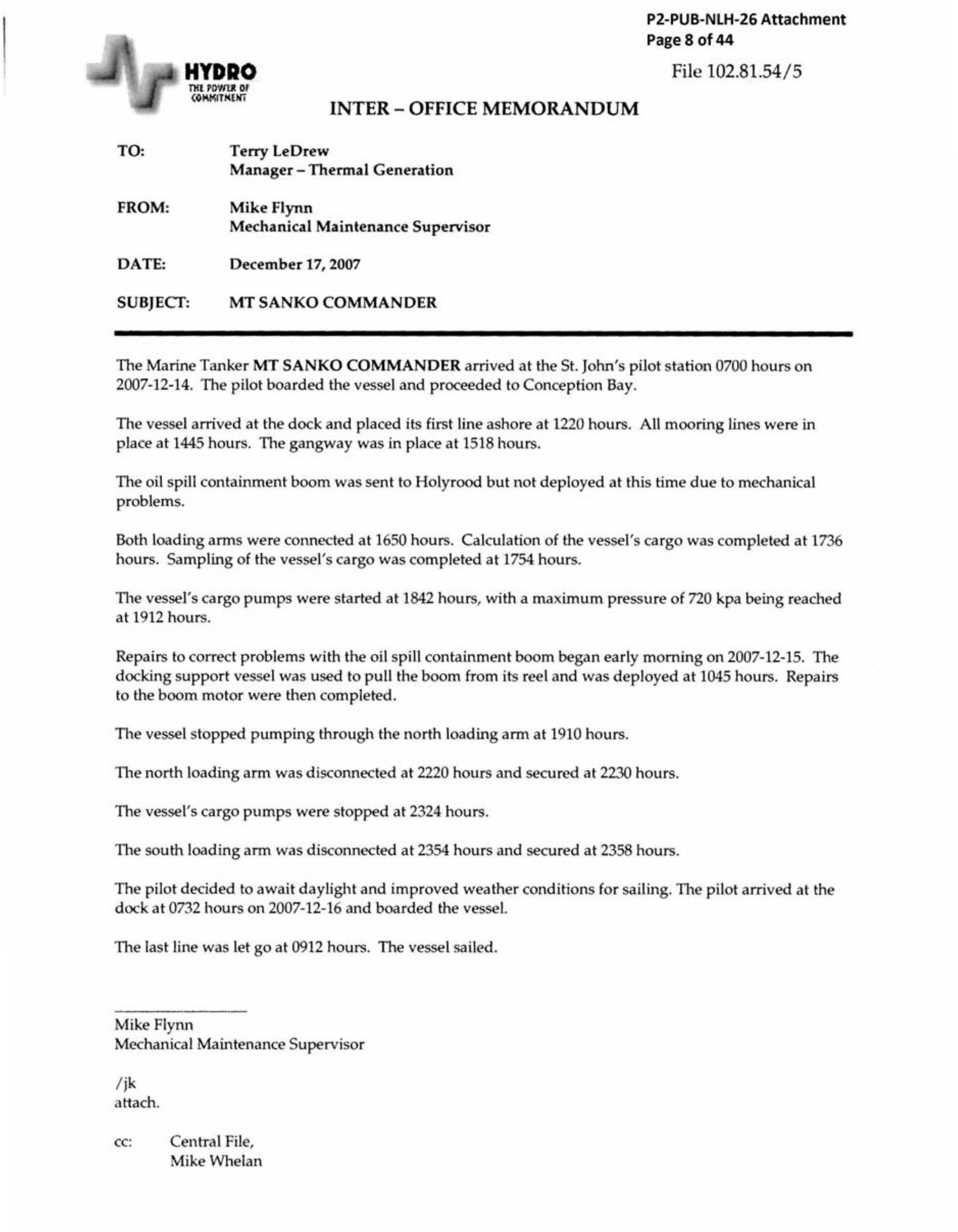
The pilot boarded the vessel at 0700 hours November 20, 2007 and elected to sail. The last line was let go at 0827 hours. The vessel sailed.

Joe Bennett
Mechanical Maintenance Supervisor

/ms

attach.

cc: Central File,
Mike Whelan



HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: Terry LeDrew
Manager – Thermal Generation

FROM: Mike Flynn
Mechanical Maintenance Supervisor

DATE: December 17, 2007

SUBJECT: MT SANKO COMMANDER

The Marine Tanker **MT SANKO COMMANDER** arrived at the St. John's pilot station 0700 hours on 2007-12-14. The pilot boarded the vessel and proceeded to Conception Bay.

The vessel arrived at the dock and placed its first line ashore at 1220 hours. All mooring lines were in place at 1445 hours. The gangway was in place at 1518 hours.

The oil spill containment boom was sent to Holyrood but not deployed at this time due to mechanical problems.

Both loading arms were connected at 1650 hours. Calculation of the vessel's cargo was completed at 1736 hours. Sampling of the vessel's cargo was completed at 1754 hours.

The vessel's cargo pumps were started at 1842 hours, with a maximum pressure of 720 kpa being reached at 1912 hours.

Repairs to correct problems with the oil spill containment boom began early morning on 2007-12-15. The docking support vessel was used to pull the boom from its reel and was deployed at 1045 hours. Repairs to the boom motor were then completed.

The vessel stopped pumping through the north loading arm at 1910 hours.

The north loading arm was disconnected at 2220 hours and secured at 2230 hours.

The vessel's cargo pumps were stopped at 2324 hours.

The south loading arm was disconnected at 2354 hours and secured at 2358 hours.

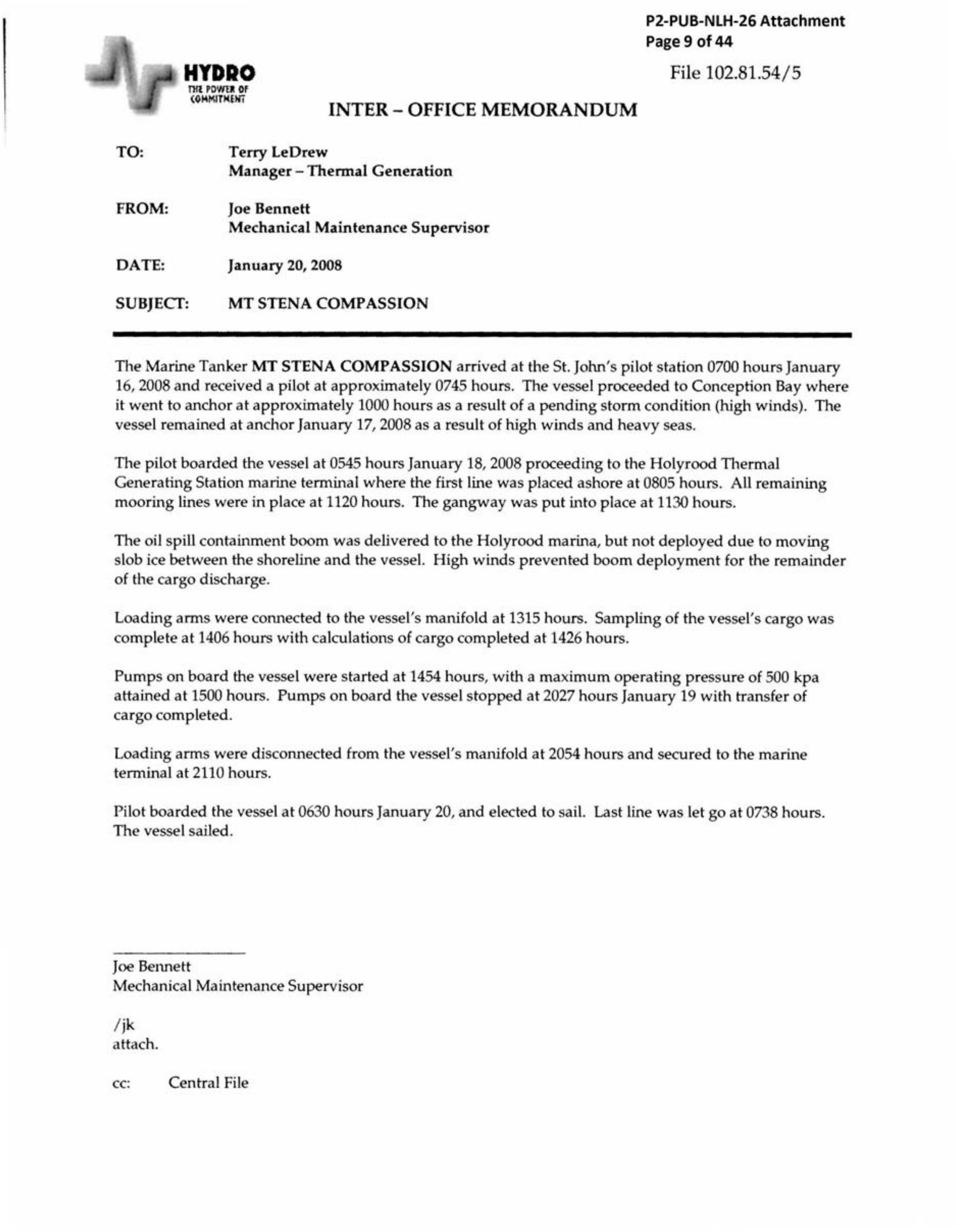
The pilot decided to await daylight and improved weather conditions for sailing. The pilot arrived at the dock at 0732 hours on 2007-12-16 and boarded the vessel.

The last line was let go at 0912 hours. The vessel sailed.

____
Mike Flynn
Mechanical Maintenance Supervisor

/jk
attach.

cc: Central File,
Mike Whelan



HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Joe Bennett**
Mechanical Maintenance Supervisor

DATE: **January 20, 2008**

SUBJECT: **MT STENA COMPASSION**

The Marine Tanker **MT STENA COMPASSION** arrived at the St. John's pilot station 0700 hours January 16, 2008 and received a pilot at approximately 0745 hours. The vessel proceeded to Conception Bay where it went to anchor at approximately 1000 hours as a result of a pending storm condition (high winds). The vessel remained at anchor January 17, 2008 as a result of high winds and heavy seas.

The pilot boarded the vessel at 0545 hours January 18, 2008 proceeding to the Holyrood Thermal Generating Station marine terminal where the first line was placed ashore at 0805 hours. All remaining mooring lines were in place at 1120 hours. The gangway was put into place at 1130 hours.

The oil spill containment boom was delivered to the Holyrood marina, but not deployed due to moving slob ice between the shoreline and the vessel. High winds prevented boom deployment for the remainder of the cargo discharge.

Loading arms were connected to the vessel's manifold at 1315 hours. Sampling of the vessel's cargo was complete at 1406 hours with calculations of cargo completed at 1426 hours.

Pumps on board the vessel were started at 1454 hours, with a maximum operating pressure of 500 kpa attained at 1500 hours. Pumps on board the vessel stopped at 2027 hours January 19 with transfer of cargo completed.

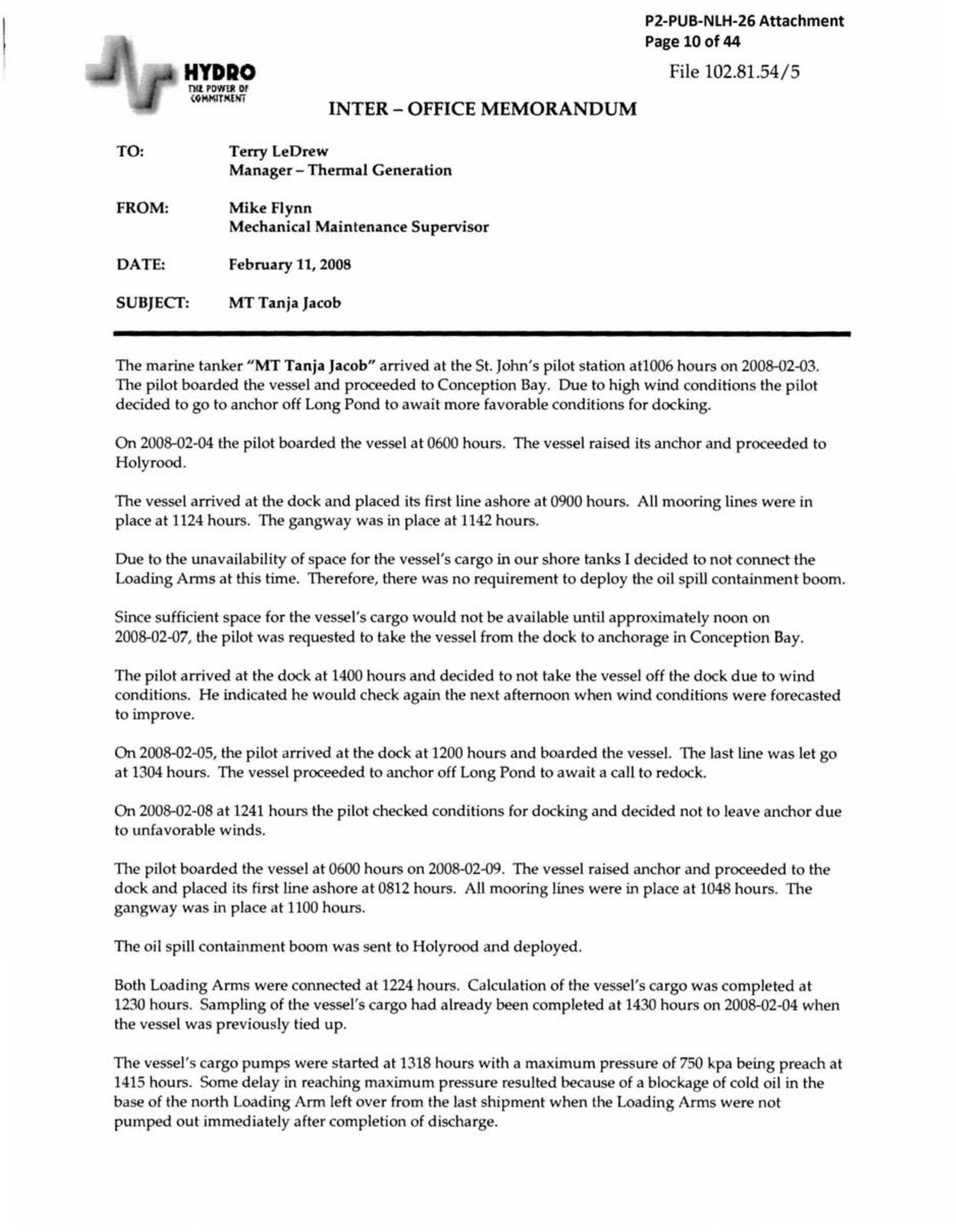
Loading arms were disconnected from the vessel's manifold at 2054 hours and secured to the marine terminal at 2110 hours.

Pilot boarded the vessel at 0630 hours January 20, and elected to sail. Last line was let go at 0738 hours. The vessel sailed.

Joe Bennett
Mechanical Maintenance Supervisor

/jk
attach.

cc: Central File



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File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **February 11, 2008**

SUBJECT: **MT Tanja Jacob**

The marine tanker **"MT Tanja Jacob"** arrived at the St. John's pilot station at1006 hours on 2008-02-03. The pilot boarded the vessel and proceeded to Conception Bay. Due to high wind conditions the pilot decided to go to anchor off Long Pond to await more favorable conditions for docking.

On 2008-02-04 the pilot boarded the vessel at 0600 hours. The vessel raised its anchor and proceeded to Holyrood.

The vessel arrived at the dock and placed its first line ashore at 0900 hours. All mooring lines were in place at 1124 hours. The gangway was in place at 1142 hours.

Due to the unavailability of space for the vessel's cargo in our shore tanks I decided to not connect the Loading Arms at this time. Therefore, there was no requirement to deploy the oil spill containment boom.

Since sufficient space for the vessel's cargo would not be available until approximately noon on 2008-02-07, the pilot was requested to take the vessel from the dock to anchorage in Conception Bay.

The pilot arrived at the dock at 1400 hours and decided to not take the vessel off the dock due to wind conditions. He indicated he would check again the next afternoon when wind conditions were forecasted to improve.

On 2008-02-05, the pilot arrived at the dock at 1200 hours and boarded the vessel. The last line was let go at 1304 hours. The vessel proceeded to anchor off Long Pond to await a call to redock.

On 2008-02-08 at 1241 hours the pilot checked conditions for docking and decided not to leave anchor due to unfavorable winds.

The pilot boarded the vessel at 0600 hours on 2008-02-09. The vessel raised anchor and proceeded to the dock and placed its first line ashore at 0812 hours. All mooring lines were in place at 1048 hours. The gangway was in place at 1100 hours.

The oil spill containment boom was sent to Holyrood and deployed.

Both Loading Arms were connected at 1224 hours. Calculation of the vessel's cargo was completed at 1230 hours. Sampling of the vessel's cargo had already been completed at 1430 hours on 2008-02-04 when the vessel was previously tied up.

The vessel's cargo pumps were started at 1318 hours with a maximum pressure of 750 kpa being preach at 1415 hours. Some delay in reaching maximum pressure resulted because of a blockage of cold oil in the base of the north Loading Arm left over from the last shipment when the Loading Arms were not pumped out immediately after completion of discharge.

File 102.81.54/5

INTER – OFFICE MEMORANDUM

The vessel's cargo pumps were stopped at 0004 hours on 2008-01-11.

The Loading Arms were disconnected at 0054 hours and secured at 0106 hours.

The pilot decided to await daylight and improved weather conditions for sailing. The pilot arrived at the dock at 0630 hours and boarded the vessel.

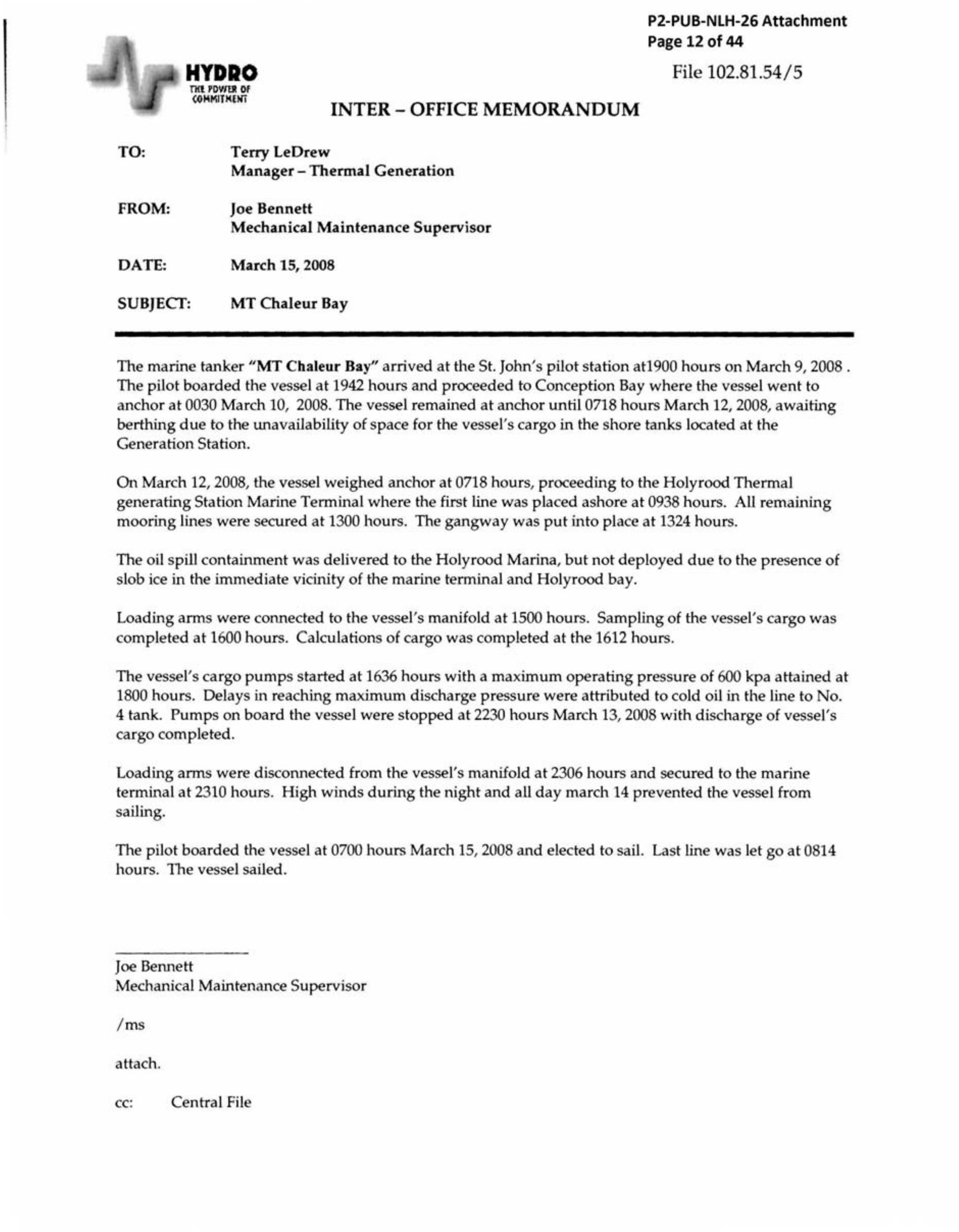
The last line was let go at 0748 hours. The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor

/ms

attach.

cc: Central File



File 102.81.54/5

HYDRO
THE POWER OF COMMITMENT

INTER – OFFICE MEMORANDUM

TO:	**Terry LeDrew** **Manager – Thermal Generation**
FROM:	**Joe Bennett** **Mechanical Maintenance Supervisor**
DATE:	**March 15, 2008**
SUBJECT:	**MT Chaleur Bay**

The marine tanker **"MT Chaleur Bay"** arrived at the St. John's pilot station at1900 hours on March 9, 2008 . The pilot boarded the vessel at 1942 hours and proceeded to Conception Bay where the vessel went to anchor at 0030 March 10, 2008. The vessel remained at anchor until 0718 hours March 12, 2008, awaiting berthing due to the unavailability of space for the vessel's cargo in the shore tanks located at the Generation Station.

On March 12, 2008, the vessel weighed anchor at 0718 hours, proceeding to the Holyrood Thermal generating Station Marine Terminal where the first line was placed ashore at 0938 hours. All remaining mooring lines were secured at 1300 hours. The gangway was put into place at 1324 hours.

The oil spill containment was delivered to the Holyrood Marina, but not deployed due to the presence of slob ice in the immediate vicinity of the marine terminal and Holyrood bay.

Loading arms were connected to the vessel's manifold at 1500 hours. Sampling of the vessel's cargo was completed at 1600 hours. Calculations of cargo was completed at the 1612 hours.

The vessel's cargo pumps started at 1636 hours with a maximum operating pressure of 600 kpa attained at 1800 hours. Delays in reaching maximum discharge pressure were attributed to cold oil in the line to No. 4 tank. Pumps on board the vessel were stopped at 2230 hours March 13, 2008 with discharge of vessel's cargo completed.

Loading arms were disconnected from the vessel's manifold at 2306 hours and secured to the marine terminal at 2310 hours. High winds during the night and all day march 14 prevented the vessel from sailing.

