

**Comments on
Joint Review Panel Environmental Assessment Report
Sydney Tar Ponds and Coke Ovens Sites Remediation Project**

G. Fred Lee, PhD, PE, DEE
G. Fred Lee & Associates
27298 E. El Macero Drive, El Macero, CA 95618
Ph: (530)753-9630 Fx: (530)753-9956 Em: gfredlee@aol.com
www.gfredlee.com

July 25, 2006

For approximately 100 years, a steelmaking facility and its associated coke ovens located on the shores of Muggah Creek estuary in Sydney, Nova Scotia, discharged wastewaters and deposited solid wastes that have contaminated both the estuarine sediments and nearby shoreline. According to the Sydney Tar Ponds Agency's (STPA's) website (<http://tarpondscleanup.ca>),

“100 years of steel and coke production left more than a million tonnes of contaminated soil and sediment in Sydney.”

* * *

“The Tar Ponds and Coke Ovens lie in the heart of Sydney, an historic community on the eastern coast of Cape Breton Island, Nova Scotia, Canada.”

In an effort to clean up the contaminated Coke Ovens site and Tar Ponds sediments, the Sydney Tar Ponds Agency was organized. This Agency has the responsibility of developing a plan for contaminated site remediation. The STPA website, under “Our Solution,” states,

“A \$400 Million Plan

The cleanup plan put forward by the federal and provincial government relies on technologies that have proven successful on similar sites, of which there are many across North America.

We will dig up and destroy the worst contaminants, then treat the remaining materials in place before containing them within an engineered containment system.”

The Sierra Club of Canada, Cape Breton Group, became concerned about the adequacy, reliability and technical feasibility of the STPA's proposed approach of excavation and incineration of the most contaminated sediments and soils, and the proposed *in situ* mixing of cement with the Tar Ponds sediments (in a process known as solidification/stabilization), followed by capping and surface water and groundwater flow diversion, in preventing future releases of PCBs, PAHs, heavy metals and other pollutants in the Tar Ponds sediments. Information on the Sierra Club's position on the proposed remediation of the Coke Ovens site soils and Tar Ponds sediments is available at <http://www.sierraclub.ca/national/sydney-tar-ponds/>.

As a result of the controversy regarding the adequacy, reliability and technical feasibility of STPA's proposed remediation approach for the Coke Ovens site and Tar Ponds sediments, in July 2005 the Minister of the Environment for Canada and the Minister of Environment and Labour for Nova Scotia established a Joint Review Panel, consisting of Lesley Griffiths, MCIP (Chair), William H.R. Charles, QC, and Louis LaPierre, Ph.D., to conduct an environmental assessment of the Sydney Tar Ponds and Coke Ovens Site Remediation Project. Further information on the expertise and experience of the Joint Review Panel members is available from http://www.stpco-review.ca/site/article.php3?id_article=2&lang=en. This Panel established a website, <http://www.stpco-review.ca/site/sommaire.en.php3>. According to this website,

“The Panel has the responsibility to identify, evaluate and report on the potential environmental effects to the federal Minister of the Environment and the Nova Scotia Minister of Environment and Labour. In conducting the environmental assessment, the Joint Review Panel will take into consideration a number of factors, as outlined in the Joint Panel Agreement.”

The Panel conducted 17 days of public hearings in Sydney, Nova Scotia, in April and May 2006, in which the STPA and all others interested in the remediation of the Coke Ovens site and Tar Ponds sediments were provided an opportunity to present reports and testimony to the Joint Review Panel regarding their views on STPA's proposed approach for remediation of these sites. Drs. G. Fred Lee and Anne Jones-Lee were asked by the Sierra Club of Canada to conduct a review of the STPA's Environmental Impact Statement (EIS) for the proposed remediation project, focusing on the proposed remediation of the Coke Ovens site soils and Tar Ponds sediments. Drs. Lee and Jones-Lee prepared a report,

