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March 2, 2006

Ms. Lesley Griffiths, Chair
Joint Review Panel
Sydney Tar Ponds and Coke Ovens Remediation Project
P. O. Box 431, 582 George St.
Sydney Nova Scotia,
B1P 6G9

Dear Ms. Griffiths;

RE: STPA RESPONSE TO INFORMATION REQUESTS 17 TO 34 INCLUSIVE

Thank you for the Information Requests submitted by the Joint Panel on February 13, 2006, to which you requested a response.

Attached you will find the STPA response to each of these requests (IR-17 to IR-34 inclusive) received by the agency between February 13, 2006.

If you have any questions, please do not hesitate to contact me.

Yours truly,

Original signed

Frank Potter P.Eng.,
A/CEO Sydney Tar Ponds Agency

Encl.

Remediation of Sydney Tar Ponds and Coke Ovens Site Information Requests (IRs)

Responses to IR-17 to IR-34

IR – 17

Issue (IR-17):

The Panel notes that Section 1.2 of the Memorandum of Agreement provides for the maintenance and monitoring of the Tar Ponds and Coke Ovens sites or 25 years after the completion of the Project.

Section 8.0 of the EIS Guidelines requires STPA to define temporal boundaries for the environmental assessment based on the duration of project activities and potential effects.

Volume 1, Section 4.3.4 of the EIS indicates that ecological temporal boundaries were defined based on the relevant characteristics of environmental components.

Section 6.3.3.2 of the EIS establishes a 25 year temporal boundary for groundwater remediation monitoring. Similar boundaries are established for other VECs.

Elsewhere in the EIS, some activities appear not to be limited to 25 years after the completion of the Tar Ponds and Coke Ovens construction phases. Two examples:

- Volume 1, Table 13.1-1, Ensure water treatment system is designed to be operational for 25+ years;
- Volume, Table 1.1, Treat contaminated surface and groundwater for up to 25 years or as required.

Information Request (IR-17):

Indicate which VECs have a temporal boundary of 25 years, and explain how the anticipated environmental effects for that VEC related to the 25 year boundary.

Indicate how contaminants that remain at both Tar Ponds and Coke Ovens sites are expected to change over the 25 year period following completion of the project. Detail the expected decay rates of the contaminants and provide information on the decay pathways within a spatial and temporal framework. Identify the potential need for further mitigation, monitoring and maintenance following the expiration of the 25 year period identified in the MOA, and indicate the criteria to be used to determine whether further mitigation, maintenance and monitoring of both sites may be required following completion of the project.

Based on the project schedule presented in Figure 2.6-1 of the EIS, will long term monitoring, a component of the operation phase of the project, end no later than 2039?

Response (IR-17):

The proponent acknowledges that interactions of the Project with the biophysical and socio-economic environment will continue long after the current Memorandum of Agreement has expired, (i.e., more than 25 years). The Project will bring about major long-term changes in the biophysical and socio-economic environment of the Tar Ponds and Coke Ovens sites, which will continue to interact with all VECs after 25 years. It is anticipated that, over time, the environment at the Tar Ponds and Coke Ovens sites will reach an equilibrium or stasis condition where no major changes in the chemical, physical and ecological components of the sites are likely. Socio-economic effects (e.g., improved conditions for land use and economic activity) are expected to continue indefinitely. A monitoring program for the Project will be designed in consultation with regulatory authorities. The MOA provides for the ongoing future maintenance and monitoring of the sites for 25 years after completion of the Project. The monitoring program will be an integrated part of an adaptive management plan to verify impact predictions and inform potential modifications to the mitigation program as necessary over the life of the Project until regulatory officials are confident that any residual Project related risk remains at acceptable levels. This may or may not be longer than 25 years.

The aim of the Project is to remove and destroy certain contaminants, and to stabilize those that remain in place. Solidification/stabilization techniques are designed, and have been proven, to greatly reduce or eliminate the mobility of contaminants in soils. Leaching of contaminants from the stabilized areas will be minimal. To ensure that risk to human and biotic receptors is minimized, both sites will be capped. Under these conditions, decay of residual contaminants is not an environmental risk issue.

IR – 18

Issue (IR-18):

Section 6.3 of the EIS Guidelines requires STPA to identify or describe the current and potential future land ownership within the project area.

Information Request (IR-18):

Identify the potential future land owner of the Victoria Junction site.

Response (IR-18):

STPA expects that the site of the proposed temporary incinerator will be owned by the Province of Nova Scotia.

IR – 19

Issue (IR-19):

Volume 1, Tables 2.1-1 and 2.2-1 indicate that the Project will include groundwater collection treatment at the Tar Ponds site during the operation (post-construction) phase. Section 6.3 seems to indicate that Tar Ponds groundwater discharges directed to surface flows during the operation phase of the Project may be collected and treated.

Sections 2.2.1.6 and 2.13.2.1 identify a requirement for long-term treatment of groundwater but only for the Coke Ovens site.

Information Request (IR-19):

Provide clarification on the likelihood of groundwater collection and treatment at the Tar Ponds site during the operation phase of the Project.

Response (IR-19):

As the Tar Ponds are an area of groundwater discharge for the surrounding areas, it is likely that groundwater will need to be managed at the site. As a result, a number of measures have been developed to address the issue of groundwater intrusion onto the Tar Ponds site (see Vol. 1 Section 2.2 of the EIS).

