Wes Stewart, a retired newspaper reporter and freelance writer living in Cape Breton, Canada, reveals how a $400 million (Canadian) cleanup operation has infused new life into a struggling economy.

Introduction
The massive cleanup of one of Canada’s worst contaminated sites, the Sydney Tar Ponds and Coke Ovens, is taking place, using cement-based solidification and stabilisation to encapsulate the residue of more than a century of coking and steel making activity.

Nova Scotia’s Sydney Tar Ponds Agency (STPA) awarded a $52 million (Canadian) contract to Cape Breton company, Nordlys Environmental LP and partner ECC to solidify and stabilise the 600,000 m³ of impacted sediment collected in two natural ponds. Cement is mixed into the contaminated material to bind and immobilise the contaminants and to protect the surrounding environment.
“It’s the keystone contract, the one with the most impact visually,” said STPA Project Director Donnie Burke.

Sydney, the commercial and business centre of Cape Breton Island, grew around the Sydney Steel and Coke Ovens operations. The provincially-owned mill closed in 2000, prompting renewed calls for a concerted cleanup.

Having grown up in the area, Burke could see that the biggest personal challenge was to show people it could be done and done effectively.

The project
After years of wrangling and negotiation, the cleanup is underway. The goal is to have the 97 ha. site in the heart of the island’s commercial centre transformed into a useful piece of real estate.

The decision to clean up the tar ponds and coke ovens arose in 2004 when a federal-Nova Scotia partnership agreed to a cost-shared arrangement for the $400 million cleanup. After completing an EA and setting up an independent panel review, the project was cleared to start by January 2007. Soon after, the provincial government created the Sydney Tar Ponds Agency (STPA) to focus efforts on the cleanup until completion in 2014.

Public Works and Government Services Canada is the federal lead for the project and Nova Scotia Transportation and Infrastructure Renewal represents the province. The federal department has led a successful negotiation to include
Aboriginal companies in the reclamation work, signing an agreement with the Mi’Kmaq First Nations of Cape Breton in the autumn of 2008.

First phase: autumn 2009
Nordlys Environmental was awarded the S/S contract on 23 October 2009 and began moving material in and around the ponds a week later.

The contractor completed 70 - 80 cells by mid-December when winter road conditions and freezing temperatures shut down the cleanup operations until spring 2010.

“It is significant in that this is one of the largest environmental projects in Canada and one of the largest stabilisation projects in the world,” said Nordlys Project Manager Raymond Francisco. He works for Environmental Chemical Corporation ECC and noted Nordlys partner on this project, J&T van Zutphen, is a really good fit. “We do large-scale government environmental projects and van Zutphen brings a lot of civil projects experience, a local presence and expertise.”

For this project, they added sub-contractor Entact, stabilisation experts from Texas.

Second phase: spring 2010
Last autumn’s initial S/S work on the south pond was a trial period to become familiar with the procedures. Francisco will take the lessons learned in the autumn and apply them to the rest of the project when Nordlys will bring in a full crew this spring.

A big concern is dust abatement. Francisco wants to ensure that his efforts do not have a negative impact on the environment. “We will be cautious about the dust and take the necessary procedures to test the control measures.”

Burke is so delighted with Nordlys’ initial solidification and stabilisation work, he took his bosses for a ride. “We can drive a bus on the cells; we had a group of Deputy Ministers here from the province and I drove them right out to the end of the cell and turned it around. It’s a typical cement pour, so after a day or two it is firm enough that we will actually put an excavator on the cell and the operator is going out and mixing his next cell,” Burke said.

A layer of slag and gravel is laid over the cell to protect the top. Cell size is determined by the cement-to-sediment ratio and depth of the pond. The deeper the sediment, the smaller the footprint at the top, the shallower the sediment, the longer the cell becomes. Each cell is comprised of roughly 250 m$^2$ of sediment.

An area is marked off for the excavator operator who mixes the cement with the sediment to form the cell.

Contractors
The key ingredient for a project of this size is an engaged team. “We have top notch contractors; they are working well with our folks, the Design Engineer and the independents,” Burke said. When done, it will blend in with the surrounding community aesthetically; it remedies an eyesore and removes the potential for contamination, he added.

STPA estimates that at least 100 000 t of cement will be needed over the three-year cleanup.

Using cement
Part of the overall solution is the use of cement. Through its use they are able to turn unusable land into useable land. “We are resolving an environmental problem with cement,” Randy Vallis, Director, Sydney Tar Ponds Coke Ovens Remediation Project, points out. “When you think of complex solutions of using other methods, whether it is incineration or something of that sort, the simplicity of treatment with cement and having a useable property afterwards is very significant.”