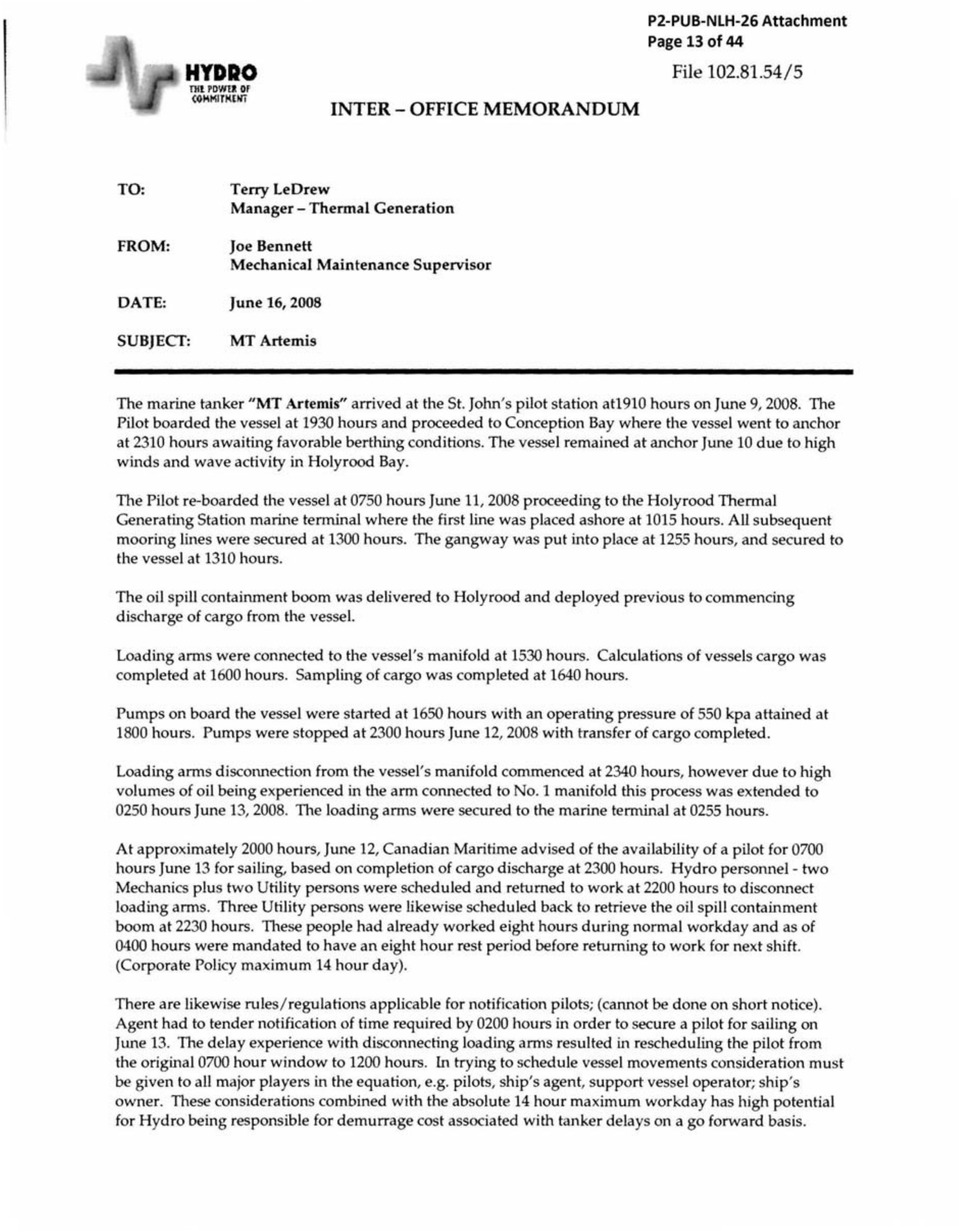
The pilot boarded the vessel at 0700 hours March 15, 2008 and elected to sail. Last line was let go at 0814 hours. The vessel sailed.

Joe Bennett
Mechanical Maintenance Supervisor

/ms

attach.

cc: Central File



HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Joe Bennett**
Mechanical Maintenance Supervisor

DATE: **June 16, 2008**

SUBJECT: **MT Artemis**

The marine tanker **"MT Artemis"** arrived at the St. John's pilot station at1910 hours on June 9, 2008. The Pilot boarded the vessel at 1930 hours and proceeded to Conception Bay where the vessel went to anchor at 2310 hours awaiting favorable berthing conditions. The vessel remained at anchor June 10 due to high winds and wave activity in Holyrood Bay.

The Pilot re-boarded the vessel at 0750 hours June 11, 2008 proceeding to the Holyrood Thermal Generating Station marine terminal where the first line was placed ashore at 1015 hours. All subsequent mooring lines were secured at 1300 hours. The gangway was put into place at 1255 hours, and secured to the vessel at 1310 hours.

The oil spill containment boom was delivered to Holyrood and deployed previous to commencing discharge of cargo from the vessel.

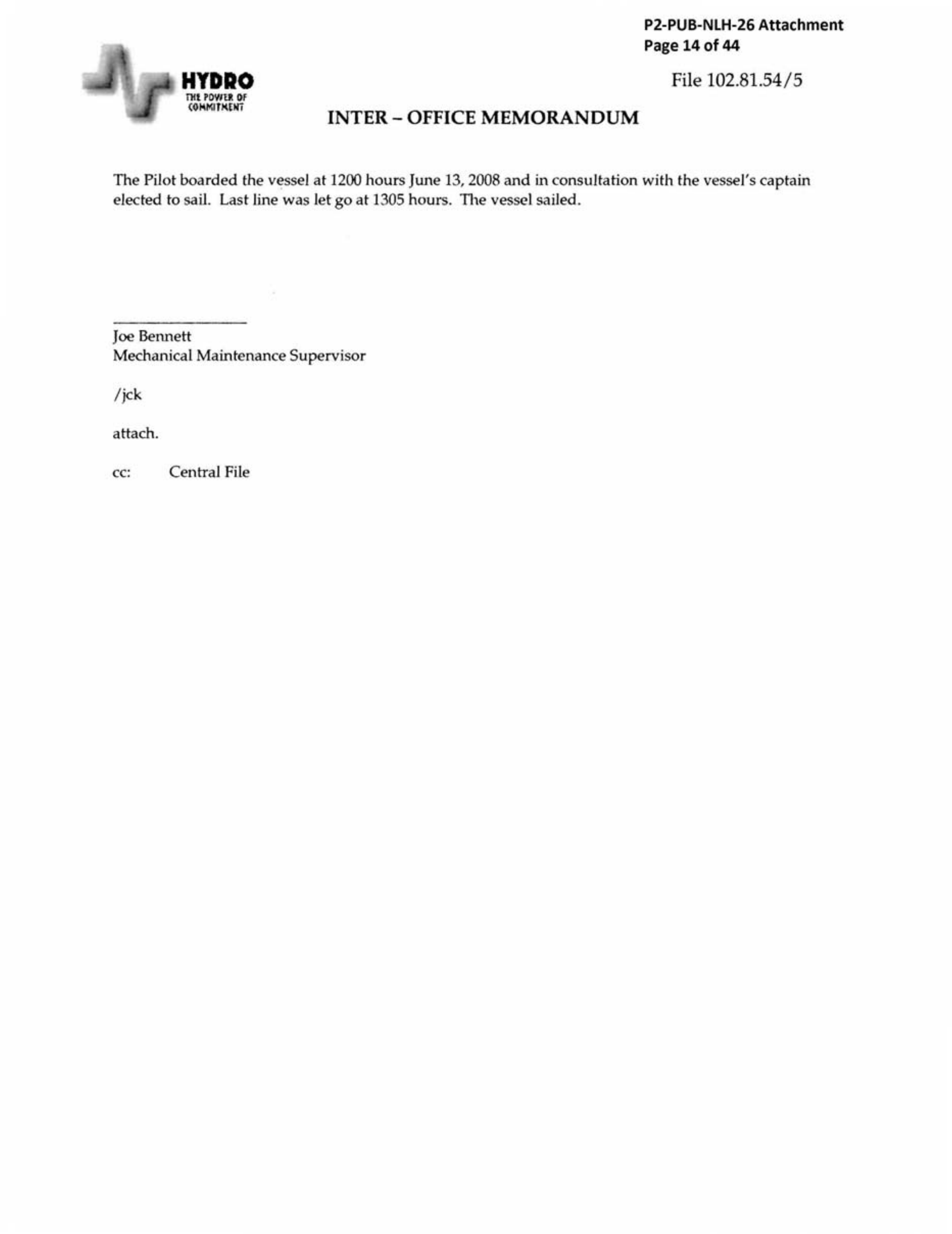
Loading arms were connected to the vessel's manifold at 1530 hours. Calculations of vessels cargo was completed at 1600 hours. Sampling of cargo was completed at 1640 hours.

Pumps on board the vessel were started at 1650 hours with an operating pressure of 550 kpa attained at 1800 hours. Pumps were stopped at 2300 hours June 12, 2008 with transfer of cargo completed.

Loading arms disconnection from the vessel's manifold commenced at 2340 hours, however due to high volumes of oil being experienced in the arm connected to No. 1 manifold this process was extended to 0250 hours June 13, 2008. The loading arms were secured to the marine terminal at 0255 hours.

At approximately 2000 hours, June 12, Canadian Maritime advised of the availability of a pilot for 0700 hours June 13 for sailing, based on completion of cargo discharge at 2300 hours. Hydro personnel - two Mechanics plus two Utility persons were scheduled and returned to work at 2200 hours to disconnect loading arms. Three Utility persons were likewise scheduled back to retrieve the oil spill containment boom at 2230 hours. These people had already worked eight hours during normal workday and as of 0400 hours were mandated to have an eight hour rest period before returning to work for next shift. (Corporate Policy maximum 14 hour day).

There are likewise rules/regulations applicable for notification pilots; (cannot be done on short notice). Agent had to tender notification of time required by 0200 hours in order to secure a pilot for sailing on June 13. The delay experience with disconnecting loading arms resulted in rescheduling the pilot from the original 0700 hour window to 1200 hours. In trying to schedule vessel movements consideration must be given to all major players in the equation, e.g. pilots, ship's agent, support vessel operator; ship's owner. These considerations combined with the absolute 14 hour maximum workday has high potential for Hydro being responsible for demurrage cost associated with tanker delays on a go forward basis.



HYDRO
THE POWER OF COMMITMENT

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INTER – OFFICE MEMORANDUM

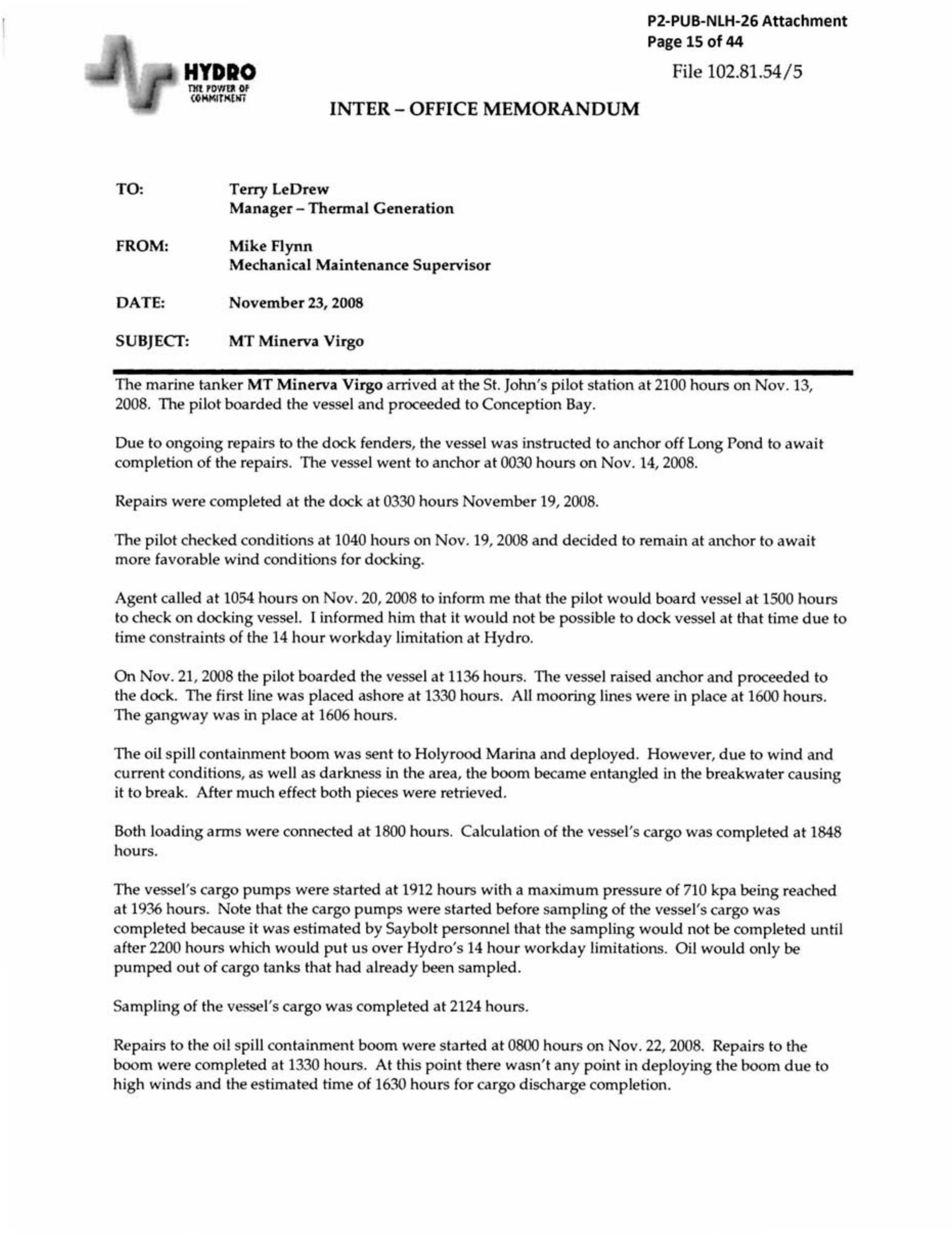
The Pilot boarded the vessel at 1200 hours June 13, 2008 and in consultation with the vessel's captain elected to sail. Last line was let go at 1305 hours. The vessel sailed.

Joe Bennett
Mechanical Maintenance Supervisor

/jck

attach.

cc: Central File



HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO:	**Terry LeDrew** **Manager – Thermal Generation**
FROM:	**Mike Flynn** **Mechanical Maintenance Supervisor**
DATE:	**November 23, 2008**
SUBJECT:	**MT Minerva Virgo**

The marine tanker **MT Minerva Virgo** arrived at the St. John's pilot station at 2100 hours on Nov. 13, 2008. The pilot boarded the vessel and proceeded to Conception Bay.

Due to ongoing repairs to the dock fenders, the vessel was instructed to anchor off Long Pond to await completion of the repairs. The vessel went to anchor at 0030 hours on Nov. 14, 2008.

Repairs were completed at the dock at 0330 hours November 19, 2008.

The pilot checked conditions at 1040 hours on Nov. 19, 2008 and decided to remain at anchor to await more favorable wind conditions for docking.

Agent called at 1054 hours on Nov. 20, 2008 to inform me that the pilot would board vessel at 1500 hours to check on docking vessel. I informed him that it would not be possible to dock vessel at that time due to time constraints of the 14 hour workday limitation at Hydro.

On Nov. 21, 2008 the pilot boarded the vessel at 1136 hours. The vessel raised anchor and proceeded to the dock. The first line was placed ashore at 1330 hours. All mooring lines were in place at 1600 hours. The gangway was in place at 1606 hours.

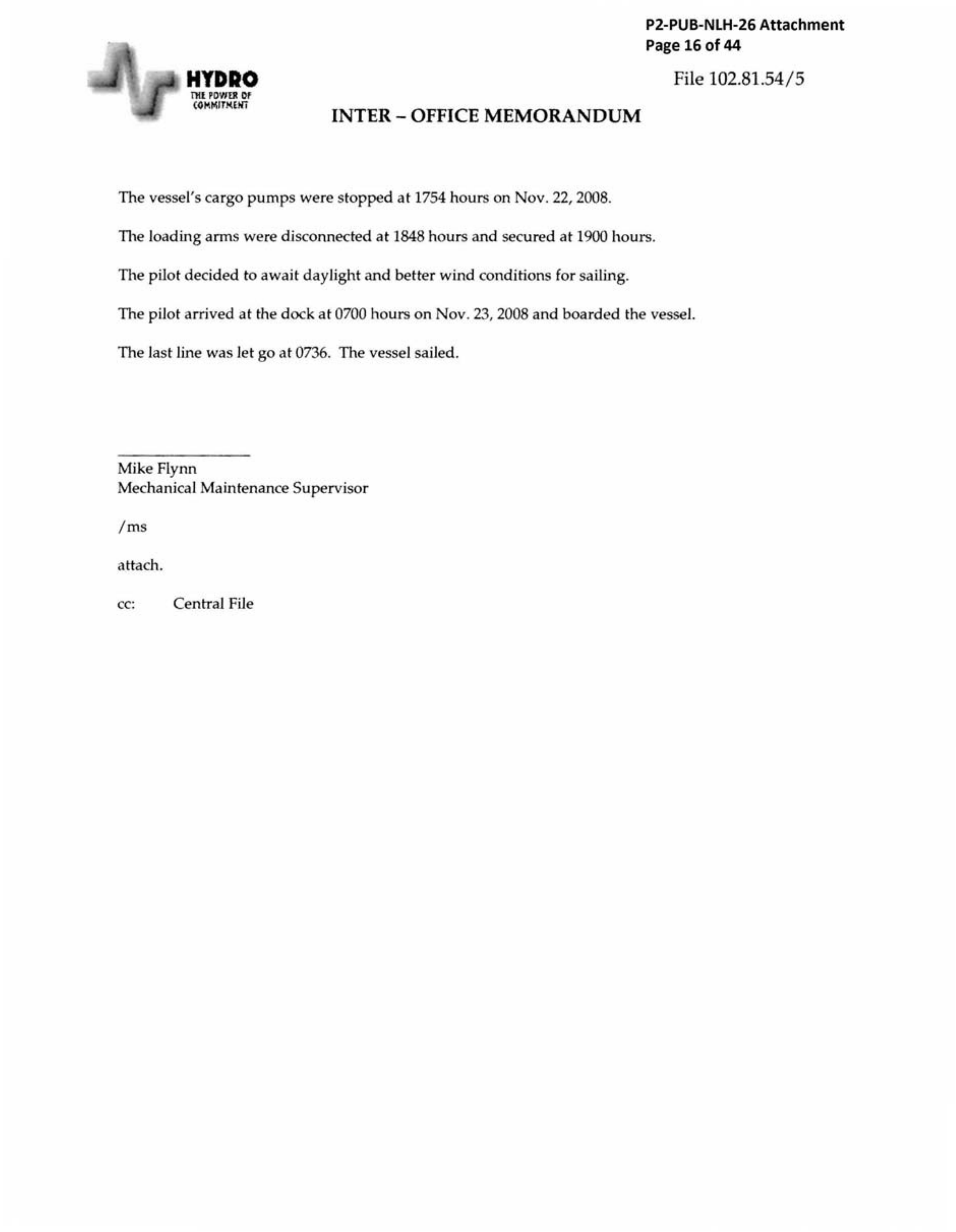
The oil spill containment boom was sent to Holyrood Marina and deployed. However, due to wind and current conditions, as well as darkness in the area, the boom became entangled in the breakwater causing it to break. After much effect both pieces were retrieved.

Both loading arms were connected at 1800 hours. Calculation of the vessel's cargo was completed at 1848 hours.

The vessel's cargo pumps were started at 1912 hours with a maximum pressure of 710 kpa being reached at 1936 hours. Note that the cargo pumps were started before sampling of the vessel's cargo was completed because it was estimated by Saybolt personnel that the sampling would not be completed until after 2200 hours which would put us over Hydro's 14 hour workday limitations. Oil would only be pumped out of cargo tanks that had already been sampled.

Sampling of the vessel's cargo was completed at 2124 hours.

Repairs to the oil spill containment boom were started at 0800 hours on Nov. 22, 2008. Repairs to the boom were completed at 1330 hours. At this point there wasn't any point in deploying the boom due to high winds and the estimated time of 1630 hours for cargo discharge completion.



HYDRO
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File 102.81.54/5

INTER – OFFICE MEMORANDUM

The vessel's cargo pumps were stopped at 1754 hours on Nov. 22, 2008.

The loading arms were disconnected at 1848 hours and secured at 1900 hours.

The pilot decided to await daylight and better wind conditions for sailing.

The pilot arrived at the dock at 0700 hours on Nov. 23, 2008 and boarded the vessel.

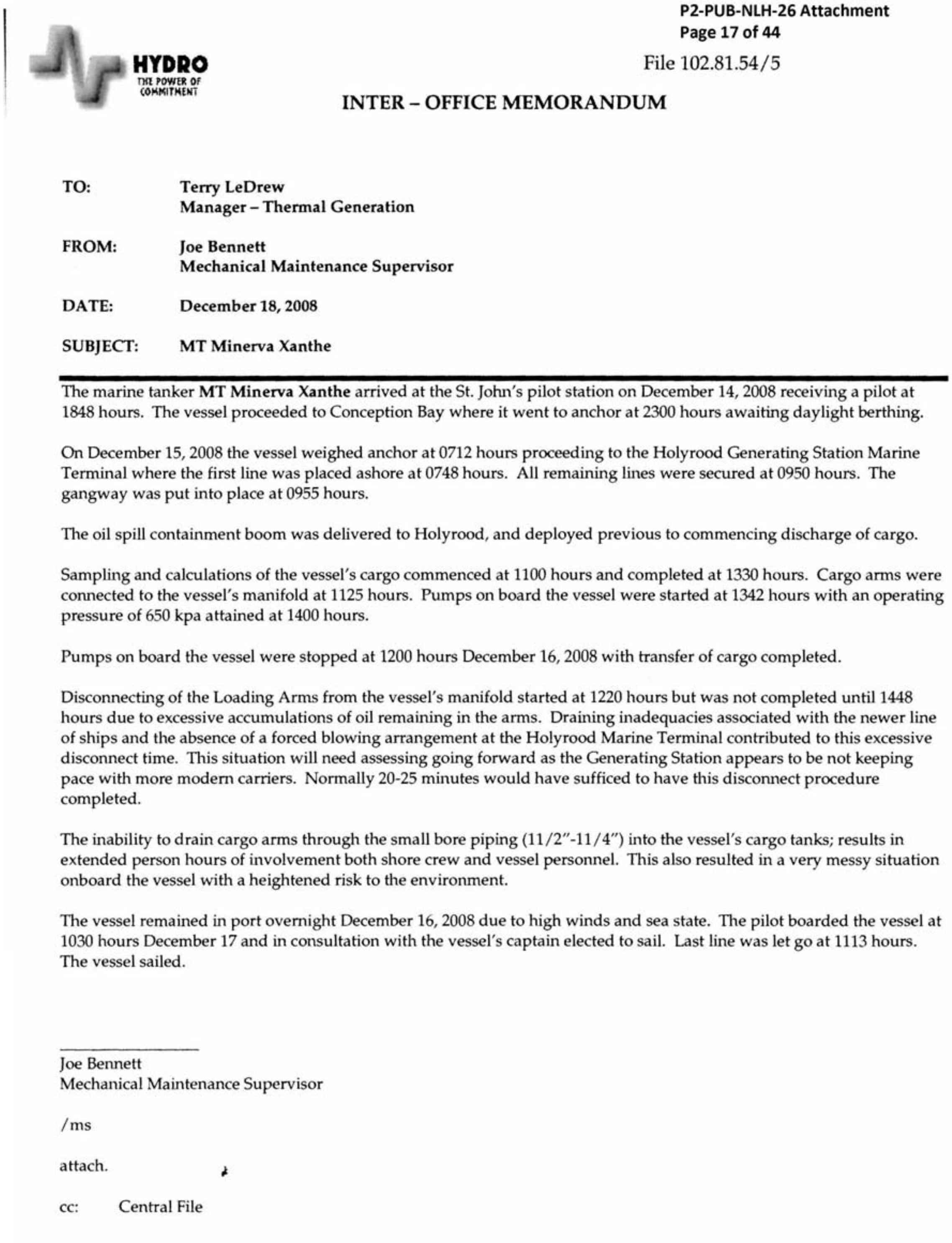
The last line was let go at 0736. The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor

/ms

attach.

cc: Central File



File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Joe Bennett**
Mechanical Maintenance Supervisor

DATE: **December 18, 2008**

SUBJECT: **MT Minerva Xanthe**

The marine tanker **MT Minerva Xanthe** arrived at the St. John's pilot station on December 14, 2008 receiving a pilot at 1848 hours. The vessel proceeded to Conception Bay where it went to anchor at 2300 hours awaiting daylight berthing.

On December 15, 2008 the vessel weighed anchor at 0712 hours proceeding to the Holyrood Generating Station Marine Terminal where the first line was placed ashore at 0748 hours. All remaining lines were secured at 0950 hours. The gangway was put into place at 0955 hours.