Lee, G. F., “Comments on ‘Remediation of Sydney Tar Ponds and Coke Ovens Sites Environmental Impact Statement, Sydney, Nova Scotia,’ dated December 2005,” Report of G. Fred Lee & Associates, El Macero, CA, USA, May 15 (2006).
<http://www.members.aol.com/annejlee/SydneyTarPondsReport.pdf>

This report not only provides a detailed review of the STPA's EIS, but also provides detailed comments on the STPA's presentation at the Joint Review Panel hearing. Dr. Lee presented testimony at the hearing on May 15, 2006. The PowerPoint slides from his presentation are available online:

Lee, G. F., “Assessment of the Adequacy & Reliability of the STPA Proposed Approach for Remediation of the Sydney Tar Ponds' Sediments,” Presentation to the Sydney Tar Ponds and Coke Ovens Sites Remediation Project Joint Review Panel, Sydney, Nova Scotia, Canada, PowerPoint Slides, G. Fred Lee & Associates, El Macero, CA, May 15 (2006). <http://www.members.aol.com/annejlee/SydneyTarPondsPowerPt.pdf>

In accordance with Sierra Club of Canada's request, the focus of Drs. Lee and Jones-Lee's report and Dr. Lee's testimony was on the STPA's proposed solidification/stabilization and capping of Tar Ponds sediments and landfarming and capping of Coke Ovens site soils as a reliable means of preventing further contamination of the estuary by PCBs, PAHs, heavy metals and other pollutants in the sediments/soils of these two sites. The STPA, in their EIS and in their

testimony at the Joint Review Panel hearing, claimed that their proposed remediation approaches for these two sites were based on well-established technologies that had been demonstrated to be highly effective for similar kinds of contamination at other sites in North America. They also claimed that the Tar Ponds sediments remediation approach, involving mixing of the sediments with cement and then capping them would result in a “walk-away” remediation of these sediments that would require little or no further intervention after 25 years.

On the other hand, Drs. Lee and Jones-Lee concluded, based on their experience and the literature, that STPA’s proposed solidification/stabilization (S/S), capping and flow diversion approach was not a reliable approach for immobilization/containment of the pollutants in the Tar Ponds sediments. They also concluded that, rather than developing a “walk-away” approach as claimed by STPA, considerable intervention would be needed to adequately monitor and maintain the S/S-treated sediments and the flow diversion structures that STPA proposed be used to keep surface water and groundwater from entering the S/S-treated sediments and from leaving the treated sediments to cause further pollution of the estuary. They further concluded that, at some time in the future, the Nova Scotia provincial government, which would inherit the responsibility for post-25-year remediation of the Tar Ponds sediments, could conclude that the S/S treatment of these sediments, and the associated capping and flow diversions, was not a reliable approach, and that it would be necessary to excavate and treat the polluted sediments offsite.

The Joint Review Panel report issued on July 12, 2006, is available online:

http://www.gov.ns.ca/enla/ea/tarponds/TarPonds_EnvironmentalAssessmentReport.pdf

The Executive Summary of the Joint Review Panel’s report summarized the STPA proposed remediation approach as follows:

“At the Coke Ovens site, containment structures around the perimeter would prevent groundwater from entering the site. Material from the Tar Cell and sediments from Coke Ovens Brook would be excavated and sent by rail to a temporary incinerator. Approximately 40% of the site, where contaminants in the soils exceed certain levels, would be capped to limit the infiltration of surface water and to prevent people or wildlife from coming into contact with the contaminants. In some areas, STPA would carry out a form of bioremediation called landfarming before capping, in order to treat some of the hydrocarbons in the soil. Nonhazardous waste debris generated during the remediation at both sites may be landfilled in an uncapped portion of the site. Remediation of the Coke Ovens site would be complete by 2011.

At the Tar Ponds, two areas of sediments with PCBs in higher concentrations (over 50 part per million) would be excavated, conditioned and transported by rail for incineration. The remaining sediments in the Tar Ponds would be solidified in-place using cement and other materials, and capped. STPA would construct an internal drainage system in order to manage the influx of both groundwater and seawater. Remediation of the Tar Ponds would be complete by 2014.