While it is unknown whether groundwater from adjacent areas will need to be treated due to contamination, this potential does exist. As a result, it was concluded (Section 6.3.6) that groundwater that is intercepted at the Tar Ponds site will be monitored to determine whether treatment is required due to contamination from off-site sources.

If monitoring shows that contaminated groundwater is entering the site, the upstream source of the contamination will be investigated. If this source is outside the Project boundaries, STPA will work with the responsible parties to identify and address the source of contamination.

IR – 20

Issue (IR-20):

The Panel notes that the STPA has planned to begin construction of the Project as early as 2007. Volume 3, Section 4.1 of the EIS indicated that Earth Tech is preparing the preliminary engineering design of the proposed Project.

One of the references listed in Volume 6 is Earth Tech Canada Inc. 2005. “Remedial Predesign Project, Sydney Tar Ponds and Coke Ovens Sites” Sydney Tar Ponds Agency, Sydney, Nova Scotia.

Information Request (IR-20):

Indicate the current status of the preliminary engineering design of the Project. Provide the Panel with a copy of “Remedial Predesign Project, Sydney Tar Ponds and Coke Ovens Sites” document.

Response (IR-20):

A detailed design is currently in preparation. Any reference in the EIS to a “Remedial Predesign Project, Sydney Tar Ponds and Coke Ovens Sites” represents an error. Instead, the EIS should have correctly referred to the source as “information provided by the STPA’s design team”.

IR – 21

Issue (IR-21):

Volume 1, Section 7.4.3 of the EIS states that a Mikmaq ecological knowledge (MEK) report will be submitted to STPA by January 31, 2006 and provided to the review panel.

Information Request (IR-21):

Indicate the current status of the development of the MEK study and the expected delivery date. If the MEK study is complete, provide the documentation to the Panel.

Response (IR-21):

The proponent has received the complete MEK study. A copy of the report has been provided to the panel under separate cover.

IR – 22

Issue (IR-22):

Section 5.3.1, Volume 1 indicates that, in the Project area, subsidence inversions may accompany high pressure systems during the summer and that these conditions may increase the chance that air quality could deteriorate. Volume 1, Section 10, Potential Effects of the Environment on the Project, does not identify the potential influence of an inversion on those project activities that may affect air quality.

Information Request (IR-22):

Describe the influence an inversion may have on the predicted air quality effects of the Project.

Response (IR-22):

During certain times of the year, particularly in summer, a large scale high pressure system may become established over eastern North America. This system is problematic to southern Ontario, for example, because windspeed is very low, and the depth of pollutant mixing vertically is restricted by the formation of a temperature inversion. In Atlantic Canada, such systems can exist, but are somewhat less obvious, moderated by the proximity of the ocean. The weather records used in the analysis contain all weather phenomena, and so the influence, if any, of such systems on the dispersion of contaminants in Sydney is included and accounted for.

The occurrence of an inversion in the Sydney areas is likely to be somewhat familiar – light winds from the south or southwest, cloudless skies, and possibly a slight haze in the atmosphere. The drying of the surface is enhanced by such conditions, and the risk to air quality is the increased potential for dust generation by vehicle movements, etc. Fortunately, such systems are reasonably well predicted by Meteorological Services Canada, and the dust mitigation program will readily control the increased dust potential.

IR – 23

Issue (IR-23):

Section 7.2 of the EIS Guidelines requires a description of the assumptions that underlie the details of the project design. The Project description in Section 2 of the EIS does not describe how remediation criteria were used to determine where specific remediation approaches such as landfarming and capping are to be applied to different areas of the Coke Ovens site.

Section 2.3.1.5 of the EIS states that the surface of the Coke Ovens site will be capped with a grading layer of native silty/clayey soils. Figure 2.3-2, EIS Volume 1 illustrates the capping area as does Figure 4.3, Volume 5. There are differences between the two capping area shown in the figures.

Information Request (IR-23):

Provide additional and specific information on Coke Ovens site remediation criteria and their use in defining the capping area, the landfarm areas, the tar cell area, and the locations of the groundwater interceptor measures. Detail how groundwater will be excluded from the encapsulated area.

Provide a drawing, revised if necessary, showing the areas of the Coke Ovens site that will be capped based on the remediation criteria defined above.

Response (IR-23):

Remediation of contaminated soil at the Coke Ovens site will be accomplished by minimizing human and ecological exposure to contaminants and preventing the movement of contaminants off-site. This will be accomplished primarily by capping, and enhanced by two additional remediation measures: 1) landfarming to promote biological breakdown of contaminants in surface soils; and 2) low permeability vertical cutoff walls for beneficial control of groundwater. Figure 2.3-2, EIS Volume 1 illustrates the capping area, vertical cutoff walls and the areas within which landfarming will be conducted to enhance the remediation provided by the capping process. It is important to note that project design flexibility has been included to increase the extent of capping as necessary.