The oil spill containment boom was delivered to Holyrood, and deployed previous to commencing discharge of cargo.

Sampling and calculations of the vessel's cargo commenced at 1100 hours and completed at 1330 hours. Cargo arms were connected to the vessel's manifold at 1125 hours. Pumps on board the vessel were started at 1342 hours with an operating pressure of 650 kpa attained at 1400 hours.

Pumps on board the vessel were stopped at 1200 hours December 16, 2008 with transfer of cargo completed.

Disconnecting of the Loading Arms from the vessel's manifold started at 1220 hours but was not completed until 1448 hours due to excessive accumulations of oil remaining in the arms. Draining inadequacies associated with the newer line of ships and the absence of a forced blowing arrangement at the Holyrood Marine Terminal contributed to this excessive disconnect time. This situation will need assessing going forward as the Generating Station appears to be not keeping pace with more modern carriers. Normally 20-25 minutes would have sufficed to have this disconnect procedure completed.

The inability to drain cargo arms through the small bore piping (11/2"-11/4") into the vessel's cargo tanks; results in extended person hours of involvement both shore crew and vessel personnel. This also resulted in a very messy situation onboard the vessel with a heightened risk to the environment.

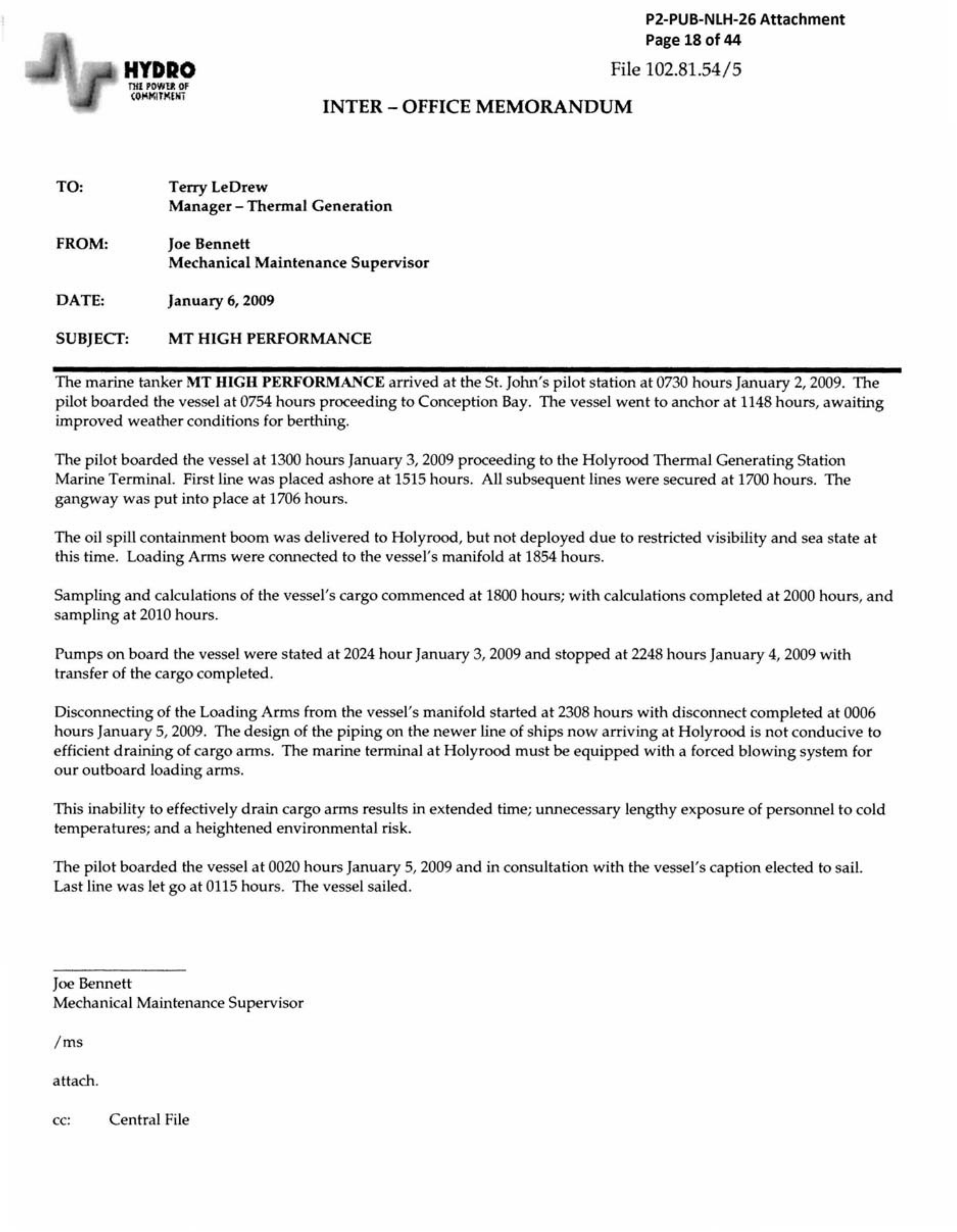
The vessel remained in port overnight December 16, 2008 due to high winds and sea state. The pilot boarded the vessel at 1030 hours December 17 and in consultation with the vessel's captain elected to sail. Last line was let go at 1113 hours. The vessel sailed.

Joe Bennett
Mechanical Maintenance Supervisor

/ms

attach.

cc: Central File



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HYDRO
THE POWER OF
COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO:	**Terry LeDrew** **Manager – Thermal Generation**
FROM:	**Joe Bennett** **Mechanical Maintenance Supervisor**
DATE:	**January 6, 2009**
SUBJECT:	**MT HIGH PERFORMANCE**

The marine tanker **MT HIGH PERFORMANCE** arrived at the St. John's pilot station at 0730 hours January 2, 2009. The pilot boarded the vessel at 0754 hours proceeding to Conception Bay. The vessel went to anchor at 1148 hours, awaiting improved weather conditions for berthing.

The pilot boarded the vessel at 1300 hours January 3, 2009 proceeding to the Holyrood Thermal Generating Station Marine Terminal. First line was placed ashore at 1515 hours. All subsequent lines were secured at 1700 hours. The gangway was put into place at 1706 hours.

The oil spill containment boom was delivered to Holyrood, but not deployed due to restricted visibility and sea state at this time. Loading Arms were connected to the vessel's manifold at 1854 hours.

Sampling and calculations of the vessel's cargo commenced at 1800 hours; with calculations completed at 2000 hours, and sampling at 2010 hours.

Pumps on board the vessel were stated at 2024 hour January 3, 2009 and stopped at 2248 hours January 4, 2009 with transfer of the cargo completed.

Disconnecting of the Loading Arms from the vessel's manifold started at 2308 hours with disconnect completed at 0006 hours January 5, 2009. The design of the piping on the newer line of ships now arriving at Holyrood is not conducive to efficient draining of cargo arms. The marine terminal at Holyrood must be equipped with a forced blowing system for our outboard loading arms.

This inability to effectively drain cargo arms results in extended time; unnecessary lengthy exposure of personnel to cold temperatures; and a heightened environmental risk.

The pilot boarded the vessel at 0020 hours January 5, 2009 and in consultation with the vessel's caption elected to sail. Last line was let go at 0115 hours. The vessel sailed.

Joe Bennett
Mechanical Maintenance Supervisor

/ms

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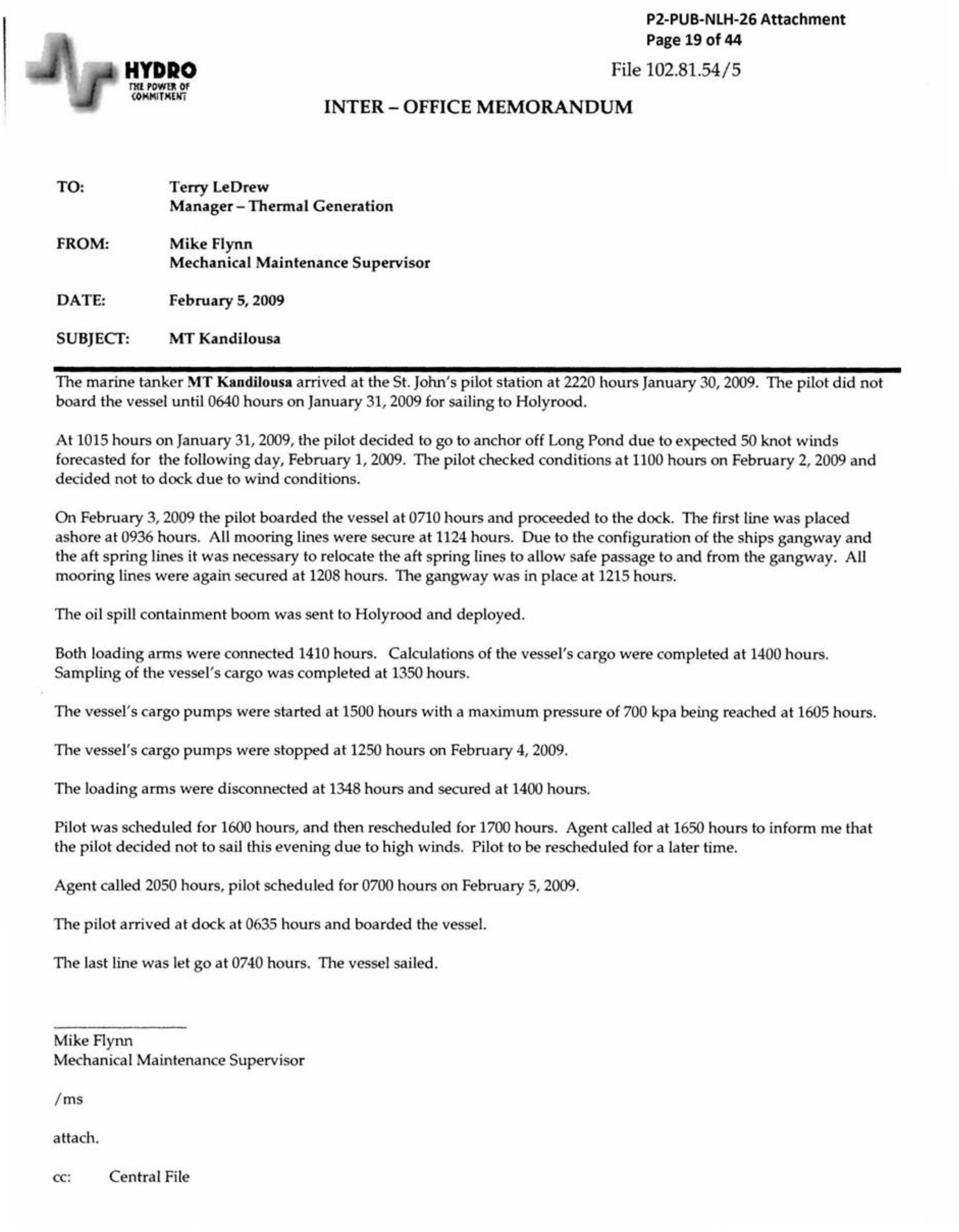
cc: Central File



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HYDRO
THE POWER OF COMMITMENT

File 102.81.54/5

INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **February 5, 2009**

SUBJECT: **MT Kandilousa**

The marine tanker **MT Kandilousa** arrived at the St. John's pilot station at 2220 hours January 30, 2009. The pilot did not board the vessel until 0640 hours on January 31, 2009 for sailing to Holyrood.

At 1015 hours on January 31, 2009, the pilot decided to go to anchor off Long Pond due to expected 50 knot winds forecasted for the following day, February 1, 2009. The pilot checked conditions at 1100 hours on February 2, 2009 and decided not to dock due to wind conditions.

On February 3, 2009 the pilot boarded the vessel at 0710 hours and proceeded to the dock. The first line was placed ashore at 0936 hours. All mooring lines were secure at 1124 hours. Due to the configuration of the ships gangway and the aft spring lines it was necessary to relocate the aft spring lines to allow safe passage to and from the gangway. All mooring lines were again secured at 1208 hours. The gangway was in place at 1215 hours.

The oil spill containment boom was sent to Holyrood and deployed.

Both loading arms were connected 1410 hours. Calculations of the vessel's cargo were completed at 1400 hours. Sampling of the vessel's cargo was completed at 1350 hours.

The vessel's cargo pumps were started at 1500 hours with a maximum pressure of 700 kpa being reached at 1605 hours.

The vessel's cargo pumps were stopped at 1250 hours on February 4, 2009.

The loading arms were disconnected at 1348 hours and secured at 1400 hours.

Pilot was scheduled for 1600 hours, and then rescheduled for 1700 hours. Agent called at 1650 hours to inform me that the pilot decided not to sail this evening due to high winds. Pilot to be rescheduled for a later time.

Agent called 2050 hours, pilot scheduled for 0700 hours on February 5, 2009.

The pilot arrived at dock at 0635 hours and boarded the vessel.

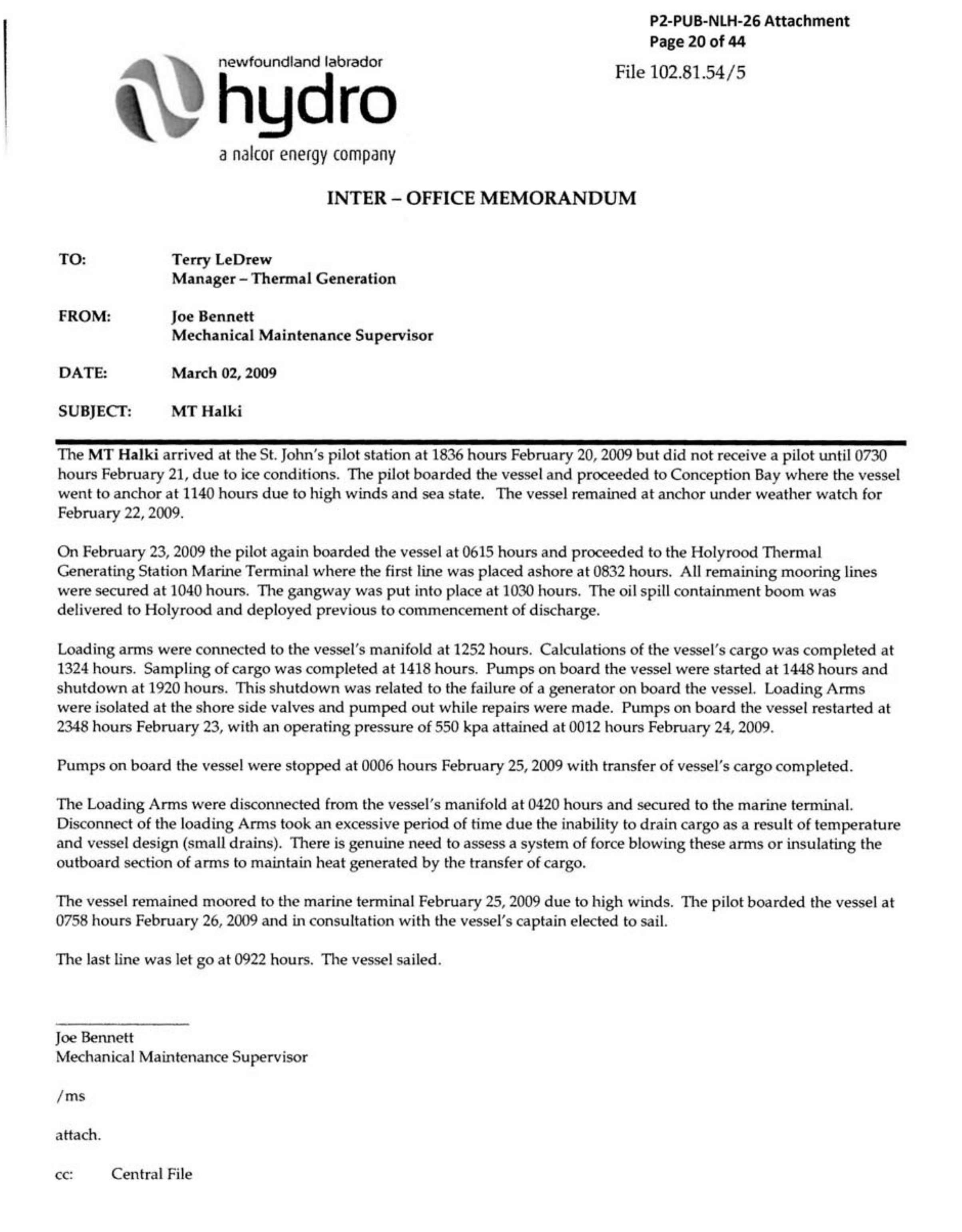
The last line was let go at 0740 hours. The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor

/ms

attach.

cc: Central File



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File 102.81.54/5

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INTER – OFFICE MEMORANDUM

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Joe Bennett**
Mechanical Maintenance Supervisor

DATE: **March 02, 2009**

SUBJECT: **MT Halki**

The **MT Halki** arrived at the St. John's pilot station at 1836 hours February 20, 2009 but did not receive a pilot until 0730 hours February 21, due to ice conditions. The pilot boarded the vessel and proceeded to Conception Bay where the vessel went to anchor at 1140 hours due to high winds and sea state. The vessel remained at anchor under weather watch for February 22, 2009.

On February 23, 2009 the pilot again boarded the vessel at 0615 hours and proceeded to the Holyrood Thermal Generating Station Marine Terminal where the first line was placed ashore at 0832 hours. All remaining mooring lines were secured at 1040 hours. The gangway was put into place at 1030 hours. The oil spill containment boom was delivered to Holyrood and deployed previous to commencement of discharge.

Loading arms were connected to the vessel's manifold at 1252 hours. Calculations of the vessel's cargo was completed at 1324 hours. Sampling of cargo was completed at 1418 hours. Pumps on board the vessel were started at 1448 hours and shutdown at 1920 hours. This shutdown was related to the failure of a generator on board the vessel. Loading Arms were isolated at the shore side valves and pumped out while repairs were made. Pumps on board the vessel restarted at 2348 hours February 23, with an operating pressure of 550 kpa attained at 0012 hours February 24, 2009.

Pumps on board the vessel were stopped at 0006 hours February 25, 2009 with transfer of vessel's cargo completed.

The Loading Arms were disconnected from the vessel's manifold at 0420 hours and secured to the marine terminal. Disconnect of the loading Arms took an excessive period of time due the inability to drain cargo as a result of temperature and vessel design (small drains). There is genuine need to assess a system of force blowing these arms or insulating the outboard section of arms to maintain heat generated by the transfer of cargo.

The vessel remained moored to the marine terminal February 25, 2009 due to high winds. The pilot boarded the vessel at 0758 hours February 26, 2009 and in consultation with the vessel's captain elected to sail.

The last line was let go at 0922 hours. The vessel sailed.

____
Joe Bennett
Mechanical Maintenance Supervisor

/ms

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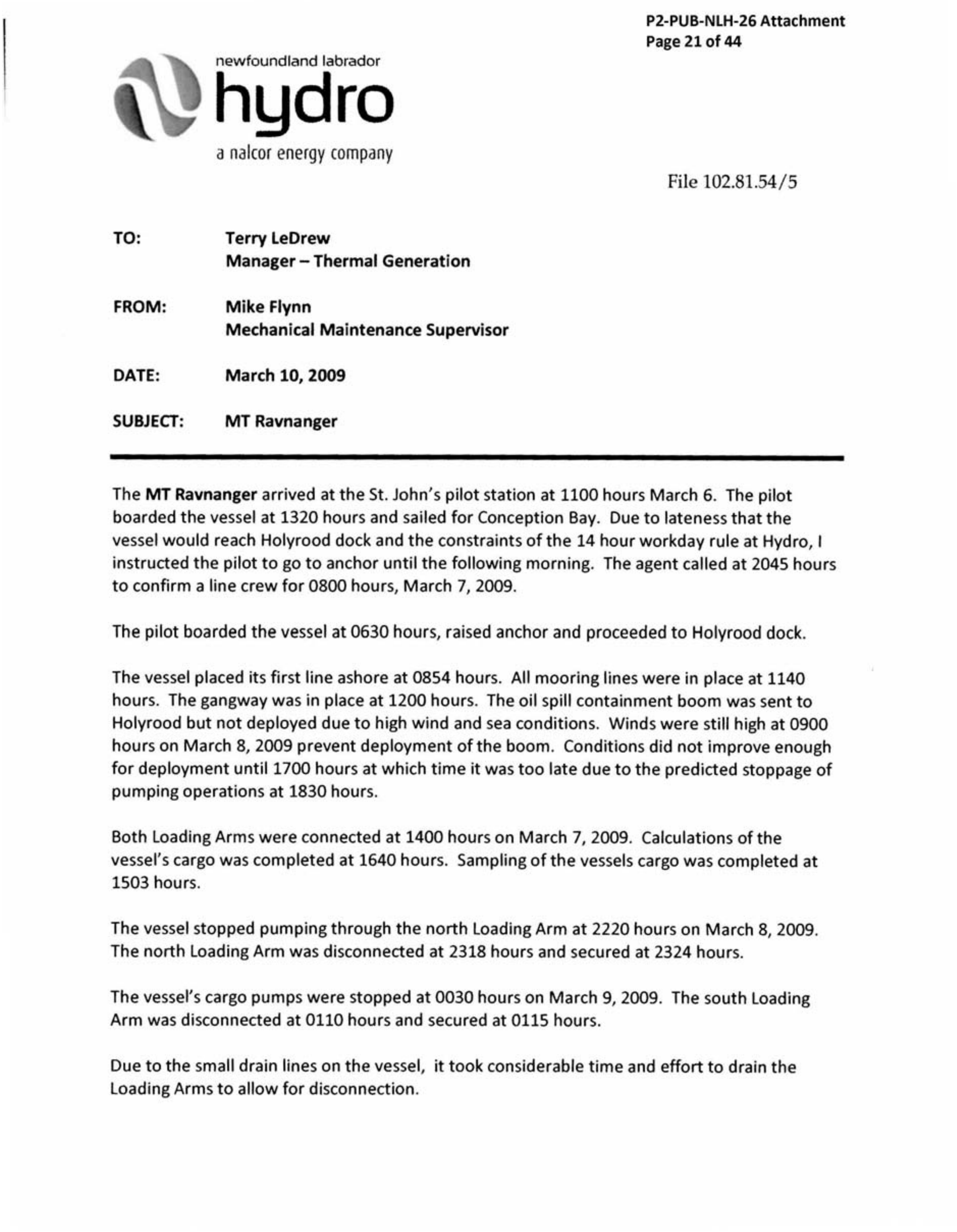

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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **March 10, 2009**

SUBJECT: **MT Ravnanger**

The **MT Ravnanger** arrived at the St. John's pilot station at 1100 hours March 6. The pilot boarded the vessel at 1320 hours and sailed for Conception Bay. Due to lateness that the vessel would reach Holyrood dock and the constraints of the 14 hour workday rule at Hydro, I instructed the pilot to go to anchor until the following morning. The agent called at 2045 hours to confirm a line crew for 0800 hours, March 7, 2009.

The pilot boarded the vessel at 0630 hours, raised anchor and proceeded to Holyrood dock.