During the construction phase wastewater generated by activities at both sites will be treated before discharge to one or more water treatment facilities. STPA would continue to pump and treat groundwater after construction has been completed for as long as monitoring results showed it to be necessary.

A temporary incinerator would be constructed at either the Victoria Junction or Phalen sites in order to incinerate approximately 150,000 tonnes of contaminated sediments and soils. The incinerator would operate for three years; construction and then decommissioning would take another two years. STPA has also proposed an alternative means of carrying out the Project that would eliminate the use of incineration, and would solidify/stabilize all of the Tar Ponds sediments in-place. The Tar Cell material and Coke Ovens Brook sediments would be similarly treated together at the Tar Cell.”

The Panel reached the following conclusion:

“THE PANEL'S OVERALL CONCLUSION

The Panel's mandate was to determine whether the Project presented by STPA, or any alternative means of carrying out the Project that are technically and economically feasible, would result in significant adverse environmental effects. In the process of reaching its overall conclusion, the Panel made four key findings:

- *STPA described the Project as permanent remediation that would at some undefined time in the future require no further monitoring or maintenance – in other words, a "walk away" solution. The Panel believes this may be true for the Coke Ovens, but not for the Tar Ponds. Therefore, STPA, the regulators and the public must be prepared for the possibility that the Tar Ponds site will have to be managed in perpetuity;*
- *Both the community and STPA have placed great importance on the use of proven technologies. The Panel is not convinced that the solidification/stabilization technology is proven for use in the Tar Ponds context—that is, to be applied to organic contaminants in organically enriched sediments in an estuary with potential groundwater and seawater influx. The Panel understands that the primary remediation technology to be applied to the Tar Ponds is containment, with use of solidification/stabilization as a secondary approach. Nevertheless, the Panel believes that further pilot studies must be carried out and specific targets reached before this technology is approved for use in the Project.*
- *The Panel has concluded that, with appropriate technology selection and stringent regulation, incineration could be carried out without significant adverse environmental effects. However, the Panel heard and takes seriously the widespread community concerns about the use of incineration and agrees that a measure of stress and anxiety would likely result. The Panel believes that, under the terms of the Toxic Substances Management Policy, the federal government is obliged to weigh the relative merits of choosing to remove and destroy PCBs*

versus managing them in-place. The Panel was told that requirements of this risk benefit assessment have only been partly met, and concludes that the results of a complete assessment, including a comparison of risks and benefits to both human health and the environment, may indicate that the "full containment, no incineration" alternative put forward by STPA would be a better approach than employing incineration; and

- *The Panel understands that the future uses of the two sites is not part of the Project but has concluded that ensuring that the sites have the capacity to support viable and sustainable uses must be an integral part of the Project design."*

As discussed in Drs. Lee and Jones-Lee's report and summarized in the PowerPoint slides for Dr. Lee's testimony, the Panel's conclusions regarding potential problems with STPA's proposed approach of S/S treatment, capping and flow diversion were in accord with Drs. Lee and Jones-Lee's conclusions, in that STPA has not adequately and reliably discussed the potential problems with the proposed remediation of the Coke Ovens and Tar Ponds sites in providing long-term control/containment of the residual pollutants that are proposed to be left in these site soils/sediments after site remediation. Lee and Jones-Lee's report provides detailed discussions of the technical basis for their conclusions on these issues.

The Joint Review Panel provided several recommendations that are pertinent to the remediation of the Coke Ovens and Tar Ponds site soils/sediments, as follows:

"REMEDICATION OF THE TAR PONDS AND COKE OVENS SITES

** * **

The Project involves extensive interception of groundwater to reduce future contact between both ground and surface water with remaining contaminated soils and sediments. The Panel agrees that this component of the Project will have a beneficial effect on environmental quality, and has recommended the use of more extensive hydrographic modeling to refine Project design and avoid any adverse impacts from redirection of groundwater flows, and a comprehensive groundwater monitoring program.