Contamination criteria used for the design of the remediation for the Coke Ovens (as described in Section 3.0 of the EIS) were set by the Site Specific Target Levels (SSTLs) determined by the risk assessment process included in the Phase II/III project (JDAC, 2002) and defined by CRA (2003). The Remedial Action Evaluation Reports (RAER) project (CBCL/ENSR, 2003) did a further assessment of site contamination for cleanup based on the SSTLs and defined the areas of exceedances. These areas are the basis for site remediation as illustrated in Figure 2.3-2, EIS Volume 1, which shows the areas identified for landfarming and clean soil cover. These areas are the same as those identified in the RAER document. Note that the RAER includes a detailed analysis of contaminant parameter concentrations by location. The complete results are included in the RAER document. Note that Figure 4.3, Volume 5 illustrates a conservative assumption for the extent of capping for the purposes of the human health risk

assessment. The human health risk assessment used this conservative approach to evaluate any potential dust related risks from possibly extending the areas to be capped.

The Tar Cell cleanup requirement is based on the knowledge of past activity and field test results from the Phase II/III work. The presence of coal tar, likely remnant material from the tar storage here, was confirmed by the Phase II/III testing. Coal tar cannot be treated by conventional landfarming. Therefore, this material is designated for excavation and incineration.

The intent of the groundwater control is twofold. First, the cutoff walls to the north and south of the Coke Ovens site will minimize contact of groundwater from off the site with contaminated areas on the site. Second, a wall along the southwest of the Coke Ovens site will minimize off-site groundwater flow to the west. The placement of low permeable barriers seated into the low permeable till along the perimeter of the impacted areas can accomplish this groundwater control. This is the basis for the location of the groundwater interception measures.

References

CBCL/ENSR, 2003. Remedial Action Evaluation Report – Coke Ovens Site. Prepared for Nova Scotia Department of Transportation and Public Works. CBCL/ENSR Report No. 012463.

CRA, 2003. Remedial Action Objectives and Site Specific Target Levels, Coke Ovens Site. Muggah Creek Remediation Project, Sydney, NS. Prepared for: Sydney Tar Ponds Agency. Ref. No. 14458 (40).

JDAC, 2002. Phase III Environmental Site and Risk Assessments – Coke Ovens Site. Phase II/III ESA - Muggah Creek Watershed. Prepared for Nova Scotia Department of Transportation and Public Works.

IR – 24

Issue (IR-24):

Table 4.3-1 of Volume 1 of the EIS identifies microbes as a concern that relates to the atmospheric environment. How this concern has been addressed in the EIS is not readily apparent.

Information Request (IR-24):

Provide additional information on the risk posed to human health by microbes particularly those related to sewage contaminated sediments. Provide additional information on the potential for airborne movement of bioaerosols (i.e. aerosols containing viruses, fungi, bacteria and their cellular materials) associated with the excavation, treatment and disposal, of contaminated sediments.

Response (IR-24):

On August 24, 2005 AMEC and Jacques Whitford Limited performed a field experiment to simulate the excavation and *in situ* stabilization of Sydney Tar Ponds sediments. During this field experiment, AMEC collected data on the level of microbes in the air upwind and downwind of the experimental site. This sampling was conducted to obtain data on the concentration of microbial constituents during cleanup activities during a sampling activity.

The bacteria sampling results showed that the total counts at the “Near Excavation” areas were lower than the “Downwind” or “Upwind” sites. Based on these bacteria sampling results, one can therefore conclude that the excavation and stabilization activities are not apparently serving as a source of bacteria to on-site work areas and nearby residential neighborhoods.

The sampling of airborne fungi provided no evidence for a notable release of fungi from the excavation activities. The sampling results for the concentrations at the downwind location were only slightly higher, and for some of the sampling rounds and species even lower than for the upwind locations.

The sampling program identified the presence of common or “ubiquitous” species that will be found associated with decaying material, such as leaves, grass, wood, etc. (Aerotech Laboratories, Inc. 2006; Health Canada, 1995).

Species detected included *Cladosporium cladosporioides*, *Ulocladium chartarum*, *Cladosporium herbarium*, *Penicillium bravicompactum*, and yeasts. Airborne fungi detected downwind of and next to active excavation activities in the Tar Ponds in 2005 were about the same as the fungi detected at the water surface of the Tar Ponds in 1998 when no intrusive activities were being undertaken. The species present are common species, with the total being dominated by *Cladosporium cladosporioides*, which is a common tree and leaf fungus specifically cited by Health Canada (1995) and Public Works and Government Services Canada (2005).

Total fungus concentrations were within the range of concentrations reported in outdoor air from Maritime Provinces (1992-1996) [RCS air sampler] by Rand (1997), which was 0-3,944 CFU/m³.

IR – 25

Issue (IR-25):

Table 2.9-2 of Volume 1 suggests that a baghouse and a wet scrubber may be used as part of the incinerator's air pollution control system. Table 6.1-12 refers to a "proper" air pollution control system. Section 8.2.1.3 refers to the possible use of a quencher. Section 8.1 of Volume 2 recommends the addition of a scrubber to the incinerator air pollution control system to reduce sulfur dioxide emissions. The EIS does not provide information on the criteria to be used to decide what pollution control equipment will be installed.

Information Request (IR-25):

(25.1): Consistent with Section 7.1.4 of the EIS Guidelines, identify air pollution control devices, or combinations of devices, the use of which are technically and economically feasible for the two types of incinerators under consideration. Detail the criteria and/or thresholds used in determining the viable pollution control options.