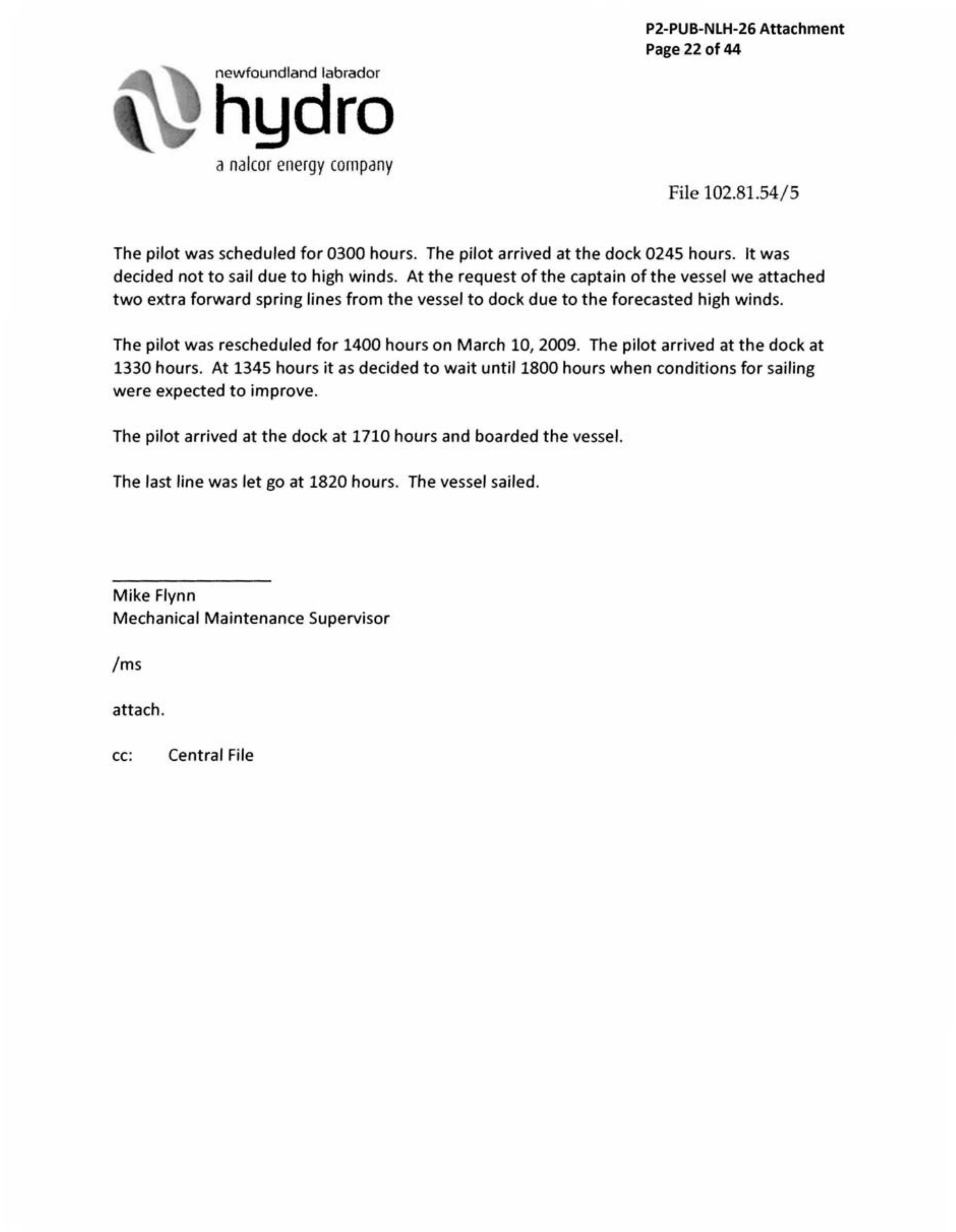
The vessel placed its first line ashore at 0854 hours. All mooring lines were in place at 1140 hours. The gangway was in place at 1200 hours. The oil spill containment boom was sent to Holyrood but not deployed due to high wind and sea conditions. Winds were still high at 0900 hours on March 8, 2009 prevent deployment of the boom. Conditions did not improve enough for deployment until 1700 hours at which time it was too late due to the predicted stoppage of pumping operations at 1830 hours.

Both Loading Arms were connected at 1400 hours on March 7, 2009. Calculations of the vessel's cargo was completed at 1640 hours. Sampling of the vessels cargo was completed at 1503 hours.

The vessel stopped pumping through the north Loading Arm at 2220 hours on March 8, 2009. The north Loading Arm was disconnected at 2318 hours and secured at 2324 hours.

The vessel's cargo pumps were stopped at 0030 hours on March 9, 2009. The south Loading Arm was disconnected at 0110 hours and secured at 0115 hours.

Due to the small drain lines on the vessel, it took considerable time and effort to drain the Loading Arms to allow for disconnection.



File 102.81.54/5

The pilot was scheduled for 0300 hours. The pilot arrived at the dock 0245 hours. It was decided not to sail due to high winds. At the request of the captain of the vessel we attached two extra forward spring lines from the vessel to dock due to the forecasted high winds.

The pilot was rescheduled for 1400 hours on March 10, 2009. The pilot arrived at the dock at 1330 hours. At 1345 hours it as decided to wait until 1800 hours when conditions for sailing were expected to improve.

The pilot arrived at the dock at 1710 hours and boarded the vessel.

The last line was let go at 1820 hours. The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor

/ms

attach.

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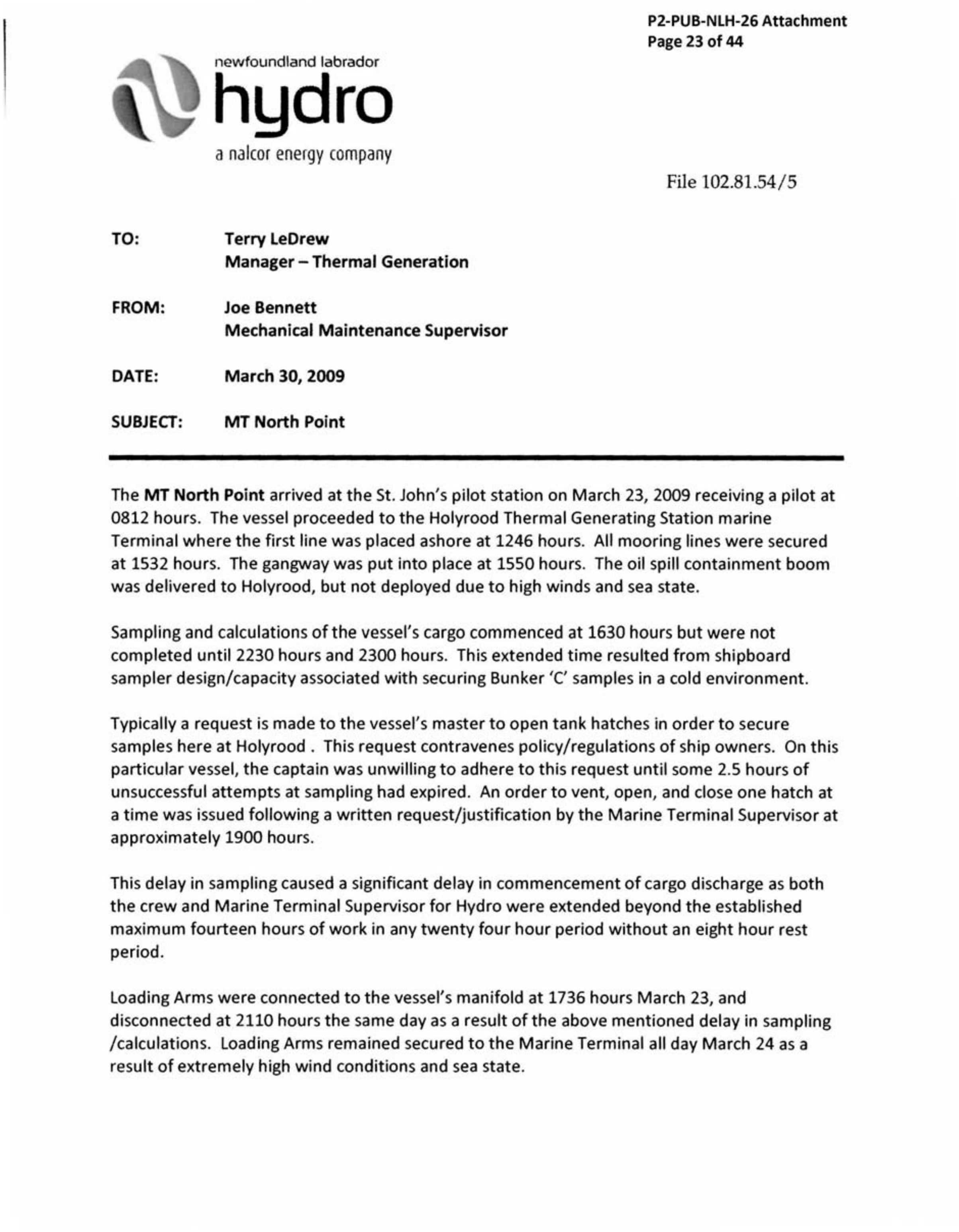

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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Joe Bennett**
Mechanical Maintenance Supervisor

DATE: **March 30, 2009**

SUBJECT: **MT North Point**

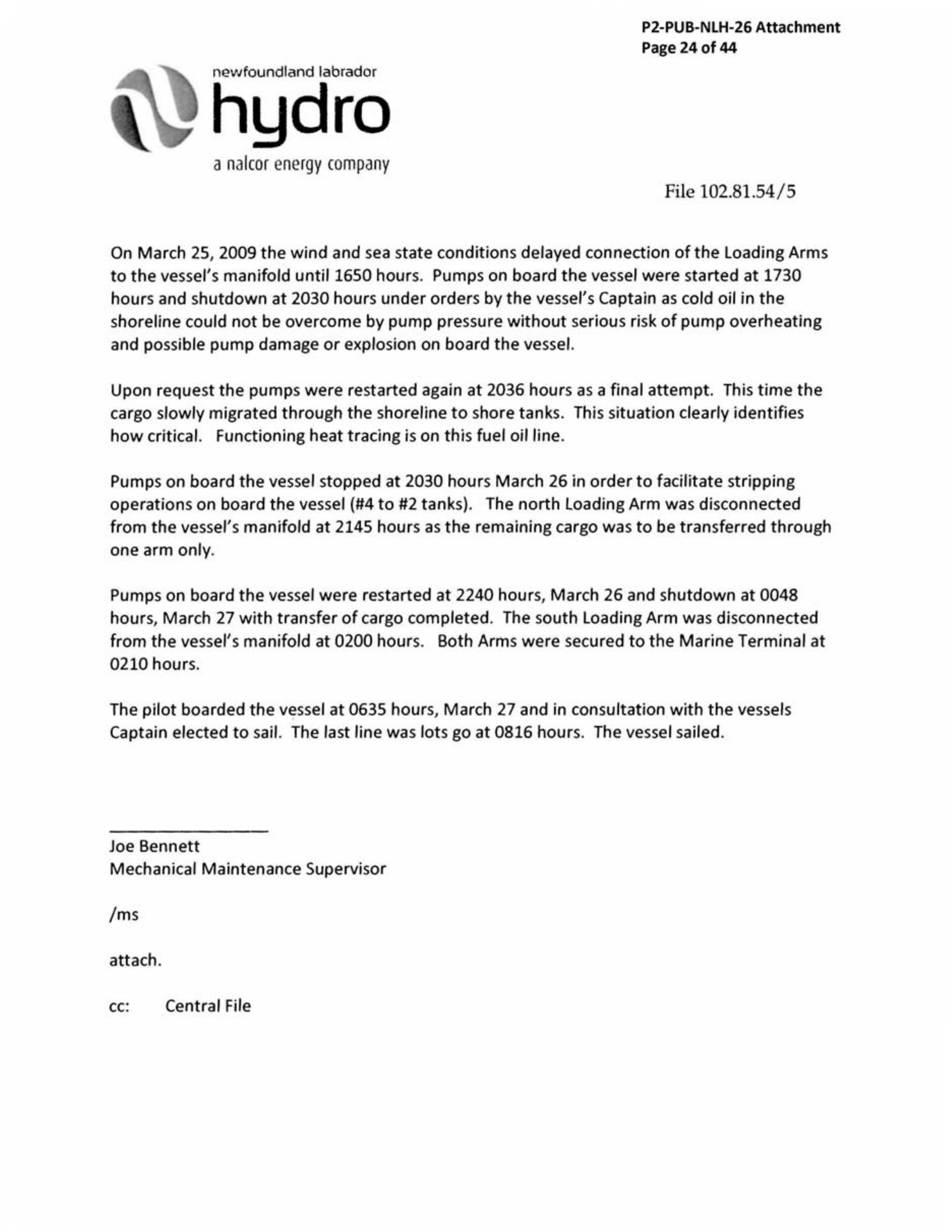
The **MT North Point** arrived at the St. John's pilot station on March 23, 2009 receiving a pilot at 0812 hours. The vessel proceeded to the Holyrood Thermal Generating Station marine Terminal where the first line was placed ashore at 1246 hours. All mooring lines were secured at 1532 hours. The gangway was put into place at 1550 hours. The oil spill containment boom was delivered to Holyrood, but not deployed due to high winds and sea state.

Sampling and calculations of the vessel's cargo commenced at 1630 hours but were not completed until 2230 hours and 2300 hours. This extended time resulted from shipboard sampler design/capacity associated with securing Bunker 'C' samples in a cold environment.

Typically a request is made to the vessel's master to open tank hatches in order to secure samples here at Holyrood . This request contravenes policy/regulations of ship owners. On this particular vessel, the captain was unwilling to adhere to this request until some 2.5 hours of unsuccessful attempts at sampling had expired. An order to vent, open, and close one hatch at a time was issued following a written request/justification by the Marine Terminal Supervisor at approximately 1900 hours.

This delay in sampling caused a significant delay in commencement of cargo discharge as both the crew and Marine Terminal Supervisor for Hydro were extended beyond the established maximum fourteen hours of work in any twenty four hour period without an eight hour rest period.

Loading Arms were connected to the vessel's manifold at 1736 hours March 23, and disconnected at 2110 hours the same day as a result of the above mentioned delay in sampling /calculations. Loading Arms remained secured to the Marine Terminal all day March 24 as a result of extremely high wind conditions and sea state.



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On March 25, 2009 the wind and sea state conditions delayed connection of the Loading Arms to the vessel's manifold until 1650 hours. Pumps on board the vessel were started at 1730 hours and shutdown at 2030 hours under orders by the vessel's Captain as cold oil in the shoreline could not be overcome by pump pressure without serious risk of pump overheating and possible pump damage or explosion on board the vessel.

Upon request the pumps were restarted again at 2036 hours as a final attempt. This time the cargo slowly migrated through the shoreline to shore tanks. This situation clearly identifies how critical. Functioning heat tracing is on this fuel oil line.

Pumps on board the vessel stopped at 2030 hours March 26 in order to facilitate stripping operations on board the vessel (#4 to #2 tanks). The north Loading Arm was disconnected from the vessel's manifold at 2145 hours as the remaining cargo was to be transferred through one arm only.

Pumps on board the vessel were restarted at 2240 hours, March 26 and shutdown at 0048 hours, March 27 with transfer of cargo completed. The south Loading Arm was disconnected from the vessel's manifold at 0200 hours. Both Arms were secured to the Marine Terminal at 0210 hours.

The pilot boarded the vessel at 0635 hours, March 27 and in consultation with the vessels Captain elected to sail. The last line was lots go at 0816 hours. The vessel sailed.

____

Joe Bennett
Mechanical Maintenance Supervisor

/ms

attach.

cc: Central File

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File 102.81.54/5

TO:	**Terry LeDrew** **Manager – Thermal Generation**
FROM:	**Bill Kilfoy** **Mechanical Maintenance Supervisor**
DATE:	**November 13, 2009**
SUBJECT:	**MT KANDILOUSA**

The **MT Kandilousa** arrived at the St. John's pilot station at 2045 hours November 5, 2009. The pilot did not board due to unsuitable weather conditions for berthing.

November 6, 2009 pilot boarding delayed due to unsuitable weather conditions for berthing. Estimated pilot on board November 7, 2009, 0700-0900 hours.

November 7, 2009 pilot boarding cancelled due to unsuitable weather conditions for berthing. Estimated pilot on board November 9, 2009 0700 hours.

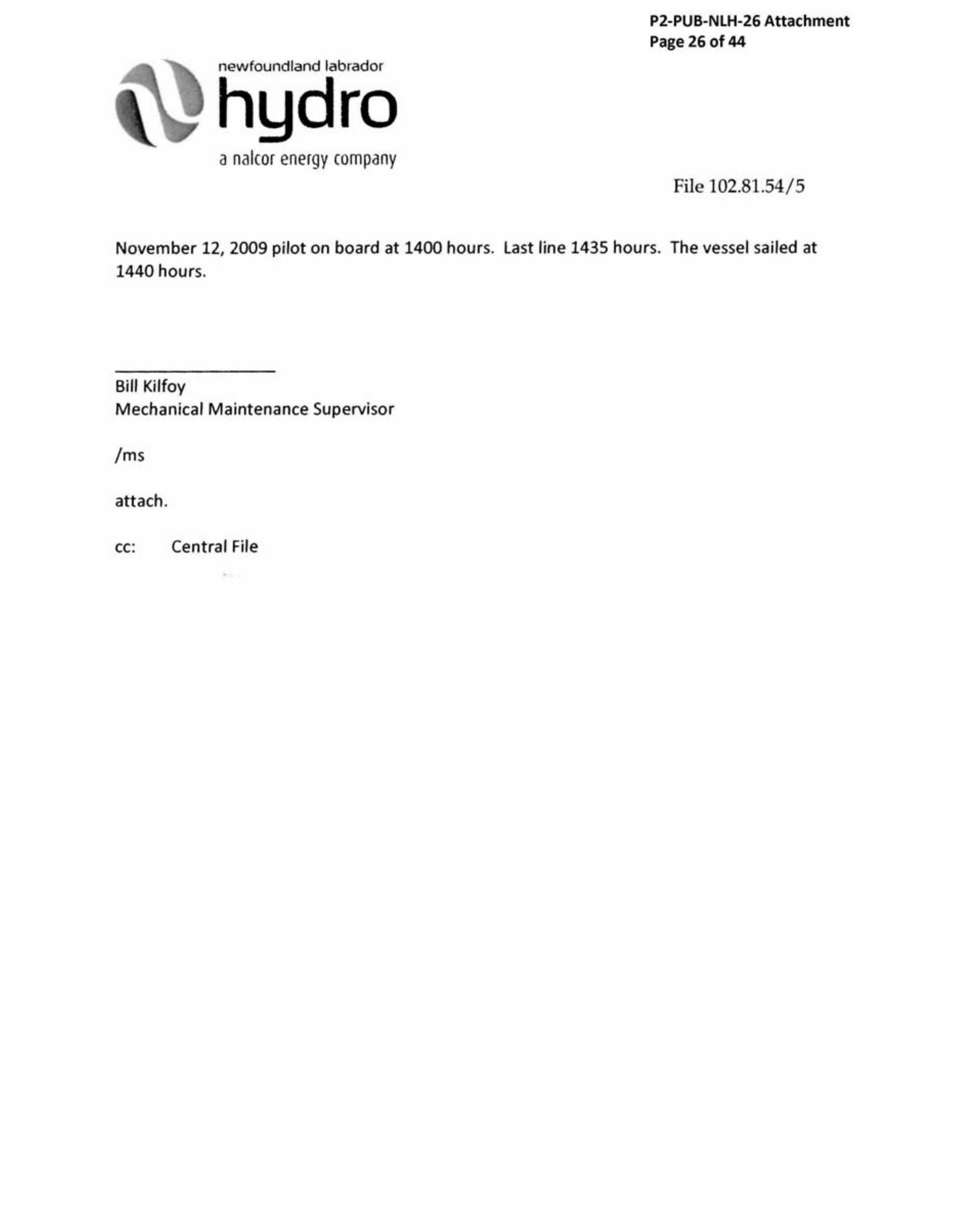
November 8, 2009 pilot on board at 0725 hours. Pilot decided to anchor at Long Pond at 1205 due to high winds. November 9, 2009 MT Kandilousa remained at anchorage due to high winds.

November 10, 2009 pilot on board 1305 hours. First line was placed ashore at 1515 hours. All mooring lines were secure at 1730 hours. Gangway secured at 1740 hours. Agents on board at 1745 hours.

The oil spill containment boom was sent to Holyrood at 1840 hours. It was not deployed until 0800 hours November 11 due to shortage of crew on pilot boat.

Cargo survey started 1845 hours and completed 1925 hours. Calculation of the vessels cargo was completed at 1945 hours. Loading arms were connected at 1955. The vessel cargo pumps were started at 2100 hours with maximum pressure of 700kpa reached at 2145 hours.

November 11, 2009 completed discharging cargo at 1925 hours. Both loading arms disconnected 2140 hours. Commenced tank inspection 2000 hours. Calculations completed 2030 hours. All cargo documentation completed 2145.



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File 102.81.54/5

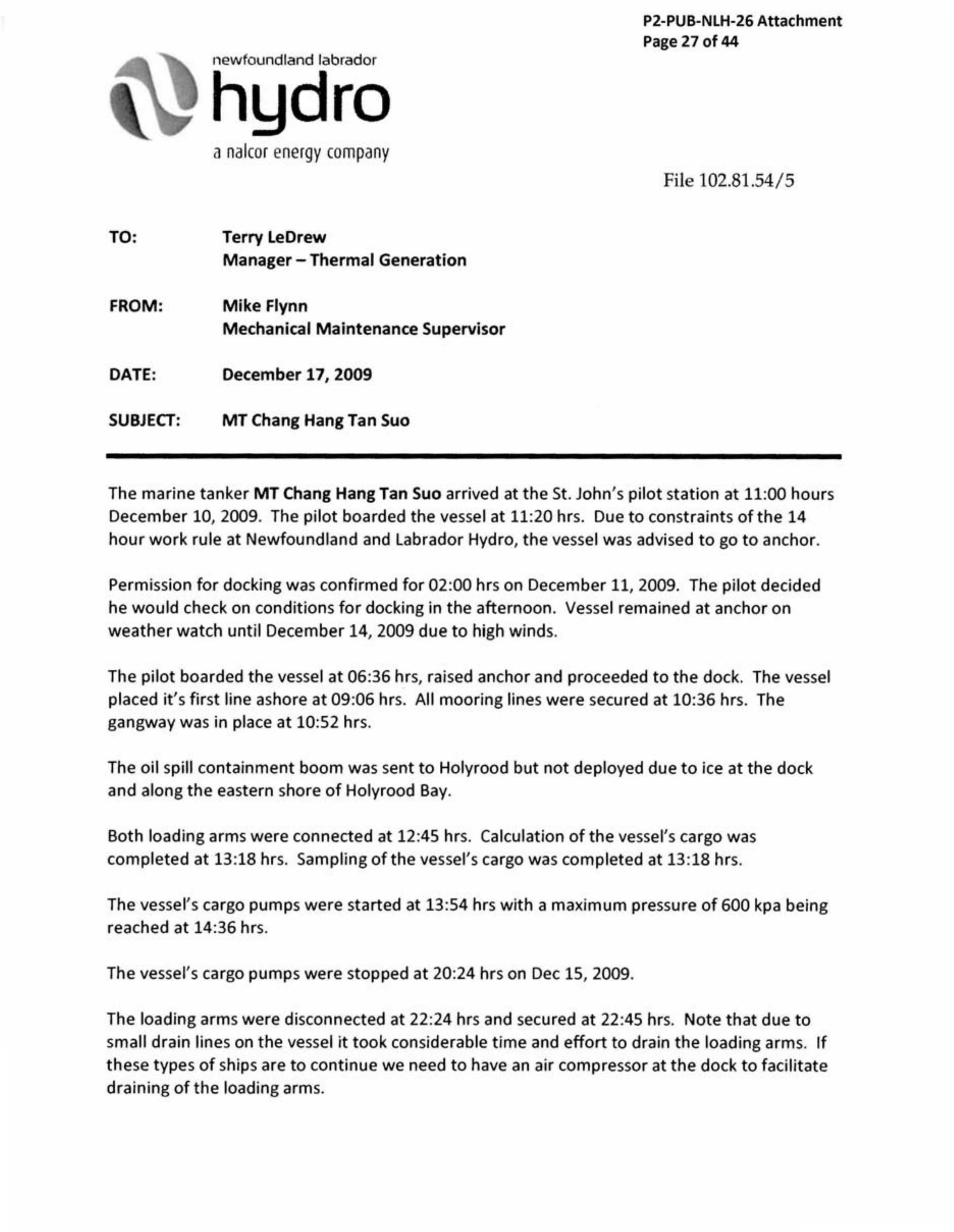
November 12, 2009 pilot on board at 1400 hours. Last line 1435 hours. The vessel sailed at 1440 hours.

Bill Kilfoy
Mechanical Maintenance Supervisor

/ms

attach.

cc: Central File



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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **December 17, 2009**

SUBJECT: **MT Chang Hang Tan Suo**

The marine tanker **MT Chang Hang Tan Suo** arrived at the St. John's pilot station at 11:00 hours December 10, 2009. The pilot boarded the vessel at 11:20 hrs. Due to constraints of the 14 hour work rule at Newfoundland and Labrador Hydro, the vessel was advised to go to anchor.