Both the Tar Ponds site and extensive areas of the Coke Ovens site will be capped. The Panel heard questions and criticisms about the design, function, durability and monitoring of the caps, and has made recommendations to address these issues.

The Panel reviewed extensive information regarding the advantages and disadvantages of using solidification/stabilization technology, which has been used quite extensively in other areas to address contaminated sites. Much of the discussion centered on whether the technology could be considered proven for the Tar Ponds context (largely organic contaminants in organically enriched sediments, in an estuarine location), how the proposed internal drainage system would work, what performance criteria were appropriate and how they should be tested. Concerns were also raised about the reported results of STPA bench scale tests of the technology on both Tar Ponds and Tar

Cell materials. The Panel recognized that containment rather than solidification/stabilization is the primary remediation approach, but concluded that if the technology is to be used it needs to be further evaluated through a pilot study based on specific performance criteria ensuring that solidification/stabilization would not significantly increase contaminant mobility.

The Panel has also recommended that the need to undertake landfarming activities at the Coke Ovens site be re-evaluated. This recommendation stems from STPA's own information regarding the uncertainty of success and potential effects on some bird populations, and from public concerns about air quality effects.

Fisheries and Oceans Canada (DFO) told the Panel that environmental quality in Sydney Harbour is gradually improving and that removal and containment of the contamination at the Tar Ponds and Coke Ovens site will continue this process. However STPA has predicted that there will be a short-term increase in the contaminant flux to the Harbour during the remediation, followed by a permanent and significant decrease. The Panel agrees with DFO, Environment Canada and Natural Resources Canada that STPA should complete an ecological risk assessment for Sydney Harbour to aid in designing a mitigation and monitoring program. The Panel also recommends that STPA participate with the three federal departments in monitoring longterm environmental improvements in the Harbour.

** * **

SOCIAL, ECONOMIC AND COMMUNITY EFFECTS

** * **

The capacity of the remediated Tar Ponds and Coke Ovens sites to support future uses was discussed extensively at the hearings, though it was evident that this issue had not been a key factor in selecting remediation approaches. STPA indicated that the sites would be able to support recreational and light industrial uses, provided that they maintained the integrity of the site caps and allowed for ongoing management and maintenance. STPA agreed that if viable land uses could not be established, the sites might need to be fenced again at the conclusion of the remediation.

Overall, it is concluded that the Joint Review Panel has appropriately assessed many of the potential problems, which were discussed by Drs. Lee and Jones-Lee, with STPA's proposed approaches for remediation of the Coke Ovens site soils and wastes and the Tar Ponds sediments. An area that was not specifically discussed by the Panel that Drs. Lee and Jones-Lee discussed in their report and Dr. Lee discussed in his presentation at the hearing is the problem with the long-term integrity of the STPA-proposed water diversion/control structures based on sheets of high-density polyethylene (HDPE). As Dr. Lee has discussed, the literature contains references to a number of studies that have shown that such plastic sheeting can deteriorate fairly rapidly and lose its effectiveness in being able to prevent water/pollutants from passing through it.

It will be important that an independent technical panel of experts in areas pertinent to solidification/stabilization be appointed to oversee the Panel's recommended additional studies to be conducted by STPA on the potential effectiveness of S/S treatment of the Tar Ponds sediments. As discussed in Drs. Lee and Jones-Lee's report, STPA's review of the literature and

understanding of the technical issues pertinent to evaluating S/S treatment of Tar Ponds sediments, as presented in their EIS and hearing testimony, was significantly deficient in reliably assessing and reporting on what has been accomplished in S/S treatment of other high-organic wastes and the expected performance of S/S treatment of the Tar Ponds sediments. Appointment of an independent expert panel consisting of individuals that have not and will not be dependent on Canadian federal or Nova Scotia provincial support will be essential to potentially developing reliable information pertinent to evaluating the potential effectiveness of Coke Ovens site and Tar Ponds sediment remediation.

Please direct any questions on Drs. Lee and Jones-Lee's report or on these comments to Dr. Lee at gfredlee@aol.com.