(25.2): Did the modeling in Volume 2 assume that no pollution control devices would be present for all contaminants or just sulfur dioxide? What are the predicted emissions of sulfur dioxide expected to be with the addition of a scrubber?

Response (IR-25):

(IR-25.1): CCME, USEPA, Ontario and NS emission limits and ground level standards are related to stack and ground level concentrations and all Air pollution Control devices have to meet the air permit requirements. Any air pollution control devices must also be commercially available, economical feasible and with a proven reliability. The current state of technology contained in the table below outlines the various treatment trains that would be applicable. The devices apply equally for any type of incineration technologies.

Air Pollution Control (APC) Devices/Train	Comments on Criteria, Thresholds and Applicability
<p style="text-align: center;">Flue Gas Cooling ↓ Electrostatic Precipitator (ESP) ↓ Wet Scrubber ↓ Activated Carbon</p>	<p>ESPs are considered older technology and were the dominant APC device several decades ago. Although their use has declined the units can still perform well. Due to the particulate emission limit requirement , a large ESP unit maybe required making its use less economical.</p> <p>The presence of acid gases triggers the need for a wet scrubber.</p> <p>The presence of mercury and trace organics triggers the need for activated carbon.</p>
<p style="text-align: center;">Flue Gas Cooling ↓ Activated Carbon and Lime Injection ↓ Baghouse</p>	<p>The presence of mercury and trace organics triggers the need for activated carbon direct injection in the flue gases.</p> <p>The presence of acid gases triggers the need for lime injection. Acid removal is not as efficient as a dedicated wet scrubber.</p> <p>Baghouses have been well established and proven reliable as their use has increased. Current incineration plants utilise baghouses as the main portion of their treatment train and can readily meet the required criteria. High acid gases (SO₂, HCl) will generate large quantities of fly ash which are deemed hazardous and can increase costs from disposal.</p>
<p style="text-align: center;">Flue Gas Cooling ↓ Activated Carbon ↓ Baghouse ↓ Wet Scrubber</p>	<p>The presence of mercury and trace organics triggers the need for activated carbon.</p> <p>Baghouses have been well established and proven reliable as their use has increased. Current incineration plants utilise baghouses as the main portion of their treatment train and can readily meet the required criteria. Acid gases (SO₂, HCl) in this treatment train will be captured in the wet scrubber, reducing the amount of hazardous fly ash.</p> <p>The presence of acid gases triggers the need for a wet scrubber. This additional scrubber would increase capital and electrical costs, but will reduce the fly ash disposal cost and increase the acid gases removal efficiency.</p>
<p>All of the activated carbon devices in the above listed three APC Devices/Trains can be replaced with a Carbon Bed Scrubber</p>	<p>Carbon injection can be replaced by a dedicated bed scrubber. This would increase the removal efficiency of mercury and trace organics if required. However capital and electrical operating costs would increase.</p>
<p style="text-align: center;">Flue Gas Quenching ↓ Ionization Wet Scrubber</p>	<p>Ionization wet scrubbers are newer technology but have been proven and demonstrated at full scale in PCB applications (Baie Comeau, Vesta Full Scale Demonstration and Swan Hills). All of the unwanted contaminants are collected in liquid form which will require further treatment. Control of pH is required. Cooling tower is also require to ensure that the scrubber operate an low temperature.</p>

The final design process will determine which APC devices/train will be applied.

(IR-25.2): The incinerator technology in the assessment represents a performance-based technology. The Canadian Council of Ministers of Environment published in 1992 a report outlining the guidelines for operation of hazardous waste incinerators. This two volume report was based on a review of actual equipment that was in operation. The guidelines have been used to regulate the performance of such equipment and regulators have relied upon these reports as benchmarks for acceptability. In determining the emission rates for the EIS, CCME limits were used as the estimated emissions from the incinerator. This does not mean that the incinerator will be operated at the limit; it is likely, in fact, that the operator will include some margin to ensure that the equipment is operating within the limits. This means that the use of such emission estimates represent a reasonable worst-case approach. The question of economic feasibility is an engineering concern, but the equipment exists to meet the performance criteria (as shown by the CCME survey), and there has been no constraint on the equipment costs that has restricted the EIS analysis. There is a wide variety of emission control configurations available, and it is not the purpose of the EIS to design the equipment, but to assess the impact of available, proven technology that meets the standards set by the appropriate regulatory authorities. The actual performance must meet the standards, and the selection of the successful contractor will include a review of the design and performance.

The CCME Guidelines provide some of the performance specifications; others are provided from three additional sources. First, the Air Quality Regulations under the *Environment Act* of Nova Scotia provide ground level concentration limits for certain contaminants, referred to as the Criteria Air Contaminants, or CACs. These include sulphur dioxide, nitrogen dioxide, particulate matter and hydrogen sulphide. In order to apply these criteria, it was necessary to make a mathematical link between the stack gas concentration and the ground level concentration. This is done through atmospheric dispersion modeling. The characteristics of the incinerator – height of the stack, temperature and flow rate of the stack gas, and velocity of the stack gases – were selected to be typical of the equipment meeting the CCME criteria. The stack height of 30.5 m was selected to be reasonable for a temporary incinerator; that is, it would not be a structure that would involve permanent foundations. The flue gas flow was designed to accommodate the requirements of treating the 10 tonnes/hour (wet basis) materials. Certain characteristics, for example the temperature, were selected to be in accord with the CCME Guidelines. In the case of dioxins and furans, the emission rate used in the human health risk assessment were updated from the CCME publication of 1992 to reflect the newer, and more stringent Canada Wide Standards. Finally, the feedback from the human health risk analysis was used to determine whether the emission rates were acceptable and, whether or not there was an exceedance of any of the design standards. The emission rates do, therefore, include the mitigation required to meet the criteria listed above. Some of this mitigation is incidental; for example, the control of particulate matter emissions also causes a reduction in the emission of trace metals, even where reductions are not required by the performance criteria. The proponent will apply a level of scrubber efficiency that is adequate to meet all of the criteria for all time periods.