Permission for docking was confirmed for 02:00 hrs on December 11, 2009. The pilot decided he would check on conditions for docking in the afternoon. Vessel remained at anchor on weather watch until December 14, 2009 due to high winds.

The pilot boarded the vessel at 06:36 hrs, raised anchor and proceeded to the dock. The vessel placed it's first line ashore at 09:06 hrs. All mooring lines were secured at 10:36 hrs. The gangway was in place at 10:52 hrs.

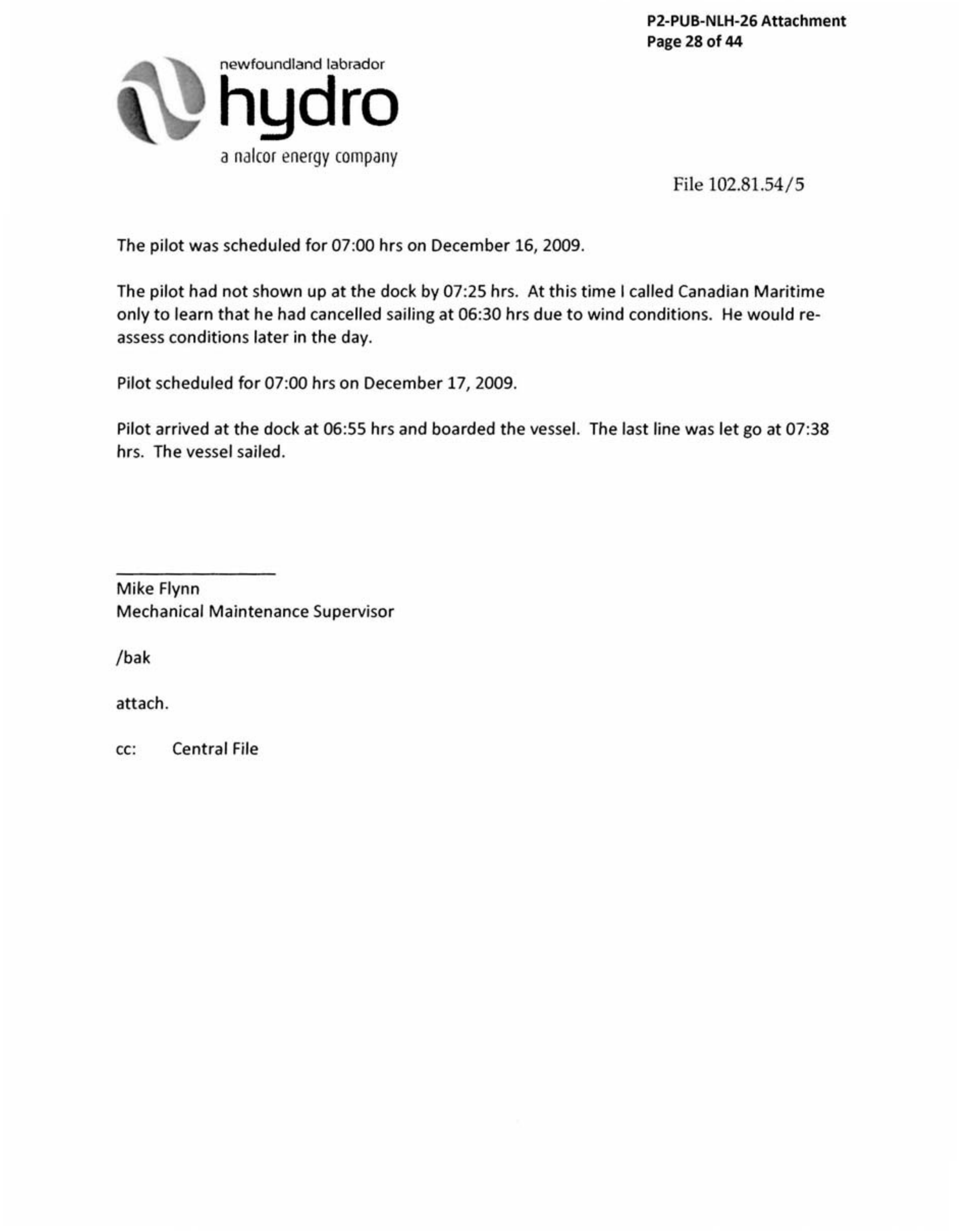
The oil spill containment boom was sent to Holyrood but not deployed due to ice at the dock and along the eastern shore of Holyrood Bay.

Both loading arms were connected at 12:45 hrs. Calculation of the vessel's cargo was completed at 13:18 hrs. Sampling of the vessel's cargo was completed at 13:18 hrs.

The vessel's cargo pumps were started at 13:54 hrs with a maximum pressure of 600 kpa being reached at 14:36 hrs.

The vessel's cargo pumps were stopped at 20:24 hrs on Dec 15, 2009.

The loading arms were disconnected at 22:24 hrs and secured at 22:45 hrs. Note that due to small drain lines on the vessel it took considerable time and effort to drain the loading arms. If these types of ships are to continue we need to have an air compressor at the dock to facilitate draining of the loading arms.



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The pilot was scheduled for 07:00 hrs on December 16, 2009.

The pilot had not shown up at the dock by 07:25 hrs. At this time I called Canadian Maritime only to learn that he had cancelled sailing at 06:30 hrs due to wind conditions. He would re-assess conditions later in the day.

Pilot scheduled for 07:00 hrs on December 17, 2009.

Pilot arrived at the dock at 06:55 hrs and boarded the vessel. The last line was let go at 07:38 hrs. The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor

/bak

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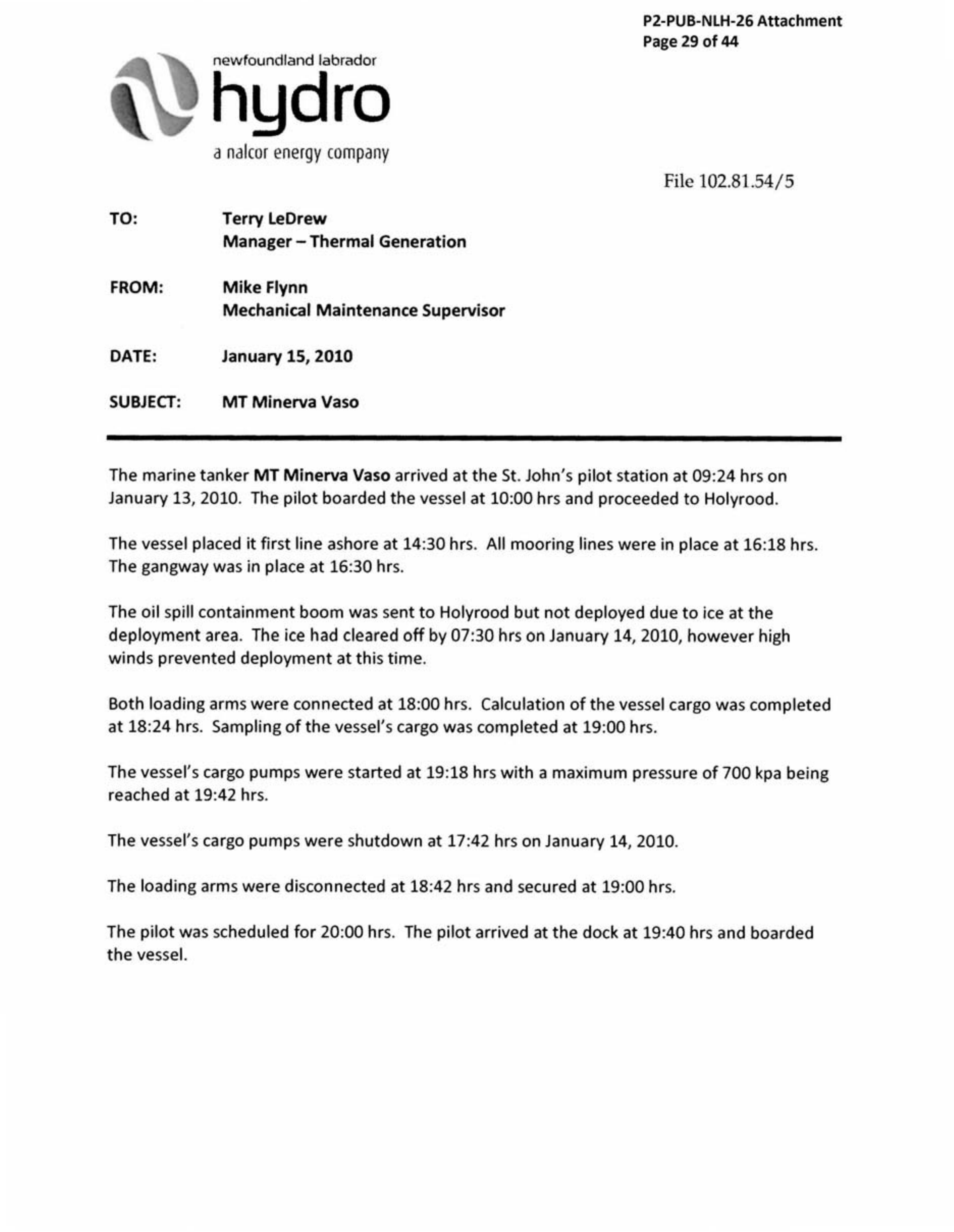

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a nalcor energy company

File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **January 15, 2010**

SUBJECT: **MT Minerva Vaso**

The marine tanker **MT Minerva Vaso** arrived at the St. John's pilot station at 09:24 hrs on January 13, 2010. The pilot boarded the vessel at 10:00 hrs and proceeded to Holyrood.

The vessel placed it first line ashore at 14:30 hrs. All mooring lines were in place at 16:18 hrs. The gangway was in place at 16:30 hrs.

The oil spill containment boom was sent to Holyrood but not deployed due to ice at the deployment area. The ice had cleared off by 07:30 hrs on January 14, 2010, however high winds prevented deployment at this time.

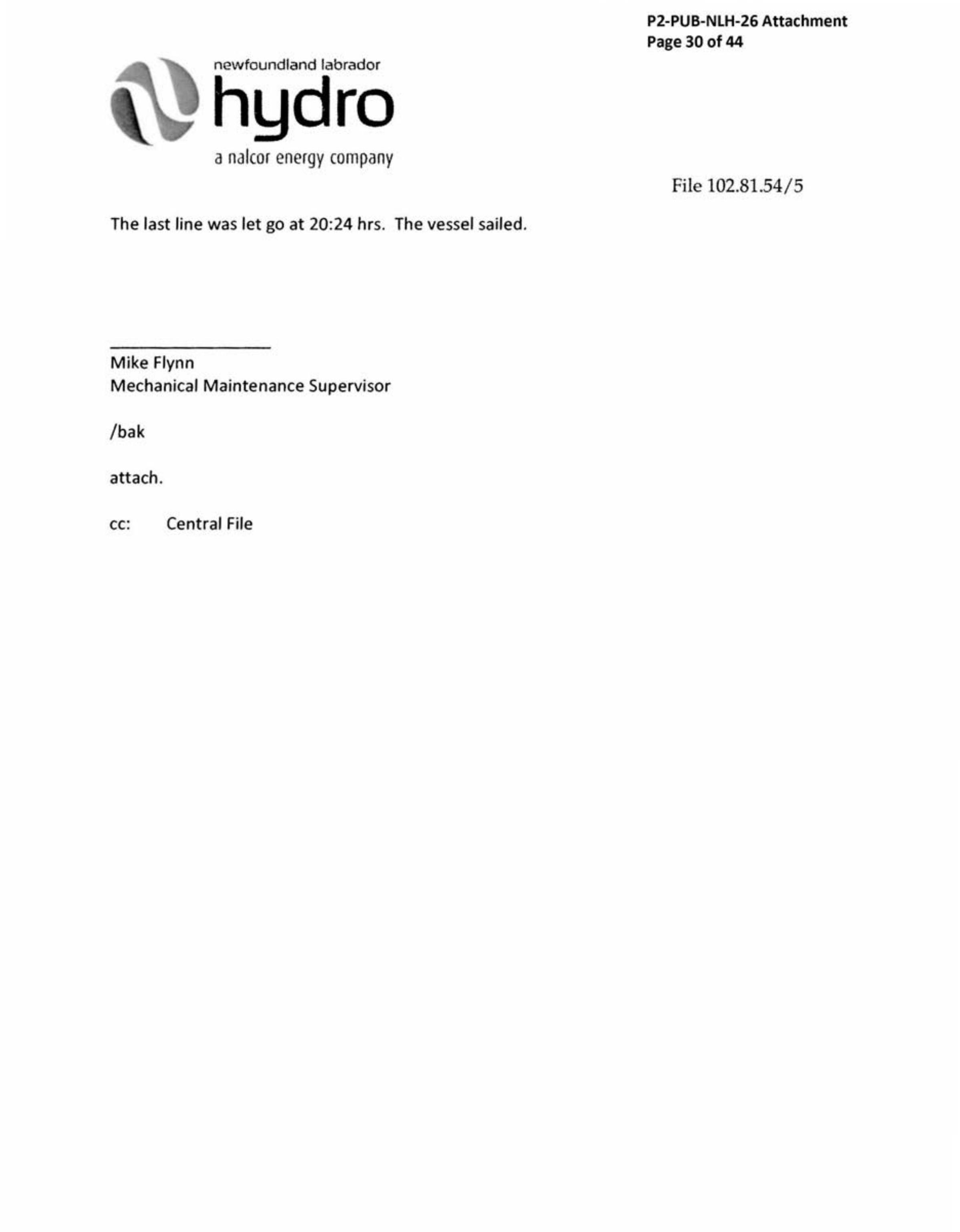
Both loading arms were connected at 18:00 hrs. Calculation of the vessel cargo was completed at 18:24 hrs. Sampling of the vessel's cargo was completed at 19:00 hrs.

The vessel's cargo pumps were started at 19:18 hrs with a maximum pressure of 700 kpa being reached at 19:42 hrs.

The vessel's cargo pumps were shutdown at 17:42 hrs on January 14, 2010.

The loading arms were disconnected at 18:42 hrs and secured at 19:00 hrs.

The pilot was scheduled for 20:00 hrs. The pilot arrived at the dock at 19:40 hrs and boarded the vessel.



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a nalcor energy company

File 102.81.54/5

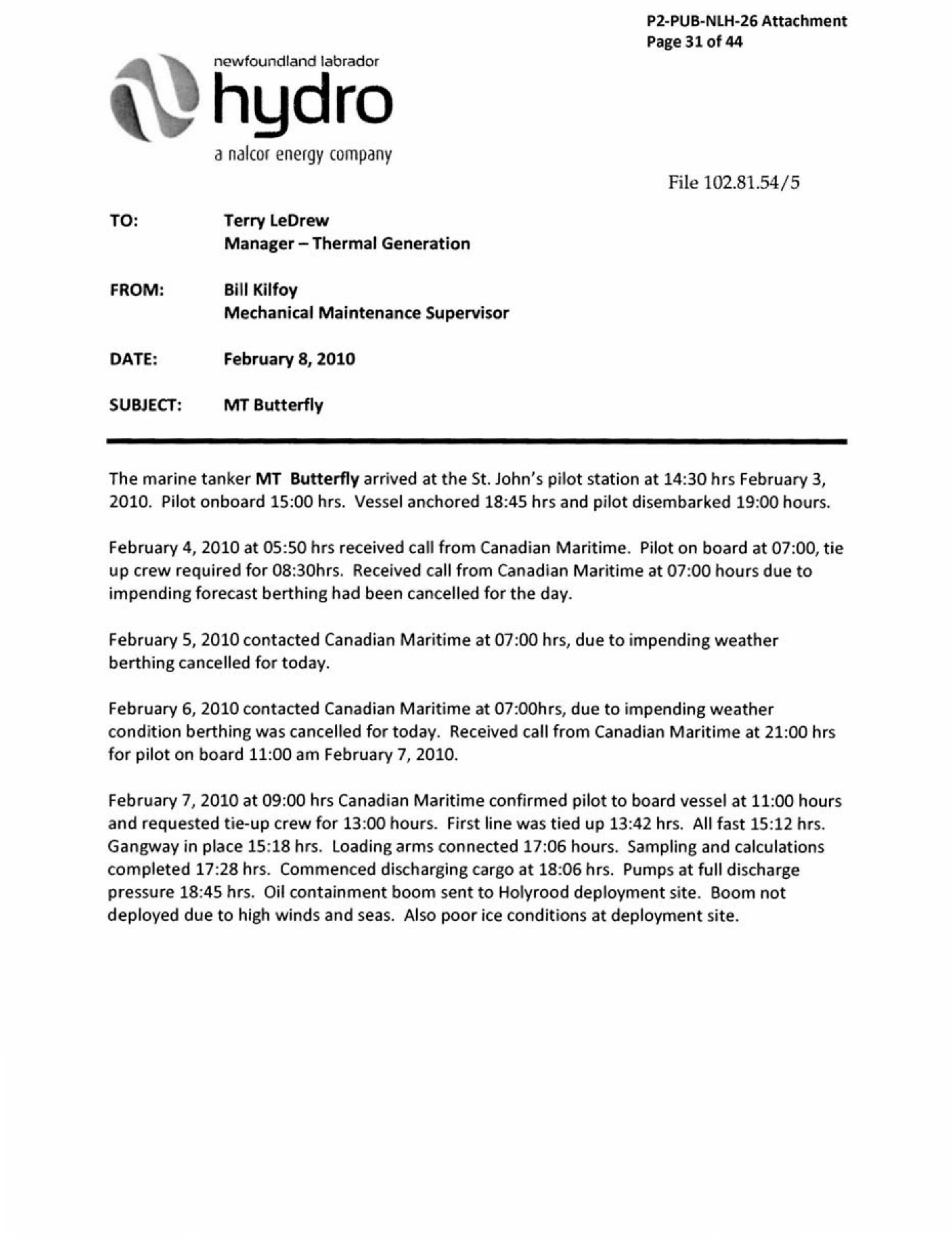
The last line was let go at 20:24 hrs. The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor

/bak

attach.

cc: Central File



P2-PUB-NLH-26 Attachment
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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Bill Kilfoy**
Mechanical Maintenance Supervisor

DATE: **February 8, 2010**

SUBJECT: **MT Butterfly**

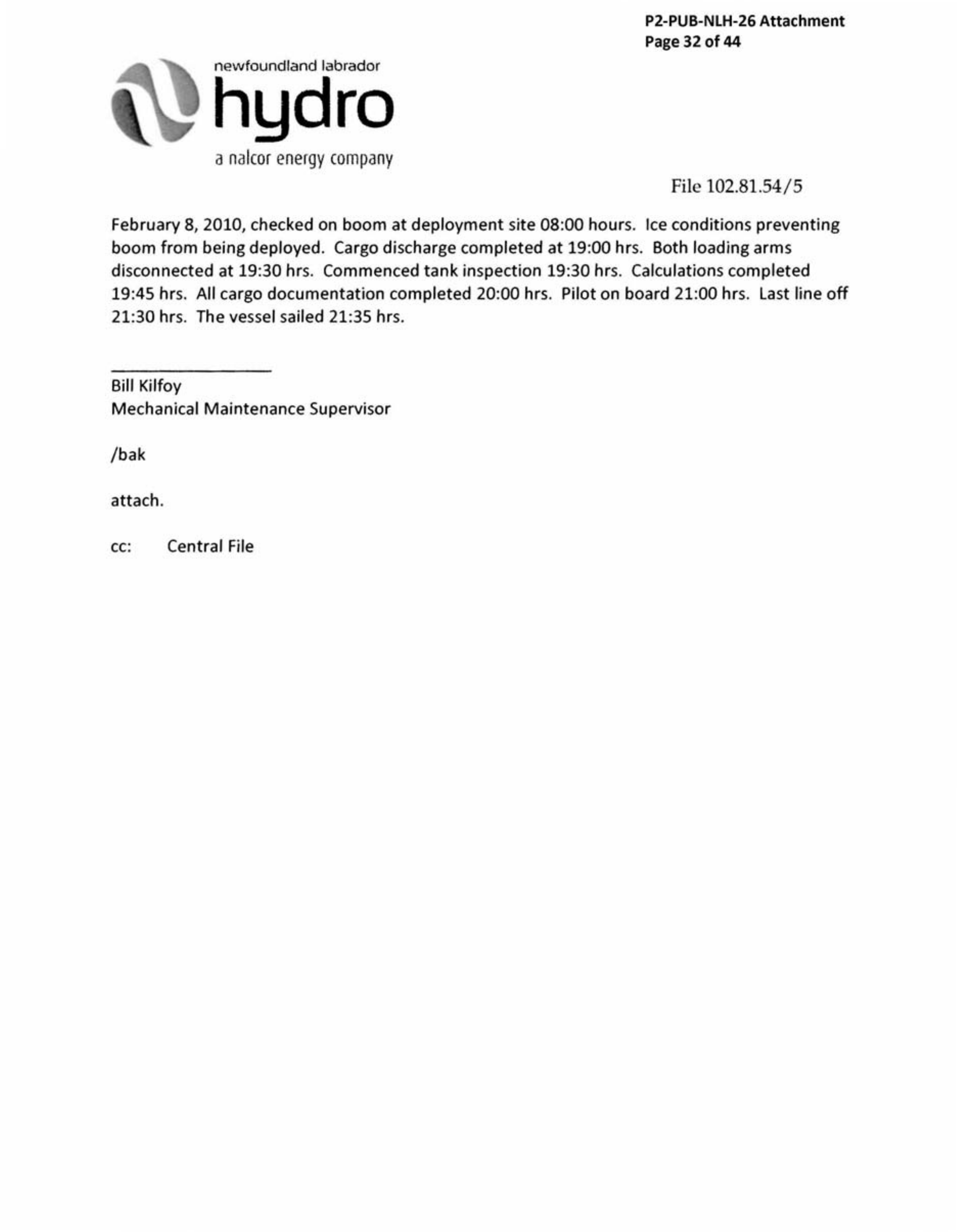
The marine tanker **MT Butterfly** arrived at the St. John's pilot station at 14:30 hrs February 3, 2010. Pilot onboard 15:00 hrs. Vessel anchored 18:45 hrs and pilot disembarked 19:00 hours.

February 4, 2010 at 05:50 hrs received call from Canadian Maritime. Pilot on board at 07:00, tie up crew required for 08:30hrs. Received call from Canadian Maritime at 07:00 hours due to impending forecast berthing had been cancelled for the day.

February 5, 2010 contacted Canadian Maritime at 07:00 hrs, due to impending weather berthing cancelled for today.

February 6, 2010 contacted Canadian Maritime at 07:00hrs, due to impending weather condition berthing was cancelled for today. Received call from Canadian Maritime at 21:00 hrs for pilot on board 11:00 am February 7, 2010.

February 7, 2010 at 09:00 hrs Canadian Maritime confirmed pilot to board vessel at 11:00 hours and requested tie-up crew for 13:00 hours. First line was tied up 13:42 hrs. All fast 15:12 hrs. Gangway in place 15:18 hrs. Loading arms connected 17:06 hours. Sampling and calculations completed 17:28 hrs. Commenced discharging cargo at 18:06 hrs. Pumps at full discharge pressure 18:45 hrs. Oil containment boom sent to Holyrood deployment site. Boom not deployed due to high winds and seas. Also poor ice conditions at deployment site.



