Q. **Re: B-7, Upgrade Marine Terminal – Holyrood $5,859,600 in 2012**

Provide a full explanation of available alternatives in relation to each of the aspects of the project.

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

- Fender Replacement/Repairs;
- Vessel Approach/Loading Arms;
- Anode Inspection/Replacement; and
- Life Safety Issues.

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 on page B18 of the report 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 page B19 of the report, fenders 5 and 6 underwent temporary repairs in 2008. The report recommends that the support suspension arms be replaced in conjunction with the replacement of back support brackets, support pins and

chains. As these fenders are critical to the docking process, there is no viable alternative outside of completing the recommended repairs.

3. Modify Existing Loading Arms

As discussed on pages B22 and B23 of the report, there are a number of deficiencies with the current loading arm setup. Given the increased vessel size the operating range of current loading arms is unable to properly facilitate the off-loading of fuel oil. At present, vessels are required to take on ballast water to reduce their freeboard to bring the ship's operating envelope in line with that of the loading arms. Furthermore, the loading arms are equipped with a twelve inch flange connection, whereby, the industry standard for vessels is sixteen inches. Both of these issues present significant challenges during the fuel oil off-loading process and need to be rectified.

Replacement of the loading arms is the only viable alternative to the proposed modifications. The installation of a new fuelling system is estimated to cost in the vicinity of $1,335,000. This is significantly greater than the proposed modifications which are estimated to cost $211,500.

4. Radar System

The installation of a radar system, to assist in the control and record of vessel approach velocities, is recommended on page B15 of the report. This equipment would play an important role in the vessel docking process. While tractor tugs are presently utilized to help the vessel dock at a controlled velocity there is no means to record the approach velocity and, as such, there is no viable alternative other than the purchase and installation of such a system. The estimated cost to purchase and install the system is $110,000.

5. Loading Arm Drainage System

As noted on page B26 of the report, the existing loading arms are not equipped with a fuel oil clean out system. This often results in residual fuel oil remaining in the lines upon completion of the off-loading process. With time the oil hardens due to a decrease in the external temperature and forms a blockage in the line. These blockages are problematic in the off-loading process and have formed the subject for a number of letters of protest from the Atlantic Pilotage Authority in the past. As such, there is no viable alternative to implementing the proposed loading arm drainage system. The cost to complete this work is estimated at $280,000.

6. Inspect All Anodes and Replace As Required

The anodes serve to reduce the corrosion rate of the steel pile jackets. These concrete filled steel pile jackets comprise the structural piles for the jetty. As described on page nine of the report, the anodes purpose is sacrificial, whereby they are selected as they are more reactive to the corrosive environment than the steel pile jackets. As a result of their increased reactivity, the anode is first dissolved in the seawater in preference to the steel pile jackets. To ensure that the marine terminal is structurally adequate to continue its vital role to the Holyrood Thermal Generation Plant it is critical that these anodes be replaced. The alternative would see new pile jackets installed. While the cost to complete the installation of new pile jackets has not been completed, given the nature of this type of installation the cost would prove to be significantly higher than the $473,200 estimated for the anode inspection and replacement.

7. 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. For this reason, the provision of a secondary egress, as outlined on page B29, is essential to the safety of this operation and there is no viable alternative outside of providing the required access.

8. Lighting Upgrades

The lighting upgrades, as outlined on page B31, 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. 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 see revisions to 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 $65,000.