IR – 26

Issue (IR-26):

Section 2.0 of Volume 5 indicates that data on metals content of coal fly ash were taken from Affolter et al. Undated. The Affolter data represents coal from a single geological formation.

Information Request (IR-26):

Advise as to why the selected data adequately characterized coal fly ash for this project.

Response (IR-26):

A reference that was used to estimate metal concentrations in coal combustion fly ash was unintentionally left out of the EIS. [Kim and Kazonich \(Undated\)](#) presented the concentrations of trace elements in 20 samples of fly ash from multiple sources, of which 3 were not relevant to power generation combustors. The averages of the remaining 17 samples were considered for the EIS. As noted, data from [Affolter et al. \(Undated\)](#) were also considered for the EIS. The maxima of the means was selected to represent the metal concentrations in the EIS. Therefore, the concentrations used in the EIS did not, in fact, represent a fly ash from a single combustor generated from a single coal source. Instead, they reflected multiple sources of coal.

IR – 27

Issue (IR-27):

Volume 1, Table 2.4-1 indicates that incineration is expected to generate process residuals, both liquid (Item B 1.2) and solid (Item B 3). Section 7.8.5 states that a very small volume of hazardous waste will be generated from the incinerator.

Information Request (IR-27):

As per Section 7.2.3 of the EIS Guidelines, identify the volumes and quantities of all potential process residuals, liquid and solid, of the proposed incinerator (provide information for both rotary kiln and fluidized bed technologies) including those residuals originating from potential air pollution control systems. Indicate which of these residuals may be characterized as hazardous waste.

Response (IR-27):

Two types of ash are generated from the thermal treatment process. Bottom Ash (over 99%) and Fly Ash (less than 1%) are the two ash types. The Bottom Ash (treated sediments and soils) and Fly Ash (bag house dust) can both be treated by stabilization and placed into the engineered containment system in the Tar Ponds, provided that the PCB concentrations after treatment are less than 50 ppm. Either material will be dry enough to use as a sorbent to dry out the sediments from the Tar Ponds.

Those identified volumes of sediments to be excavated from the Tar Ponds will be transported to the thermal treatment plant for treatment. Once treated the sediment will be tested to determine if the material has been successfully treated (i.e. treated sediments below 50 ppm PCBs). The successfully treated materials will be transported back to the Tar Ponds where they will be stabilized and then placed in the engineered containment system. If they are not below 50 ppm PCBs, they are re-treated to ensure they are below 50 ppm PCBs.

Other contaminated sediments in the Tar Ponds will be stabilized and remain within the engineered contained system.

The proponent's design philosophy is that all solid materials remaining from the incineration process, whether rotary kilns or fluidized bed incineration, will be returned to the tar ponds and solidified. This is a design refinement of the number of potential options that were considered as part of the EIS for the final destination of these materials. This refinement was considered within the suite of options that were analyzed as part of the EIS. It is possible that flyash may require additional treatment or potential offsite disposal. However, we expect the volume of flyash to be small compared with the total volume of materials handled. Estimated incineration material volumes are summarized in the following table.

Estimated Materials from Incineration	Quantity
Clean Soil (bottom ash)	~174,000 tonnes
Fly Ash from the Baghouse	~894 tonnes
Brine Solution from the Wet Scrubber	~17,550 tonnes
Wastewater	5-10 Lpm

Please see response to IR-29 for further details.

IR – 28

Issue (IR-28):

Volume 5, Section 4.4.1, Estimation of Exposure Point Concentrations Using Measured Data, indicates that ECPs for incinerator fly ash and incinerator clean soil (bottom ash) were estimated from the incinerator feed material by assuming that all metals would be partitioned either into the fly ash or the bottom ash, and that the ratios of fly ash to bottom ash for the metallic COPCs were assumed to be the same as the ratios reported for five incinerators in a U.S, EPA study of ash characteristics. The same section indicates that statistical summaries of each dataset are presented in Appendix F. Appendix F does not appear to provide data relating to bottom ash, fly ash, and slag. Table 4.12 of Volume 5 provides EPCs for incinerator clean soil (i.e. bottom ash), coal fly ash, and slag. With no statistical summaries for bottom ash, fly ash, or slag the derivation of the values listed in Table 4.12 is not readily apparent.

Information Request (IR-28):

Provide additional information on the calculation of Exposure Point Concentrations for metals by characterizing metal concentrations in incinerator feed (a 1:1 mixture of coal fly ash and sediments or soil) stack emissions, and process residuals. The characterization should use a mass balance approach. EPCs, revised if required, should be provided.