File 102.81.54/5

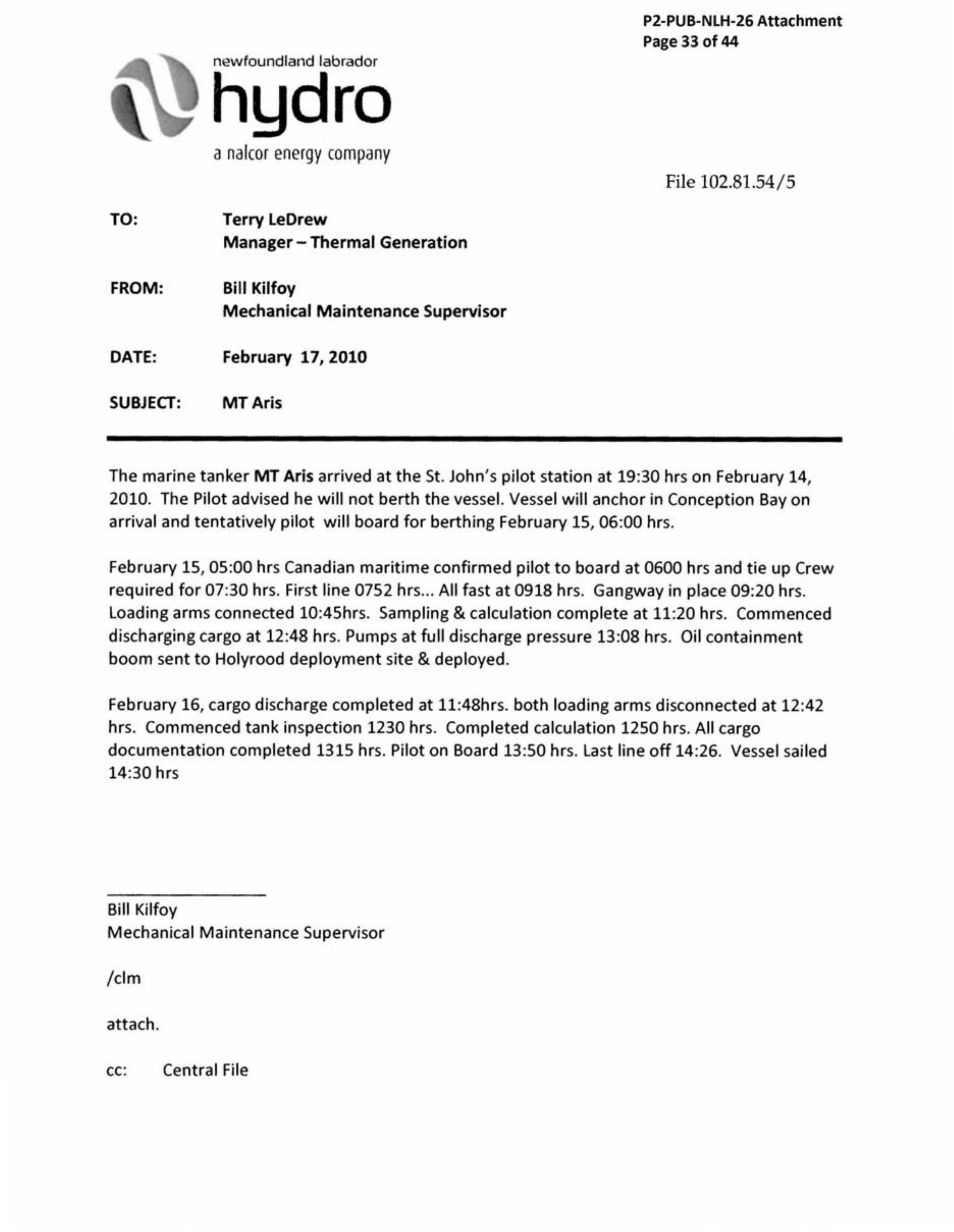
February 8, 2010, checked on boom at deployment site 08:00 hours. Ice conditions preventing boom from being deployed. Cargo discharge completed at 19:00 hrs. Both loading arms disconnected at 19:30 hrs. Commenced tank inspection 19:30 hrs. Calculations completed 19:45 hrs. All cargo documentation completed 20:00 hrs. Pilot on board 21:00 hrs. Last line off 21:30 hrs. The vessel sailed 21:35 hrs.

____
Bill Kilfoy
Mechanical Maintenance Supervisor

/bak

attach.

cc: Central File



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a nalcor energy company

File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Bill Kilfoy**
Mechanical Maintenance Supervisor

DATE: **February 17, 2010**

SUBJECT: **MT Aris**

The marine tanker **MT Aris** arrived at the St. John's pilot station at 19:30 hrs on February 14, 2010. The Pilot advised he will not berth the vessel. Vessel will anchor in Conception Bay on arrival and tentatively pilot will board for berthing February 15, 06:00 hrs.

February 15, 05:00 hrs Canadian maritime confirmed pilot to board at 0600 hrs and tie up Crew required for 07:30 hrs. First line 0752 hrs... All fast at 0918 hrs. Gangway in place 09:20 hrs. Loading arms connected 10:45hrs. Sampling & calculation complete at 11:20 hrs. Commenced discharging cargo at 12:48 hrs. Pumps at full discharge pressure 13:08 hrs. Oil containment boom sent to Holyrood deployment site & deployed.

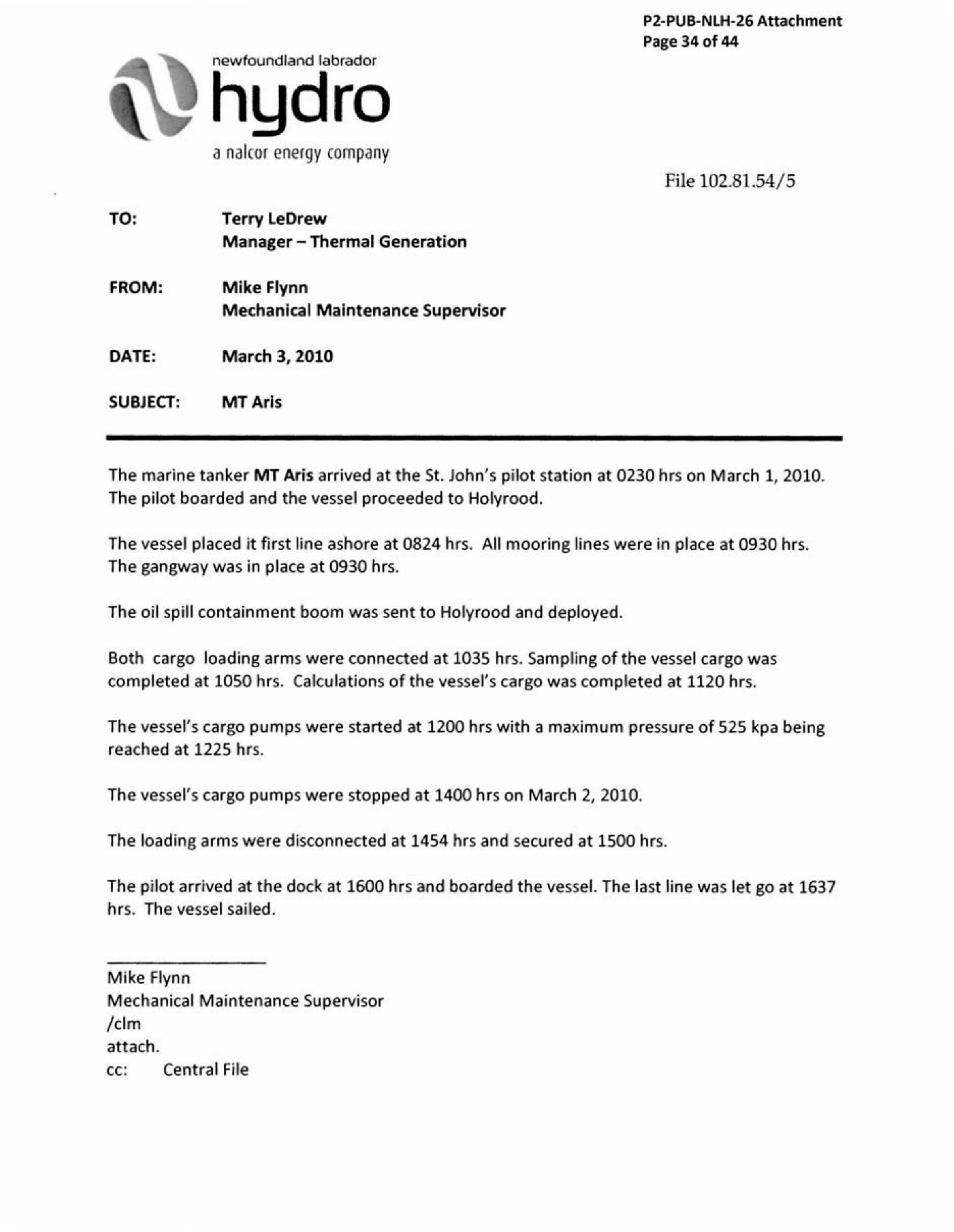
February 16, cargo discharge completed at 11:48hrs. both loading arms disconnected at 12:42 hrs. Commenced tank inspection 1230 hrs. Completed calculation 1250 hrs. All cargo documentation completed 1315 hrs. Pilot on Board 13:50 hrs. Last line off 14:26. Vessel sailed 14:30 hrs

Bill Kilfoy
Mechanical Maintenance Supervisor

/clm

attach.

cc: Central File



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newfoundland labrador
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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **March 3, 2010**

SUBJECT: **MT Aris**

The marine tanker **MT Aris** arrived at the St. John's pilot station at 0230 hrs on March 1, 2010. The pilot boarded and the vessel proceeded to Holyrood.

The vessel placed it first line ashore at 0824 hrs. All mooring lines were in place at 0930 hrs. The gangway was in place at 0930 hrs.

The oil spill containment boom was sent to Holyrood and deployed.

Both cargo loading arms were connected at 1035 hrs. Sampling of the vessel cargo was completed at 1050 hrs. Calculations of the vessel's cargo was completed at 1120 hrs.

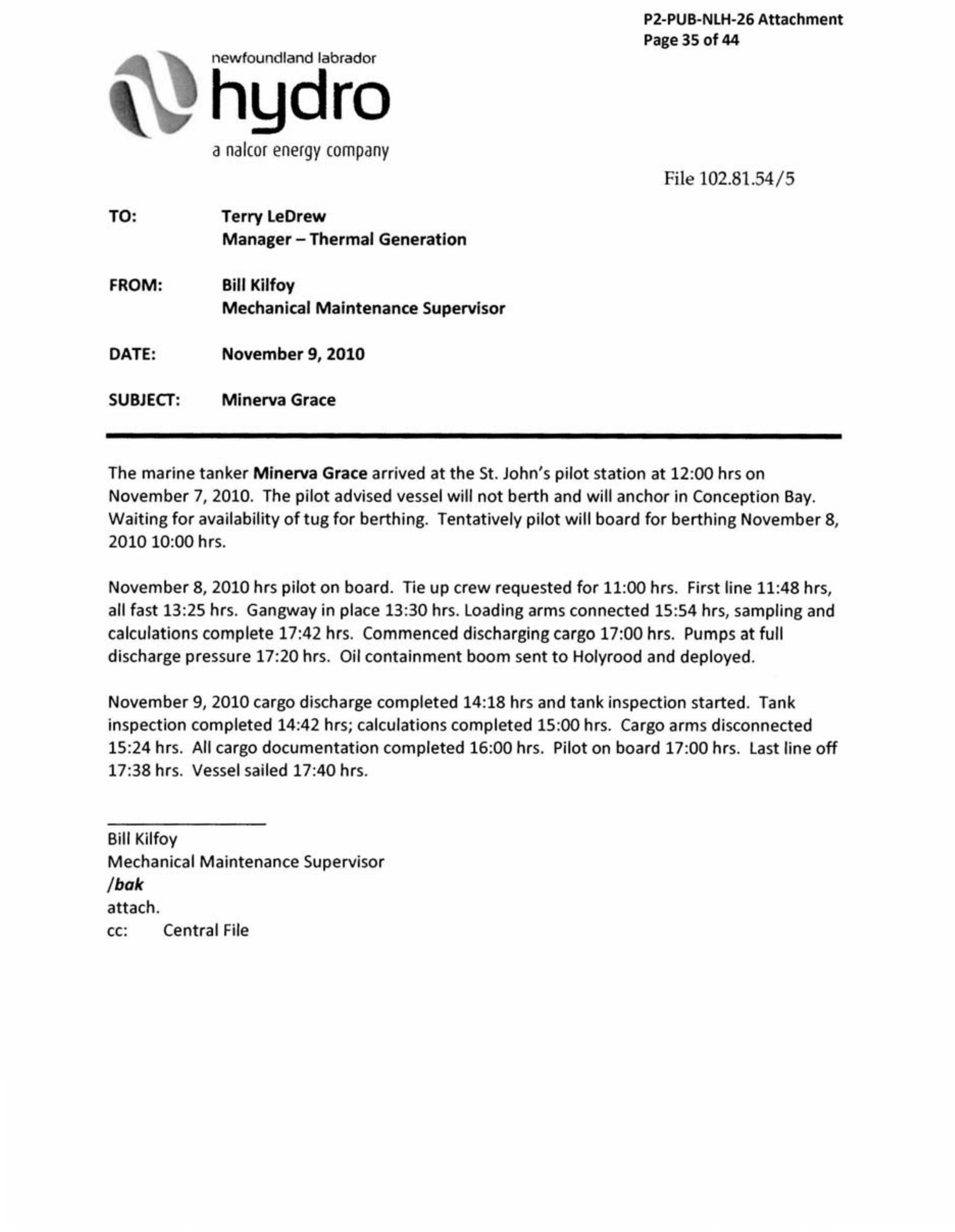
The vessel's cargo pumps were started at 1200 hrs with a maximum pressure of 525 kpa being reached at 1225 hrs.

The vessel's cargo pumps were stopped at 1400 hrs on March 2, 2010.

The loading arms were disconnected at 1454 hrs and secured at 1500 hrs.

The pilot arrived at the dock at 1600 hrs and boarded the vessel. The last line was let go at 1637 hrs. The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor
/clm
attach.
cc: Central File



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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Bill Kilfoy**
Mechanical Maintenance Supervisor

DATE: **November 9, 2010**

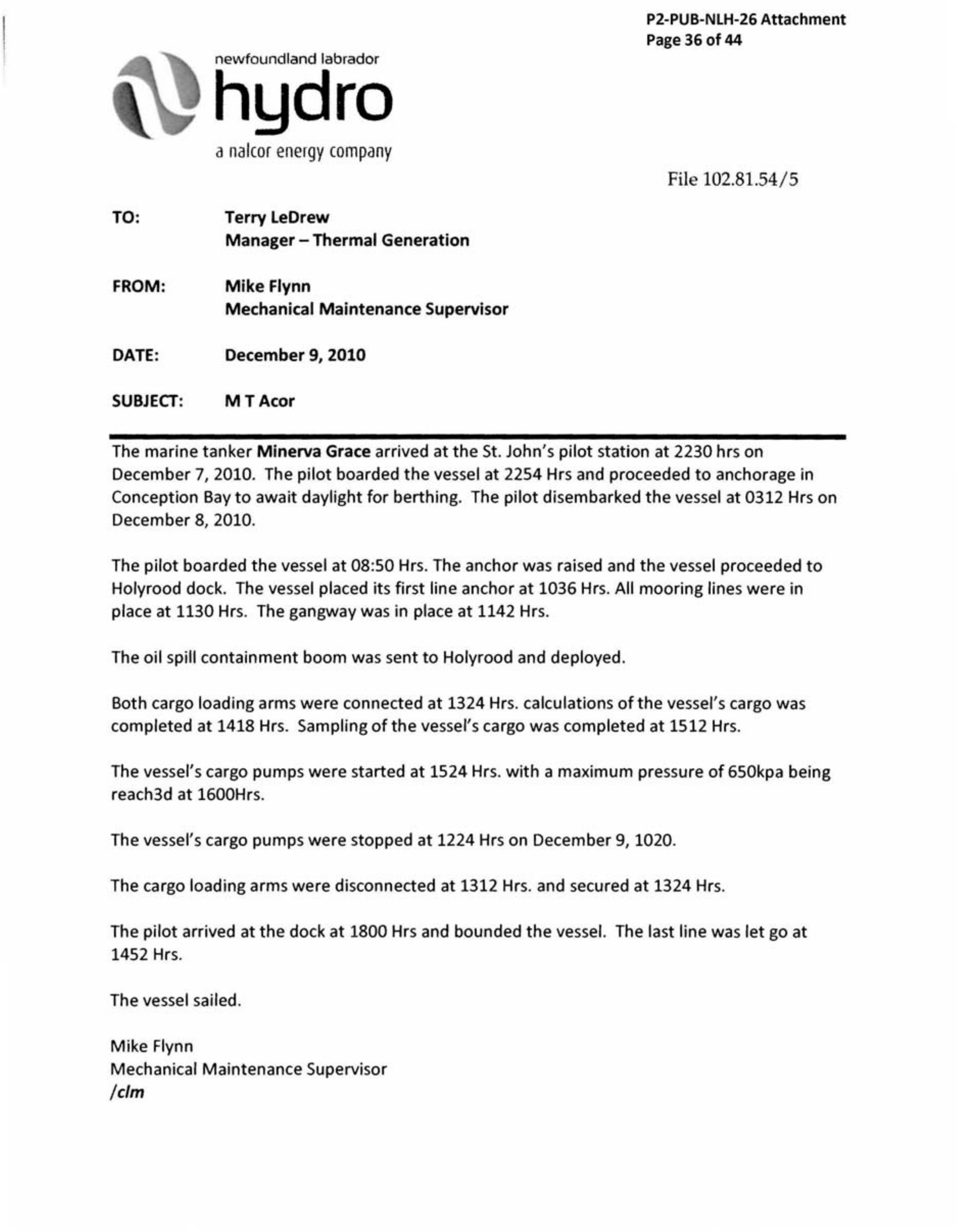
SUBJECT: **Minerva Grace**

The marine tanker **Minerva Grace** arrived at the St. John's pilot station at 12:00 hrs on November 7, 2010. The pilot advised vessel will not berth and will anchor in Conception Bay. Waiting for availability of tug for berthing. Tentatively pilot will board for berthing November 8, 2010 10:00 hrs.

November 8, 2010 hrs pilot on board. Tie up crew requested for 11:00 hrs. First line 11:48 hrs, all fast 13:25 hrs. Gangway in place 13:30 hrs. Loading arms connected 15:54 hrs, sampling and calculations complete 17:42 hrs. Commenced discharging cargo 17:00 hrs. Pumps at full discharge pressure 17:20 hrs. Oil containment boom sent to Holyrood and deployed.

November 9, 2010 cargo discharge completed 14:18 hrs and tank inspection started. Tank inspection completed 14:42 hrs; calculations completed 15:00 hrs. Cargo arms disconnected 15:24 hrs. All cargo documentation completed 16:00 hrs. Pilot on board 17:00 hrs. Last line off 17:38 hrs. Vessel sailed 17:40 hrs.

Bill Kilfoy
Mechanical Maintenance Supervisor
/bak
attach.
cc: Central File



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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **December 9, 2010**

SUBJECT: **M T Acor**

The marine tanker **Minerva Grace** arrived at the St. John's pilot station at 2230 hrs on December 7, 2010. The pilot boarded the vessel at 2254 Hrs and proceeded to anchorage in Conception Bay to await daylight for berthing. The pilot disembarked the vessel at 0312 Hrs on December 8, 2010.

The pilot boarded the vessel at 08:50 Hrs. The anchor was raised and the vessel proceeded to Holyrood dock. The vessel placed its first line anchor at 1036 Hrs. All mooring lines were in place at 1130 Hrs. The gangway was in place at 1142 Hrs.

The oil spill containment boom was sent to Holyrood and deployed.

Both cargo loading arms were connected at 1324 Hrs. calculations of the vessel's cargo was completed at 1418 Hrs. Sampling of the vessel's cargo was completed at 1512 Hrs.

The vessel's cargo pumps were started at 1524 Hrs. with a maximum pressure of 650kpa being reach3d at 1600Hrs.

The vessel's cargo pumps were stopped at 1224 Hrs on December 9, 1020.

The cargo loading arms were disconnected at 1312 Hrs. and secured at 1324 Hrs.

The pilot arrived at the dock at 1800 Hrs and bounded the vessel. The last line was let go at 1452 Hrs.

The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor
/clm

File 102.81.54/5

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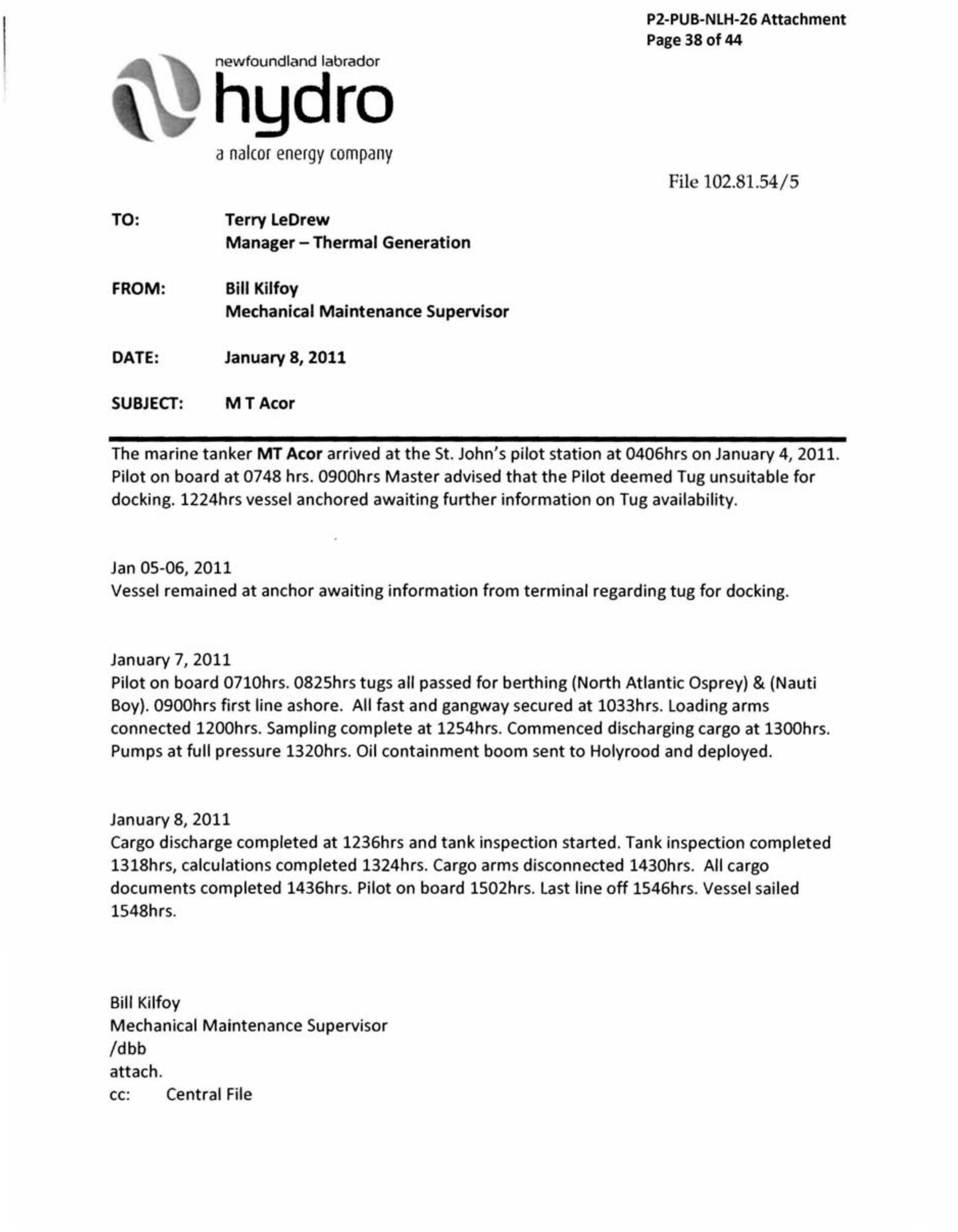
cc: Central File



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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Bill Kilfoy**
Mechanical Maintenance Supervisor