Response (IR-28):

Estimated metal concentrations in incinerator ashes are summarized in the following table. Concentrations of metals in fly and bottom ash were taken from NUS (1987) and used to determine the fractionation of metals in feed material into bottom and fly ash, conservatively assuming that no metals were emitted through the stack. The resulting fractionation was used to estimate concentrations in bottom and fly ashes from concentrations in the calculated incinerator feed.

Determination of Metals Concentrations in Incinerator Clean Soil

Compound	NUS 1987				EIS		
	Concentration		% Composition		Concentration		
	Bottom Ash	Fly Ash	Bottom Ash	Fly Ash	Incinerator Feed	Estimated Bottom Ash	Estimated Fly Ash
Arsenic	9.2	111	8%	92%	50.23	3.84	46.39
Beryllium	39140	12742	75%	25%	0.75	0.57	0.18
Cadmium	11	349	3%	97%	0.66	0.02	0.64
Chromium	61	95	39%	61%	58.93	23.04	35.88
Lead	2800	8700	24%	76%	395.57	96.31	299.25
Mercury	0.17	13.9	1%	99%	1.42	0.02	1.40
Selenium	2.5	9.5	21%	79%	1.88	0.39	1.49
Silver	887	998	47%	53%	1.76	0.83	0.93
Zinc	4671	32180	13%	87%	590.22	74.81	515.41

All units in ppm except where noted.

References

NUS. 1987. Characterization of MWC (Municipal Waste Combustion) Ashes and Leachates from MSW (Municipal Solid Waste) Landfills, Monofills and Co-disposal Sites. Volume 1. Prepared for U.S. EPA R-33-6-7.

IR – 29

Issue (IR-29):

Throughout the EIS incinerator bottom ash is described as “clean” soil. Volume 1, Section 2.4.1 indicates that treated ash that meets “acceptance criteria” for metal concentrations and leachability will be used as backfill at the Tar Ponds or Coke Ovens sites or placed in an approved landfill.

Information Request (IR-29):

As per Section 11.1 of the EIS Guidelines describe the legislation, regulations, guidelines, policies and specifications that will be adhered to during disposal of incinerator residuals. Compare anticipated specifications of the residuals with specifications required by the relevant legislation, regulations, guidelines, and policies.

Response (IR-29):

Materials identified for treatment will undergo a multi-step process that may include excavation, segregation, blending, thermal treatment, solidification and stabilization and containment. Thermal treatment unit outputs represent a stream in the treatment process and treated materials will remain on the Tar Ponds and Coke Ovens sites at the end of the project. Relevant legislation, regulations, guidelines and policies are considered within this context and provided in the table below.

Legislation, Regulation, Guidelines, Policies or Specifications for Residual Disposal	Comments on Criteria, Thresholds and Applicability
Canadian Council of Ministers of the Environment Canadian Environmental Quality Guidelines	Provides guidelines related to land use These guidelines will be applied to final placement of materials.
PCB Management Regulations, Nova Scotia Environment Act.	These regulations apply to the management and handling of PCB related material.
Nova Scotia Dangerous Goods Transportation Act.	Act addresses safe handling and transportation of materials and will be applied if required.
Transportation of Dangerous Goods Act.	Act addresses safe handling and transportation of materials and will be applied if required.

Please see response to IR-27 for additional information.

IR – 30

Issue (IR-30):

Volume 1, Section 8.2.1.3, Incinerator Emissions Control Failure states that the expected duration of this type of event (a sudden release through the bypass stack) is likely to be under a minute.

Information Request (IR-30):

Provide a source or justification for the above statement. Provide the expected frequency of bypass stack release.

Response (IR-30):

With the exception of total system failures (complete power loss, APC failure), the duration of these events is expected to be under a minute. Once a bypass occurs, the feed into the incinerator is immediately stopped and an alarm will alert the control room operator who will rectify the situation. Typically this process is of very short duration and will be completed in under one minute. Total system failures are expected to occur rarely. If such failures occur, the process will be shut down and residual emissions are expected to be limited.

It is expected that during start-up of the incinerator bypasses may occur periodically during the first month of burning of non-hazardous waste (system check and QA), however once the incinerator is operational (i.e., burning PCBs waste) bypass events are expected to occur rarely.

IR – 31

Issue (IR-31):

Section 10.5 of the EIS Guidelines directs the STPA to describe the potential effects of any predicted increase in noise levels from the project on residential, commercial, recreational and institutional areas and sensitive wildlife habitats.

Information Request (IR-31):

Indicate whether the effect of increased noise was considered for commercial, recreational and institutional areas.

Response (IR-31):

Yes, increased noise was considered in the assessment of potential effects on commercial, recreational and institutional uses. Potential for significant adverse noise-related effects was considered to be unlikely.

IR – 32

Issue (IR-32):

Section 2.13.2.1 of Volume 1 of the EIS indicates a single channel has been proposed for the channelization of surface water at the Tar Ponds site, but has provided no detail.

Information Request (IR-32):

Provide greater detail regarding the channelization of surface water at the Tar Ponds site (depth, width, length, projected flow rates under normal conditions (including annual minimum and maximum velocities) and for storm events (1:100 year, 24 hour). Would the channel provide for fish passage? Would the channel be accessible to the general public once final landscaping is complete at the site?