DATE: **January 8, 2011**

SUBJECT: **M T Acor**

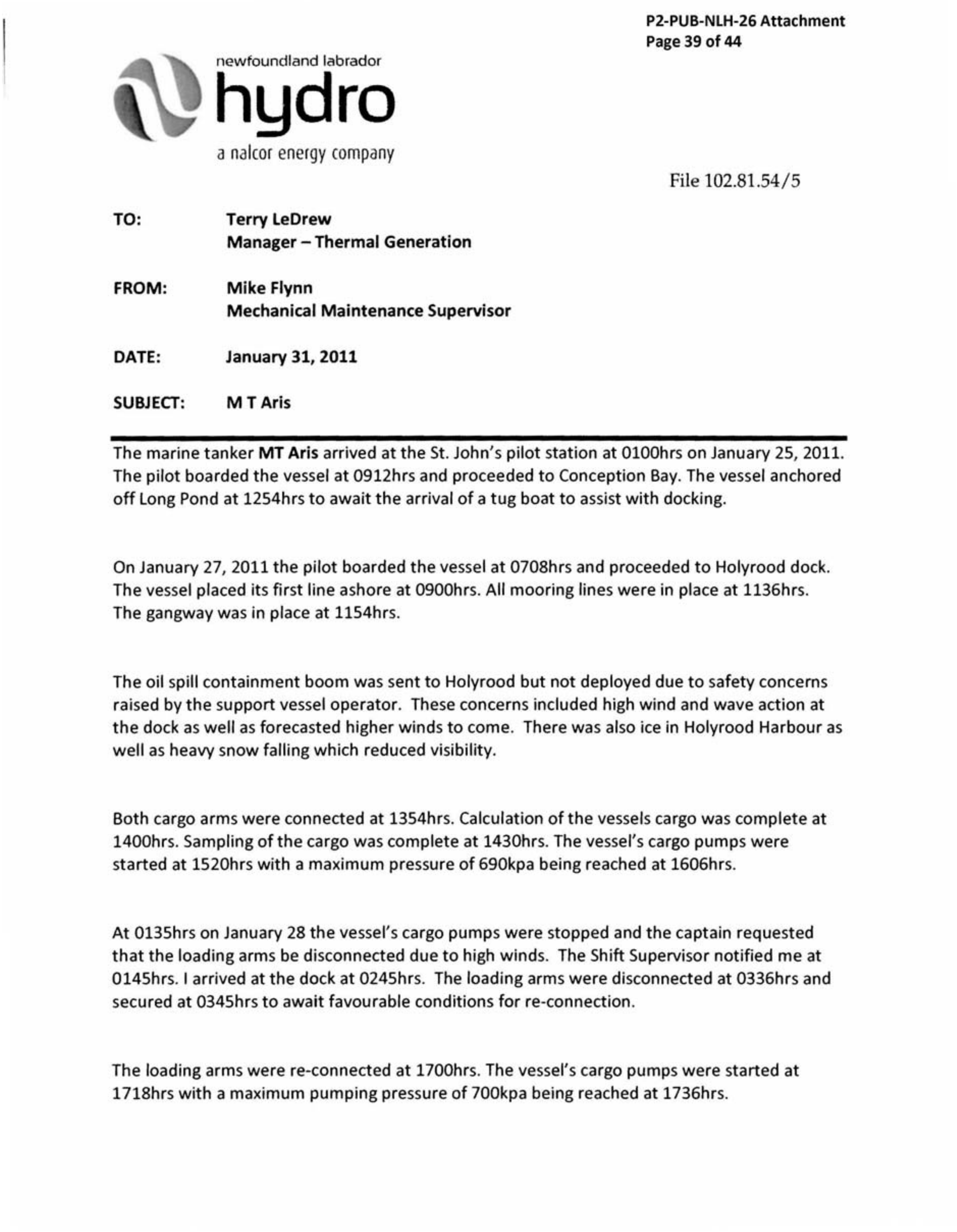
The marine tanker **MT Acor** arrived at the St. John's pilot station at 0406hrs on January 4, 2011. Pilot on board at 0748 hrs. 0900hrs Master advised that the Pilot deemed Tug unsuitable for docking. 1224hrs vessel anchored awaiting further information on Tug availability.

Jan 05-06, 2011
Vessel remained at anchor awaiting information from terminal regarding tug for docking.

January 7, 2011
Pilot on board 0710hrs. 0825hrs tugs all passed for berthing (North Atlantic Osprey) & (Nauti Boy). 0900hrs first line ashore. All fast and gangway secured at 1033hrs. Loading arms connected 1200hrs. Sampling complete at 1254hrs. Commenced discharging cargo at 1300hrs. Pumps at full pressure 1320hrs. Oil containment boom sent to Holyrood and deployed.

January 8, 2011
Cargo discharge completed at 1236hrs and tank inspection started. Tank inspection completed 1318hrs, calculations completed 1324hrs. Cargo arms disconnected 1430hrs. All cargo documents completed 1436hrs. Pilot on board 1502hrs. Last line off 1546hrs. Vessel sailed 1548hrs.

Bill Kilfoy
Mechanical Maintenance Supervisor
/dbb
attach.
cc: Central File



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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **January 31, 2011**

SUBJECT: **M T Aris**

The marine tanker **MT Aris** arrived at the St. John's pilot station at 0100hrs on January 25, 2011. The pilot boarded the vessel at 0912hrs and proceeded to Conception Bay. The vessel anchored off Long Pond at 1254hrs to await the arrival of a tug boat to assist with docking.

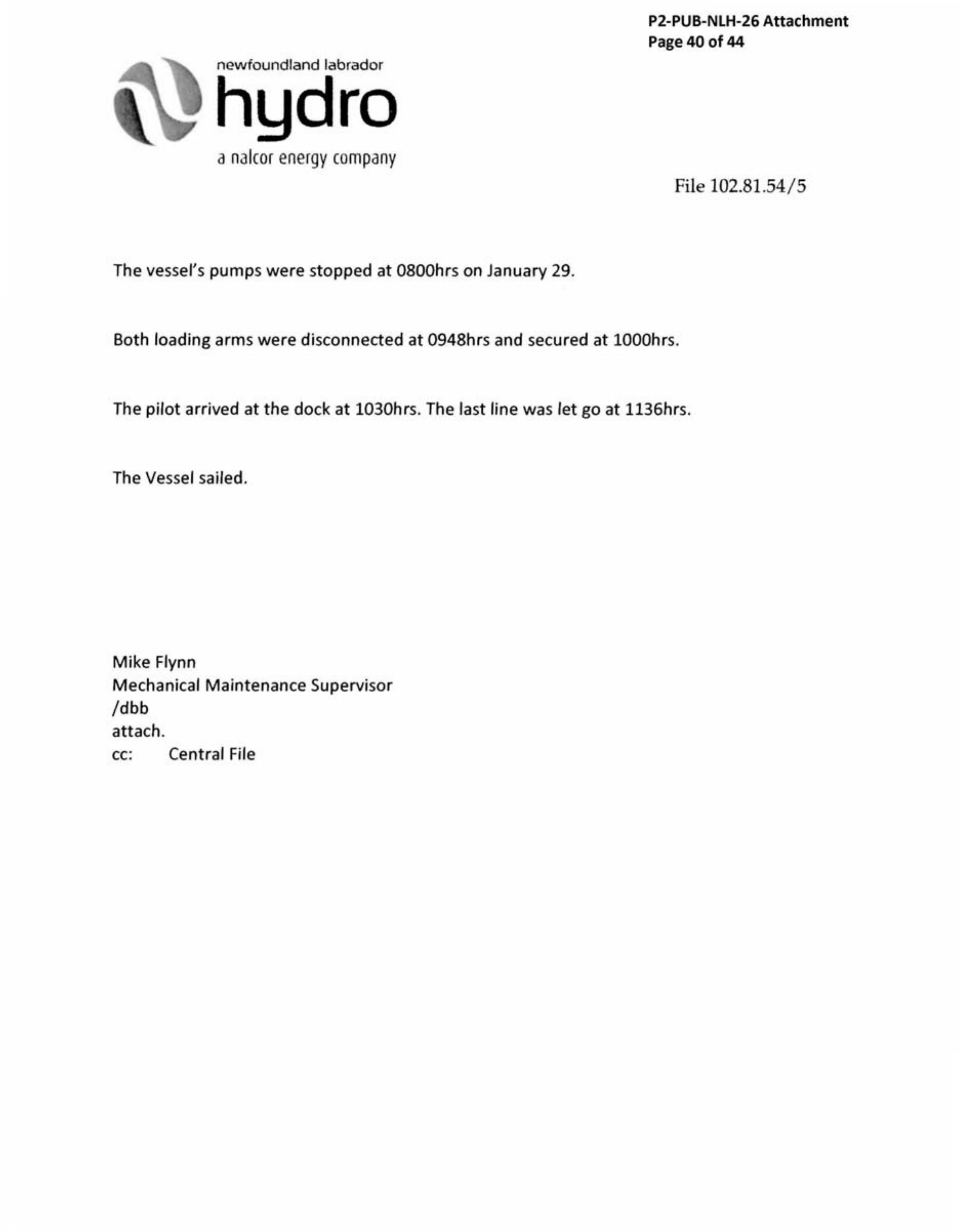
On January 27, 2011 the pilot boarded the vessel at 0708hrs and proceeded to Holyrood dock. The vessel placed its first line ashore at 0900hrs. All mooring lines were in place at 1136hrs. The gangway was in place at 1154hrs.

The oil spill containment boom was sent to Holyrood but not deployed due to safety concerns raised by the support vessel operator. These concerns included high wind and wave action at the dock as well as forecasted higher winds to come. There was also ice in Holyrood Harbour as well as heavy snow falling which reduced visibility.

Both cargo arms were connected at 1354hrs. Calculation of the vessels cargo was complete at 1400hrs. Sampling of the cargo was complete at 1430hrs. The vessel's cargo pumps were started at 1520hrs with a maximum pressure of 690kpa being reached at 1606hrs.

At 0135hrs on January 28 the vessel's cargo pumps were stopped and the captain requested that the loading arms be disconnected due to high winds. The Shift Supervisor notified me at 0145hrs. I arrived at the dock at 0245hrs. The loading arms were disconnected at 0336hrs and secured at 0345hrs to await favourable conditions for re-connection.

The loading arms were re-connected at 1700hrs. The vessel's cargo pumps were started at 1718hrs with a maximum pumping pressure of 700kpa being reached at 1736hrs.



File 102.81.54/5

The vessel's pumps were stopped at 0800hrs on January 29.

Both loading arms were disconnected at 0948hrs and secured at 1000hrs.

The pilot arrived at the dock at 1030hrs. The last line was let go at 1136hrs.

The Vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor
/dbb
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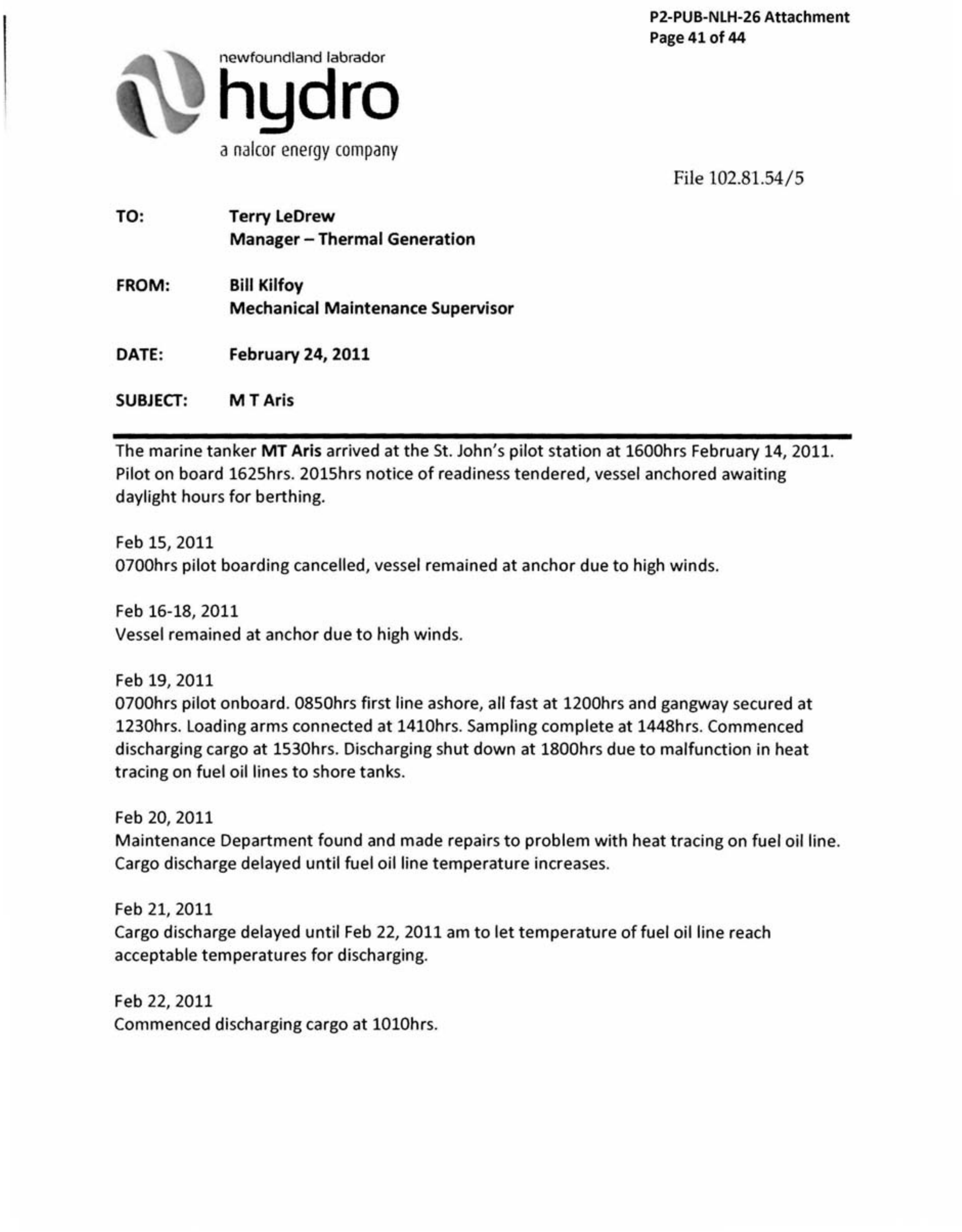

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File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Bill Kilfoy**
Mechanical Maintenance Supervisor

DATE: **February 24, 2011**

SUBJECT: **M T Aris**

The marine tanker **MT Aris** arrived at the St. John's pilot station at 1600hrs February 14, 2011. Pilot on board 1625hrs. 2015hrs notice of readiness tendered, vessel anchored awaiting daylight hours for berthing.

Feb 15, 2011
0700hrs pilot boarding cancelled, vessel remained at anchor due to high winds.

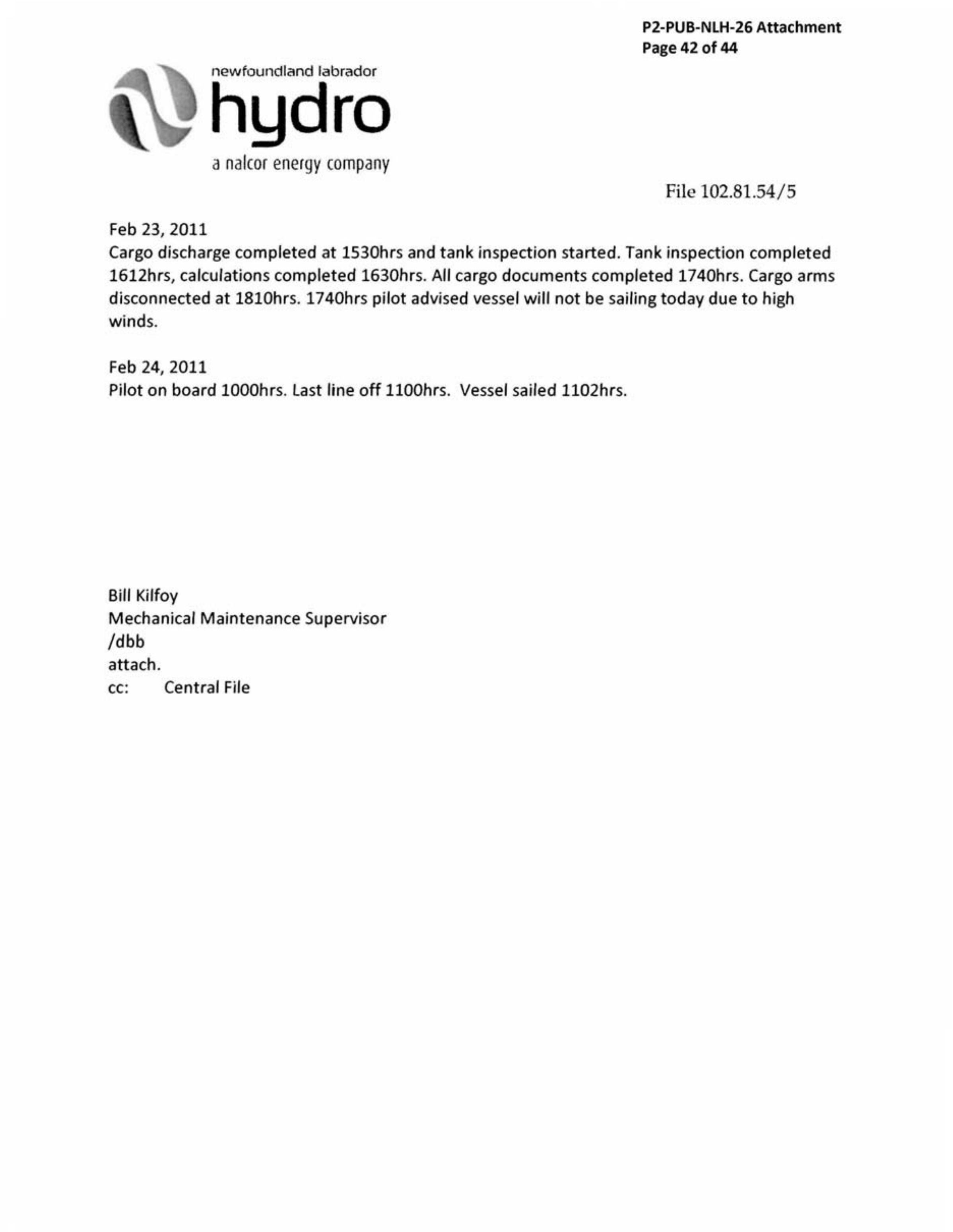
Feb 16-18, 2011
Vessel remained at anchor due to high winds.

Feb 19, 2011
0700hrs pilot onboard. 0850hrs first line ashore, all fast at 1200hrs and gangway secured at 1230hrs. Loading arms connected at 1410hrs. Sampling complete at 1448hrs. Commenced discharging cargo at 1530hrs. Discharging shut down at 1800hrs due to malfunction in heat tracing on fuel oil lines to shore tanks.

Feb 20, 2011
Maintenance Department found and made repairs to problem with heat tracing on fuel oil line. Cargo discharge delayed until fuel oil line temperature increases.

Feb 21, 2011
Cargo discharge delayed until Feb 22, 2011 am to let temperature of fuel oil line reach acceptable temperatures for discharging.

Feb 22, 2011
Commenced discharging cargo at 1010hrs.



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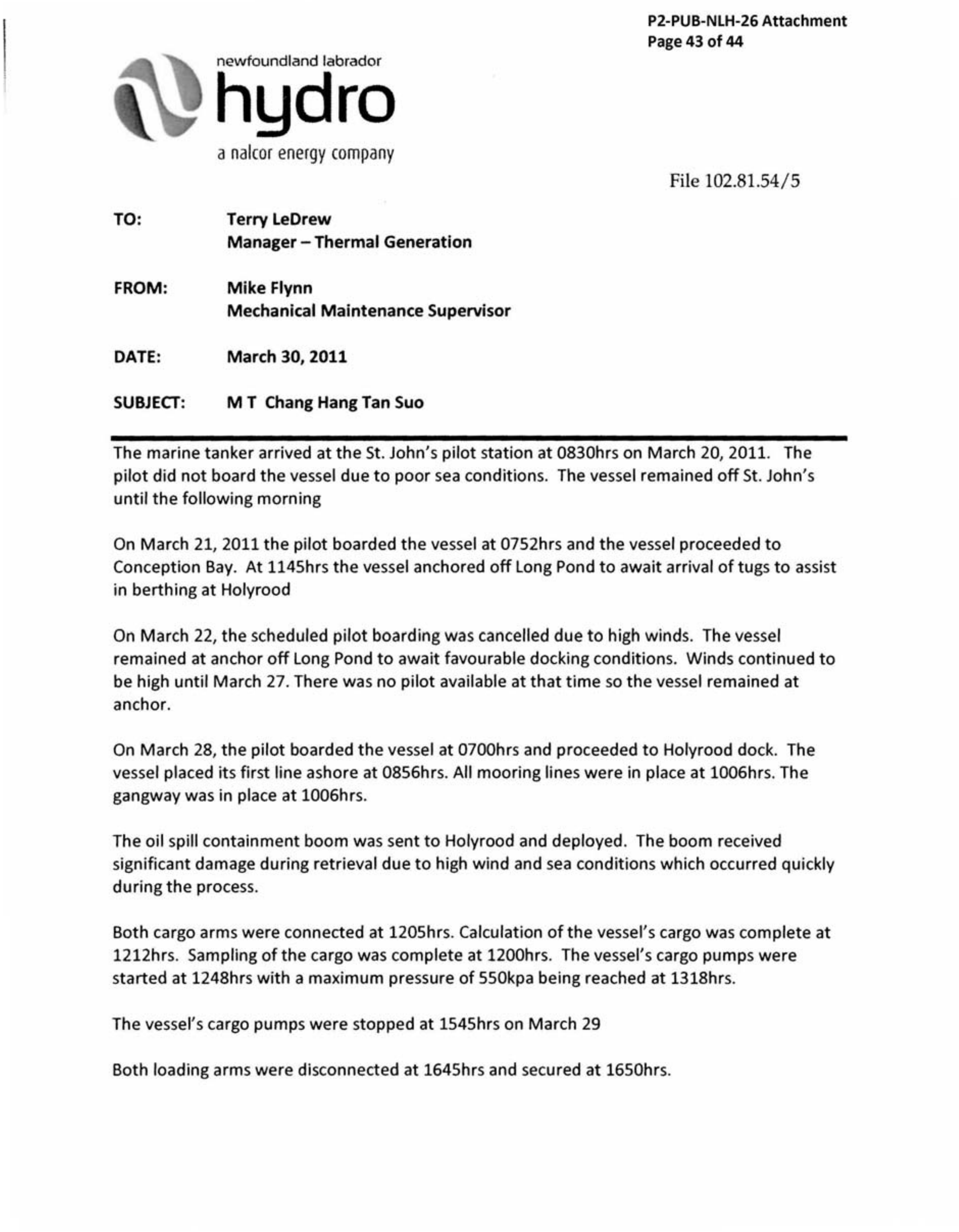
File 102.81.54/5

Feb 23, 2011
Cargo discharge completed at 1530hrs and tank inspection started. Tank inspection completed 1612hrs, calculations completed 1630hrs. All cargo documents completed 1740hrs. Cargo arms disconnected at 1810hrs. 1740hrs pilot advised vessel will not be sailing today due to high winds.

Feb 24, 2011
Pilot on board 1000hrs. Last line off 1100hrs. Vessel sailed 1102hrs.

Bill Kilfoy
Mechanical Maintenance Supervisor
/dbb
attach.
cc: Central File



File 102.81.54/5

TO: **Terry LeDrew**
Manager – Thermal Generation

FROM: **Mike Flynn**
Mechanical Maintenance Supervisor

DATE: **March 30, 2011**

SUBJECT: **M T Chang Hang Tan Suo**

The marine tanker arrived at the St. John's pilot station at 0830hrs on March 20, 2011. The pilot did not board the vessel due to poor sea conditions. The vessel remained off St. John's until the following morning

On March 21, 2011 the pilot boarded the vessel at 0752hrs and the vessel proceeded to Conception Bay. At 1145hrs the vessel anchored off Long Pond to await arrival of tugs to assist in berthing at Holyrood

On March 22, the scheduled pilot boarding was cancelled due to high winds. The vessel remained at anchor off Long Pond to await favourable docking conditions. Winds continued to be high until March 27. There was no pilot available at that time so the vessel remained at anchor.