Response (IR-32):

The EIS used information from previous work, primarily the Remedial Action Evaluation Reports (RAER) project (CBCL/ENSR, 2003), for its description of the channelization of surface flows. Concurrent with the development of cleanup plans, the STPA initiated a study for the proposed Battery Point Cofferdam. The existing and post-remediation hydraulic conditions of Muggah Creek were included in the studies for the Battery Point Cofferdam (CBCL, 2005; CBCL, 2006a; CBCL, 2006b). Much of the following description is based on these studies.

Upon completion of the cofferdam but before the channelization is started, Muggah Creek will carry all the flow, as in the existing conditions. The cofferdam will change the opening at the entrance to Muggah Creek from about 220 m to 50 m. This change was included in the modelling of flow conditions by CBCL with the results shown for the 1 in 100 year peak flow water levels in the table below.

Impact of Cofferdam Construction on Water Levels within and Upstream of Muggah Creek for the 1 in 100 Year Peak Flow

Condition	LOCATION				
	Muggah Creek Outlet	Ferry St. Downstream	Ferry St. Upstream	Upstream Of Prince St.	Upstream Of Rail Bridge
Geodetic Water Levels for Existing Conditions	1.00 m	1.02 m	1.76 m	1.81 m	2.51 m
Water Level Change with Cofferdam, 50m Opening	+0.01 m	+0.03 m	+0.01	+0.01 m	+0.01 m

The cofferdam construction will result in an increase in water levels of 1 – 3 cm for the 1 in 100 year peak flow event. This is a very minor impact and, considering the short duration of time that Muggah Creek will discharge through the cofferdam opening while the channel construction is underway, is a low risk occurrence.

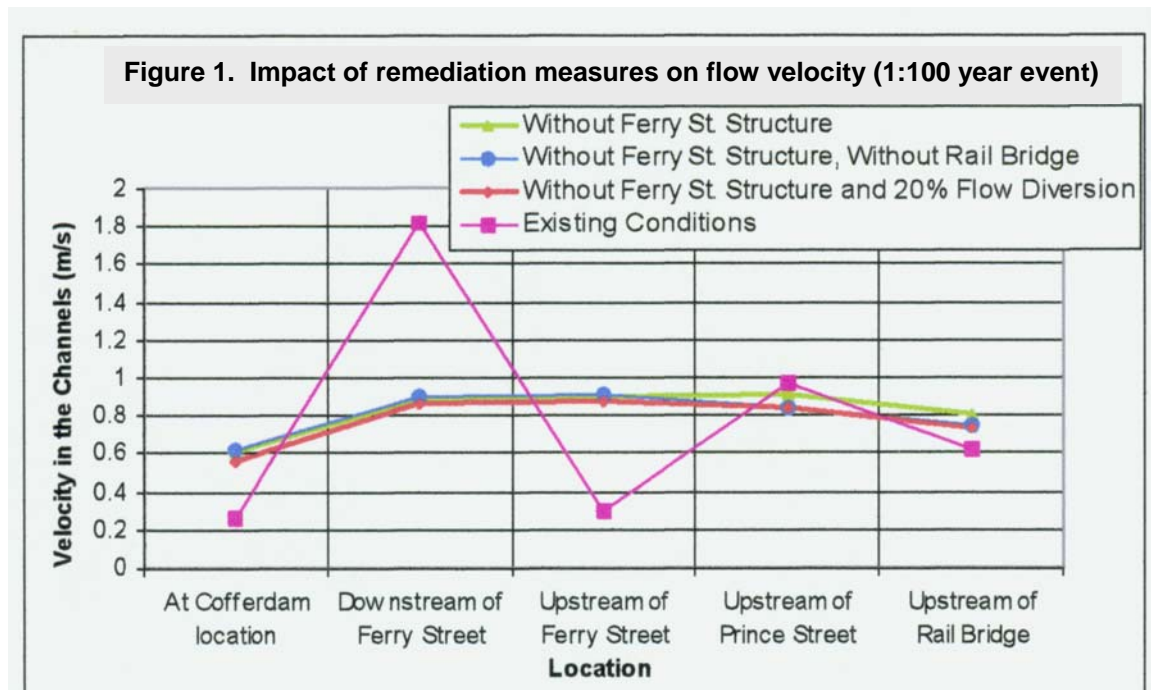
The channelization approach was also modelled during the cofferdam conceptual design. This modelling determined a minimum channel width of 20 m to carry the surface flows through the ponds to the harbour while maintaining or improving existing hydraulic conditions. Hydraulically, as long as the cofferdam does not create any restriction to the flow that is greater than what is required, it will produce no impacts. A cofferdam with an opening sized this way is acceptable as long as the full opening width is used for any of the temporary and/or final channels. The modelling included the cofferdam (50 m opening) and channel (25 m wide) scenario for the 1 in 100 year peak flow event, with the results shown in the following table.

Impact of Cofferdam and Channel on Water Levels within and Upstream of Muggah Creek for the 1 in 100 year Peak Flow

Condition	Location				
	Muggah Creek Outlet	Ferry St. Downstream	Ferry St. Upstream	Upstream of Prince St.	Upstream of Rail Bridge
Geodetic Water Levels for Existing Conditions	1.00 m	1.02 m	1.76 m	1.81 m	2.51 m
Water Level Change with Cofferdam and Channel, without Removal of the Ferry St. Structure	No Change	+0.40 m	+0.29 m	+0.35 m	+0.12 m
Water Level Change with Cofferdam and Channel, With Removal of the Ferry St. Structure	No Change	+0.40 m	-0.34 m	-0.22 m	-0.05 m

The modelling results show the significance of removing the hydraulic loss represented by the Ferry Street structure. Constructing the cofferdam and channel, with removal of the Ferry Street structure will mean a water level increase downstream of Ferry Street and a water level decrease for locations upstream of Ferry Street, compared to existing levels. This reduction in peak water levels will decrease the risk of flooding in areas upstream of the cofferdam.

The effect of implementing channels in the system and removing the flow restriction at the Ferry Street structures has a significant effect on the velocities. The velocities in the system are greatly dampened compared to the existing conditions. The very low velocities in the very large channels are increased, and the high velocities through the main flow restrictions are decreased, bringing down the range of velocities to about 0.6 m/s to 1.0 m/s. Figure 1 shows the velocities with various flood mitigation options for the 1 in 100 year event.



The channel will be constructed in sections while surface flows are directed around them. Material removal for the single channel construction will be done with long reach excavators or clams for each of the channel sections. It will include transfer of the excavated material into contained areas within the Tar Ponds for S/S treatment. Once a section is cleaned a sand layer will be placed for levelling purposes and as a bedding for a HDPE liner. A layer of clean crushed rock will be placed over the liner. The shoreline slope will be protected by armour stone. The cleaned channel will be constructed 25 metres wide and the depth will vary according to the sediment excavation.

Tides in Sydney Harbour vary between -0.4 m and $+1.0$ m of geodetic elevation. This 1.4 m of variation in water levels diminishes with the inland distance from the harbour. The tidal influence in the new channel will be decreased compared to existing conditions due to the reduced dampening effect resulting from the channel construction. It is likely that all areas where the bottom of the channel is lower than $+1.0$ m geodetic, which represents all of Muggah Creek and a portion of Wash Brook, will still see some tidal influence. As such, the channel will allow for fish passage.

The Memorandum of Agreement between the Federal and Provincial Governments does not extend to final land use. The channel may be accessible to the general public depending upon the final land use. It should also be noted that as part of the review of

the Cofferdam project, a request was made by Transport Canada to include a barrier boom as part of the Cofferdam design to restrict watercraft access to the channel.

References

CBCL, 2005. Muggah Creek Cofferdam Conceptual Design Report – Final Report. Prepared for: Sydney Tar Ponds Agency. CBCL Report No. 042410.

CBCL, 2006a. Muggah Creek Cofferdam Final Design Report. Prepared for: Sydney Tar Ponds Agency. CBCL Report No. 052576.

CBCL, 2006b. Muggah Creek Summary of Hydraulic Analysis. Prepared for: Sydney Tar Ponds Agency. CBCL Report No. 052576.

CBCL/ENSR, 2003. Remedial Action Evaluation Report – Coke Ovens Site. Prepared for Nova Scotia Department of Transportation and Public Works. CBCL/ENSR Report No. 012463.

IR – 33

Issue (IR-33):

The Panel notes that preventative works projects have been or will be undertaken in order to reduce contaminant migration to Sydney Harbour, improve existing infrastructure and facilitate the proposed remediation of the Tar Ponds and Coke Ovens sites. The EIS states that preventative works will be completed in 2005/2006.

Information Request (IR-33):

Provide the Panel with details regarding the current status of the referenced preventative works projects, including any design changes that could influence the overall performance of the Project being assessed by the panel.

Response (IR-33):

The Cofferdam is undergoing final design. Construction is planned to start summer 2006. Designs as proposed were considered in the EIS and have not changed.

The Cooling Pond Project is undergoing final design. Construction is planned to start summer 2006. Designs as proposed were considered in the EIS and have not changed.

The Coke Oven Brook realignment project is under construction. The design as proposed was considered in the EIS and has not changed.

The Victoria Rd. waterline project is now complete. This work was considered in the EIS and has not changed.

IR – 34

Issue (IR-34):

Further to the Panel information request on January 13, concerning the capacity of both the Tar Ponds and Coke Ovens as finished sites to support different land uses (IR-15), the Panel requires greater detail on the legal and policy instruments that would govern the use of the sites following project completion.

Information Request (IR-34):

Describe legislation, regulations, guidelines, and policies that would govern the use of the sites for different development options, in relation to any contaminants that may remain on the site after the completion of the remediation.

Response (IR-34):

As stated in the response to IR-15, both the Tar Ponds and the Coke Ovens sites will be able to support a number of land use options after the remediation is implemented. This could include recreational, commercial, and industrial uses.

Regulations to govern and specify the use of the site will need to be established through the municipal planning process. This process is beyond the control and mandate of the STPA. The process will be subject to public and stakeholder consultation and will establish land use designations and zoning regulations for the Project sites. It is expected that the municipality will establish and specify further use regulations through development agreements with future developers. The above instruments together with property deed and lease stipulations will ensure the compatibility of the land use with the remediation activities.