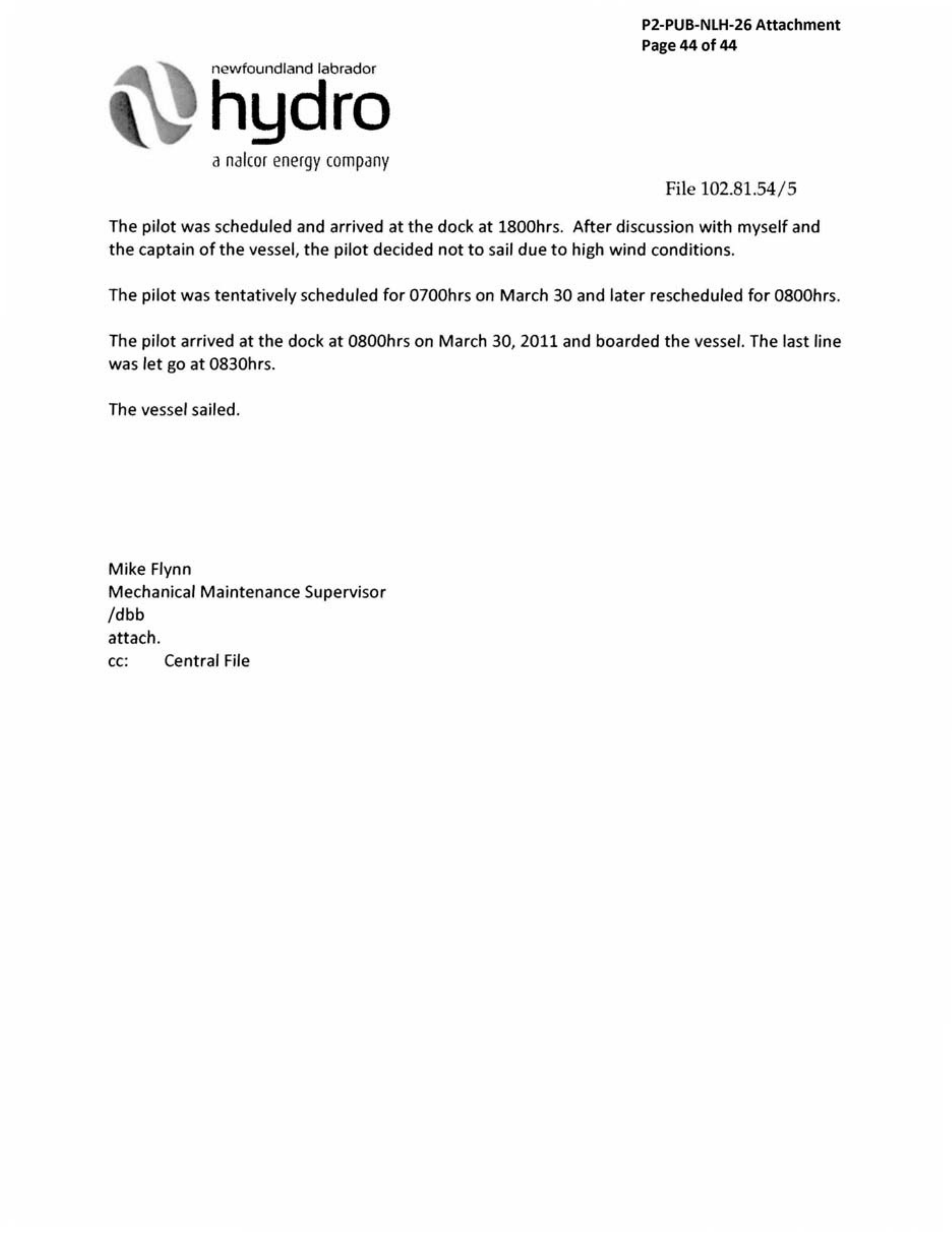
On March 28, the pilot boarded the vessel at 0700hrs and proceeded to Holyrood dock. The vessel placed its first line ashore at 0856hrs. All mooring lines were in place at 1006hrs. The gangway was in place at 1006hrs.

The oil spill containment boom was sent to Holyrood and deployed. The boom received significant damage during retrieval due to high wind and sea conditions which occurred quickly during the process.

Both cargo arms were connected at 1205hrs. Calculation of the vessel's cargo was complete at 1212hrs. Sampling of the cargo was complete at 1200hrs. The vessel's cargo pumps were started at 1248hrs with a maximum pressure of 550kpa being reached at 1318hrs.

The vessel's cargo pumps were stopped at 1545hrs on March 29

Both loading arms were disconnected at 1645hrs and secured at 1650hrs.



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a nalcor energy company

File 102.81.54/5

The pilot was scheduled and arrived at the dock at 1800hrs. After discussion with myself and the captain of the vessel, the pilot decided not to sail due to high wind conditions.

The pilot was tentatively scheduled for 0700hrs on March 30 and later rescheduled for 0800hrs.

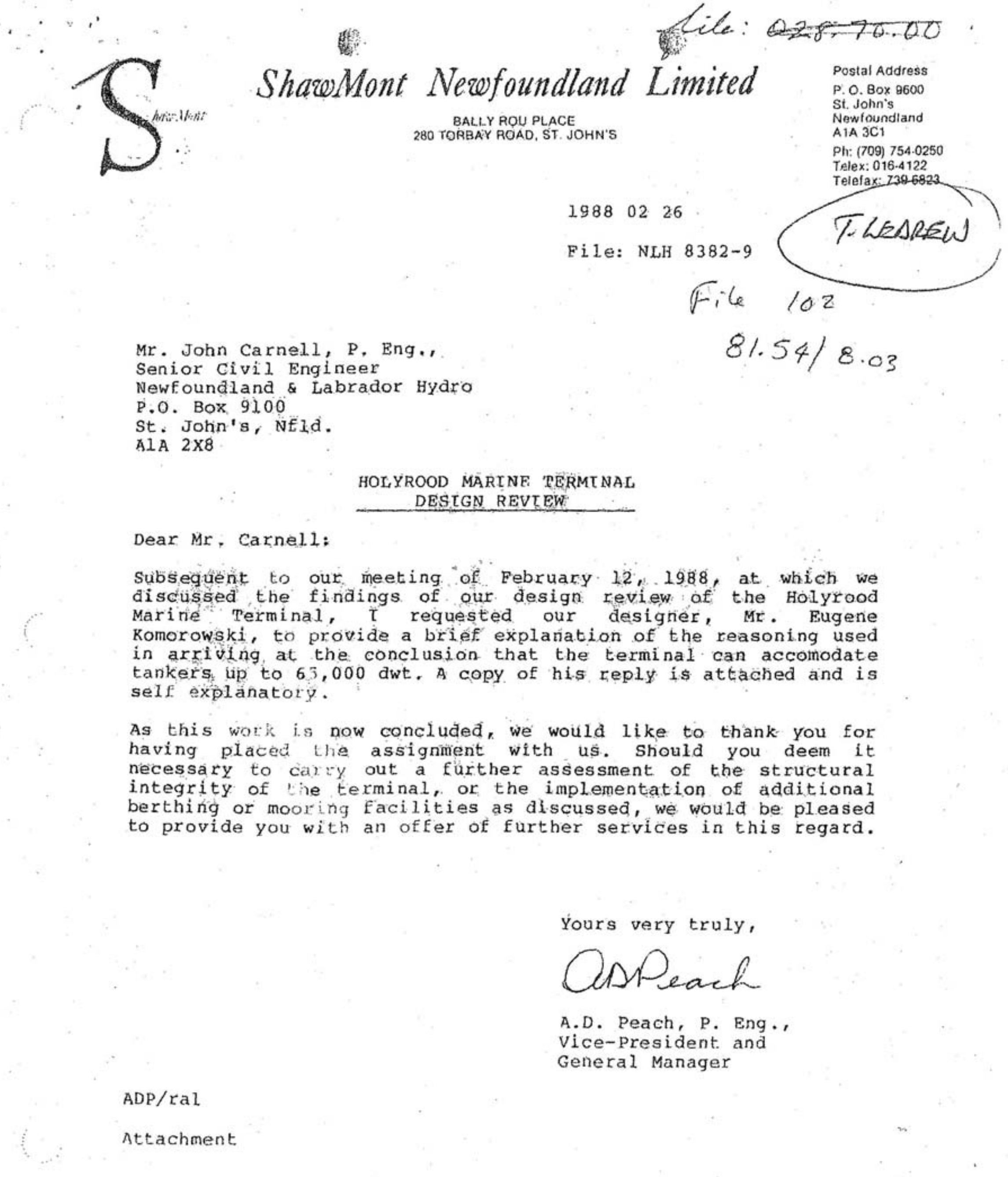
The pilot arrived at the dock at 0800hrs on March 30, 2011 and boarded the vessel. The last line was let go at 0830hrs.

The vessel sailed.

Mike Flynn
Mechanical Maintenance Supervisor
/dbb
attach.
cc: Central File

APPENDIX F

Shawmont Terminal Facility Design (1988)



File: ~~028-70.00~~

ShawMont Newfoundland Limited

BALLY ROU PLACE
280 TORBAY ROAD, ST. JOHN'S

Postal Address
P. O. Box 9600
St. John's
Newfoundland
A1A 3C1
Ph: (709) 754-0250
Telex: 016-4122
Telefax: 739-6823

T. LEDREW

1988 02 26

File: NLH 8382-9

File 102

81.54/8.03

Mr. John Carnell, P. Eng.,
Senior Civil Engineer
Newfoundland & Labrador Hydro
P.O. Box 9100
St. John's, Nfld.
A1A 2X8

HOLYROOD MARINE TERMINAL
DESIGN REVIEW

Dear Mr. Carnell:

Subsequent to our meeting of February 12, 1988, at which we discussed the findings of our design review of the Holyrood Marine Terminal, I requested our designer, Mr. Eugene Komorowski, to provide a brief explanation of the reasoning used in arriving at the conclusion that the terminal can accomodate tankers up to 63,000 dwt. A copy of his reply is attached and is self explanatory.

As this work is now concluded, we would like to thank you for having placed the assignment with us. Should you deem it necessary to carry out a further assessment of the structural integrity of the terminal, or the implementation of additional berthing or mooring facilities as discussed, we would be pleased to provide you with an offer of further services in this regard.

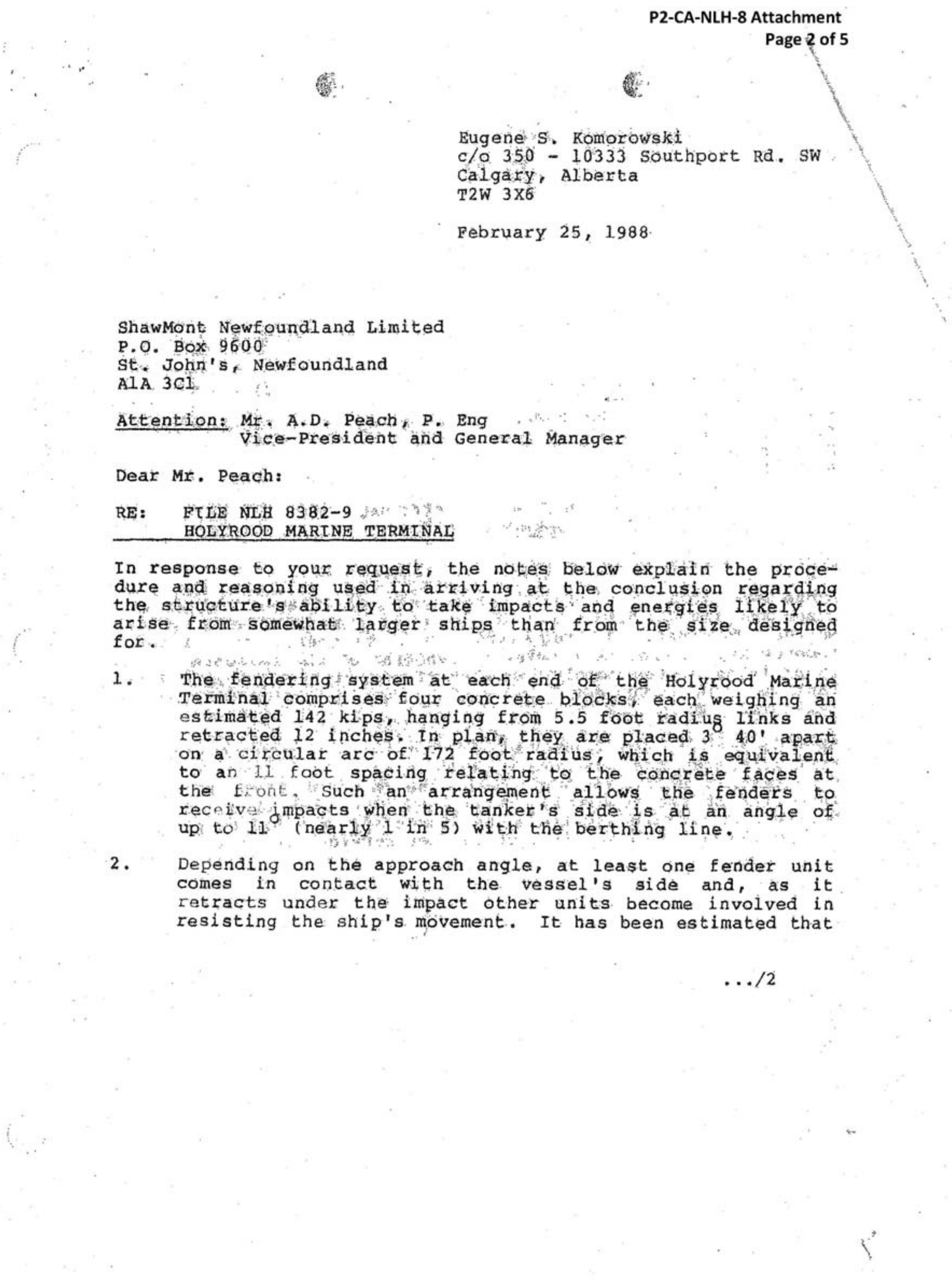
Yours very truly,

ADPeach

A.D. Peach, P. Eng.,
Vice-President and
General Manager

ADP/ral

Attachment



Eugene S. Komorowski
c/o 350 - 10333 Southport Rd. SW
Calgary, Alberta
T2W 3X6

February 25, 1988

ShawMont Newfoundland Limited
P.O. Box 9600
St. John's, Newfoundland
A1A 3C1

Attention: Mr. A.D. Peach, P. Eng
Vice-President and General Manager

Dear Mr. Peach:

RE: FILE NLH 8382-9
HOLYROOD MARINE TERMINAL

In response to your request, the notes below explain the procedure and reasoning used in arriving at the conclusion regarding the structure's ability to take impacts and energies likely to arise from somewhat larger ships than from the size designed for.

1. The fendering system at each end of the Holyrood Marine Terminal comprises four concrete blocks, each weighing an estimated 142 kips, hanging from 5.5 foot radius links and retracted 12 inches. In plan, they are placed 3° 40' apart on a circular arc of 172 foot radius, which is equivalent to an 11 foot spacing relating to the concrete faces at the front. Such an arrangement allows the fenders to receive impacts when the tanker's side is at an angle of up to 11° (nearly 1 in 5) with the berthing line.

2. Depending on the approach angle, at least one fender unit comes in contact with the vessel's side and, as it retracts under the impact other units become involved in resisting the ship's movement. It has been estimated that

.../2

depending on the retraction distance of the first unit engaged, the total amount of kinetic energy absorbed by the group of gravity units and the corresponding impact can range as follows:

(1) 3.85 foot retraction of the first unit hit - the total kinetic energy absorbed varies from 1140 to 1305 ft kips; the total resulting impact varies from 780 to 855 kips.

(2) 4 foot retraction - k.e. absorbed varies from 1265 to 1440 ft kips; resulting impact varies from 880 to 970 kips.

(3) 4.1 foot retraction (considered to be a practical maximum) - k.e. absorbed varies from 1360 to 1540 ft. kips; resulting impact varies from 980 to 1080 kips.

3. For the size of tanker considered, berthing against relatively soft fenders such as the gravity type used at Holyrood, it is quite probable they would absorb at least 90 percent of the actual energy imparted by the ship. The remaining 10 percent would be taken by the ship.

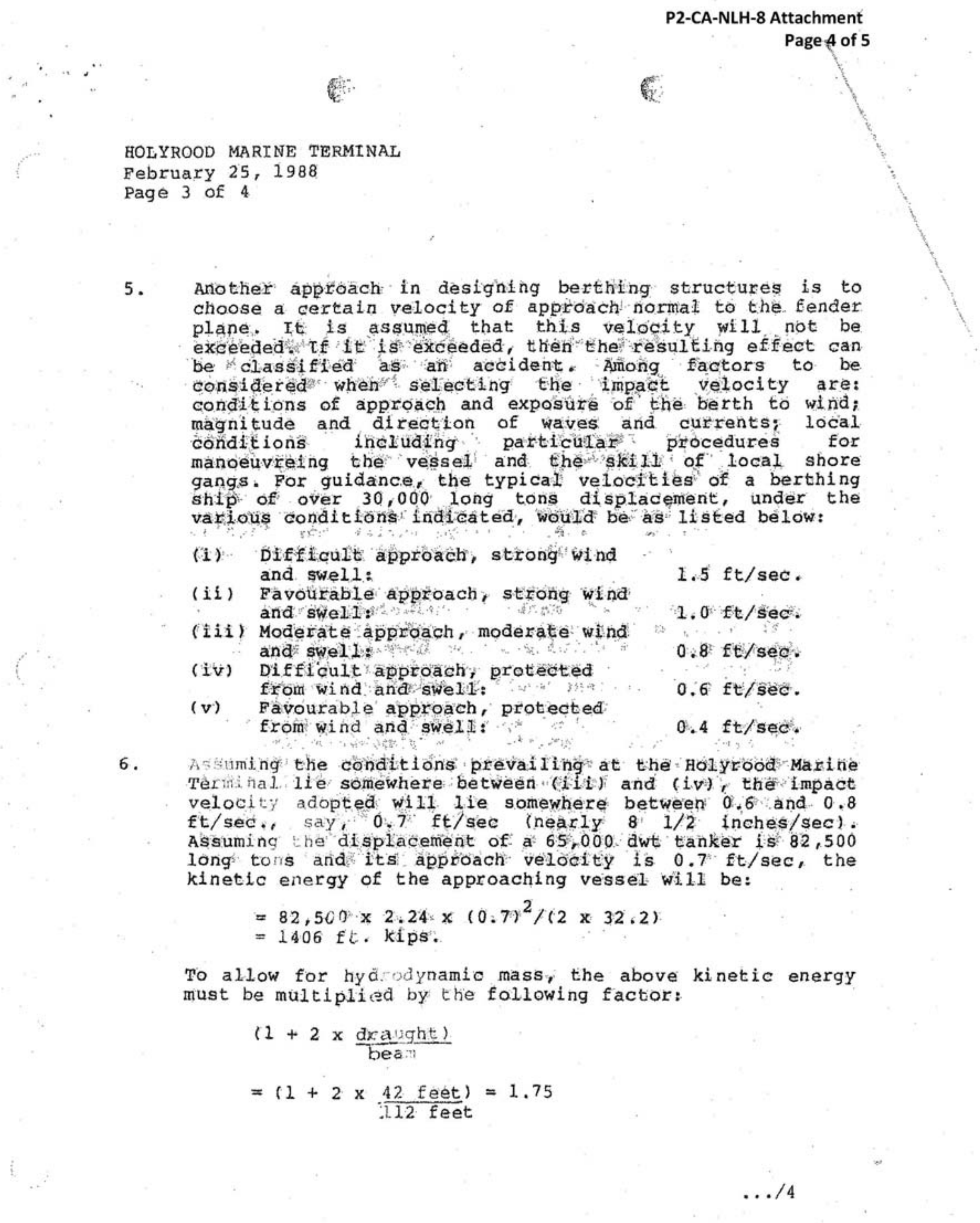
4. Based on a statistical approach, developed from the study of many recorded impacts of a similar class of tankers berthing at a number of terminals of varying types and exposure, the design criteria for a berth of average exposure are:

(1) Fender capacity to absorb energy is 17 ft. kips for each 1000 long tons deadweight up to yield point in the fenders.

(2) Fender impact reaction is not more than 1120 kips (500 long tons).

Accordingly, for tankers of 60,000 and 65,000 dwt, the required capacity of each fender group should be 1020 and 1105 ft. kips, respectively. These do not exceed the estimated energy absorbing capacities of a fender group retracting 3.85 feet as quoted in section 2 above. Actually, it can be estimated that the required retraction may be as low as 3.6 feet, resulting in a total reaction of 720 kips, on the assumption that the vessel will strike at nearly 7° to the berthing line (ie. the two internal units will be struck first followed by the two outer units).

.../3



5. Another approach in designing berthing structures is to choose a certain velocity of approach normal to the fender plane. It is assumed that this velocity will not be exceeded. If it is exceeded, then the resulting effect can be classified as an accident. Among factors to be considered when selecting the impact velocity are: conditions of approach and exposure of the berth to wind; magnitude and direction of waves and currents; local conditions including particular procedures for manoeuvreing the vessel and the skill of local shore gangs. For guidance, the typical velocities of a berthing ship of over 30,000 long tons displacement, under the various conditions indicated, would be as listed below:

(i)	Difficult approach, strong wind and swell:	1.5 ft/sec.
(ii)	Favourable approach, strong wind and swell:	1.0 ft/sec.
(iii)	Moderate approach, moderate wind and swell:	0.8 ft/sec.
(iv)	Difficult approach, protected from wind and swell:	0.6 ft/sec.
(v)	Favourable approach, protected from wind and swell:	0.4 ft/sec.

6. Assuming the conditions prevailing at the Holyrood Marine Terminal lie somewhere between (iii) and (iv), the impact velocity adopted will lie somewhere between 0.6 and 0.8 ft/sec., say, 0.7 ft/sec (nearly 8 1/2 inches/sec). Assuming the displacement of a 65,000 dwt tanker is 82,500 long tons and its approach velocity is 0.7 ft/sec, the kinetic energy of the approaching vessel will be:

$$= 82{,}500 \times 2.24 \times (0.7)^2/(2 \times 32.2)$$
$$= 1406 \text{ ft. kips.}$$

To allow for hydrodynamic mass, the above kinetic energy must be multiplied by the following factor:

$$(1 + 2 \times \frac{\text{draught}}{\text{beam}})$$

$$= (1 + 2 \times \frac{42 \text{ feet}}{112 \text{ feet}}) = 1.75$$

.../4

Thus, the virtual kinetic energy of the berthing ship would be = 1406 x 1.75 - 2460 ft. kips. Depending on the manner in which the ship makes its first contact with the fenders, only a fraction of this energy would be absorbed by the fenders. This energy factor can be adopted as 0.5. Therefore, the energy to be absorbed = 1230 ft. kips. It can be seen from the summary of berthing impacts in section 2 that the retraction of a fender unit and the resultant force under the impact would not exceed 4 feet and 880 kips, respectively. These lie within limits of the structure.

7. The impact of an estimated 880 kips, transmitted through the fender system into the supporting piles at one end of the jetty head, would be primarily resisted by a system of eight 1 in 2.5 batter piles and fourteen vertical ones. The total axial compressive force induced into the 1 in 2.5 batter piles would equal 2370 kips or about 296 kips/pile. The vertical piles would be subjected to a tension of some 2200 kips, equivalent to 157 kips/pile on average.

8. The minimum driving resistance of piles is given as:
    - 500 kips for vertical piles, and
    - 600 kips for 1 in 2.5 batter piles.

The batter piles have sufficient capacity to withstand impacts of the estimated magnitude. The vertical piles carry all the deadload of the jetty head. Their normal compressive load would be higher than the expected tensile counter reaction due to the expected impacts. They can also tolerate nominal reversal from compression to tension.

9. For comparision, the kinetic energy of 1105 ft. kips estimated in section 4 is equivalent to a berthing velocity of 0.66 feet/sec (8 inches/sec) assuming the same conditions as outlined in section 6.

I hope you find the above notes satisfactory. Should you find it necessary, I will be pleased to expand on them and provide additional information.

Yours very truly,
ORIGINAL signed by
E.S. Komorowski, P. Eng.,

ESK:dm