“It enables us to complete the project on time, economically, and end up with properties that can be used in the future,” Vallis said. Vallis is with Public Works and Government Services Canada, the federal funding partner managing the $400 million cleanup. “We are building a monolith that can carry loads comparable to a six-storey building as I understand it.

“It will handle the stream that will be carved through the site, built in such a way to become a productive habitat for fish, and designed in such a manner to be an aesthetically-pleasing functioning river,” he said.

Future site use
When the work is completed in 2014, the land will be turned over to the province, according to Nova Scotia Lands president, Gary Campbell. His department is now managing the former steel plant site, which has been converted to a commercial and industrial park.

“We’ve hired planning consultants who are now working with us to identify future uses so we can start shaping the cap of the tar ponds, and the same considerations will be given to the coke ovens,” he said.

Campbell added the municipality has clearly expressed that the former coke ovens site be designated for industrial use. He
noted there are almost 500 acres on the former Sysco site and studies have shown there are some 40 years of industrial land capacity there. They may want to land bank the coke ovens for some time in the future. “Whatever uses are identified for the tar ponds site, it cannot have any impact on the monolith. So we even have to think about what kind of plant material you would put on the tar ponds,” Campbell said.

“The Cape Breton District Health Authority has asked us to think about uses that would promote a healthy lifestyle.” They have listened, and remediation of the former Syasco steel plant site has included plans for a complete recreational soccer field, tennis courts and a trail system. It is being designed to link nearby boroughs of Whitney Pier, Ashby and the north end of the city.

**Solidification and stabilisation**

Lafarge Cement Brookfield, N.S. Plant Manager Scarth MacDonnell said this is an exciting time for the cement industry, as they come up with new uses for a very mature and stable product that people are comfortable with.

“The Tar Ponds cleanup is a good example of soil stabilisation and provides an opportunity to put our product out there,” he said.

As environmental concerns have grown in terms of the treatment of PCBs, contaminated sludge and coal tars, there have been many technical reviews, and soil stabilisation has continued to come out head-and-shoulders over other technologies. It chemically binds the contaminated material, so there are no worries about runoff or solidification - the concrete gets stronger and stronger over time.

MacDonnell pointed out.

With current STPA estimates of 100 000 t of cement utilised for the solidification and stabilisation of the site over the next three years, the Lafarge Brookfield plant is more than capable of providing all the cement required. That represents 3 – 4 months of dedicated work for their two-kiln operation.

STPA Project Director Burke invites anyone interested in cleaning up a contaminated site using S/S technology to contact the Agency. “We have many resources and experts that are more than willing to communicate with people.

“We went with experts who are familiar with the area, and utilised everything we learned from everybody else and put it in one envelope.” Burke noted that Canada has one of the most stringent environmental screening processes in the world.

**Environmental and social responsibility**

“A great deal of value and worth is being put on protection of our workers and also our neighbours who live near the ponds. We have expertise in air monitoring, environmental, quality assurance and quality control and now S/S experts,” Burke said.

“One of the biggest commitments by the funding partners is developing the brain trust that comes along with this project, a first of this size in the country. There are other potential sites in the country that will need a technology like this for their cleanup,” he added.

**S/S conference**

The remediation work will be showcased on 15 - 17 June at a three day S/S-Tech conference at Cape Breton University, expected to draw over 200 delegates from around the world. The conference will feature two days of peer-reviewed technical papers delivered by experts in solidification and stabilisation, as well as presentations by the Sydney Tar Ponds project and tours of the remediation sites.

**The future**

By the end of next summer, the agency expects to see the south pond completed, according to STPA spokesperson Tanya Collier MacDonald. To manage groundwater, two brooks and a tidal estuary from Sydney Harbour, engineers designed a pump system to control the amount of water in the cement and sediment mix.

“It’s similar to baking a cake: when you add too much water, the mixture turns to muck and we don’t want that,” said Collier MacDonald.

Pipes of 48 in. dia. encircle the pond and water is pumped around the first phase. The pump system will be advanced as each of the three phases is completed, until it reaches the harbour in 2012.

Nordlys Project Manager, Vince van Zutphen, said the van Zutphen company has the $1 million contract to remediate the former Princess Colliery and coal washplant property in Sydney Mines for the Cape Breton Development Corporation (Devco), a federal crown corporation. He pointed out that the cement containers used to move the cement from the trucks to the cells were tailor made for the project, to limit the amount of dust around the work site.

**Project expenditures**

Since project inception in April 2004, cumulative project expenditures total $88.5 million or 22% of project budget. On 30 September 2009, Cape Breton had secured 62% of cumulative expenditures on average while Nova Scotia had 10%. On the whole, 98% of average cumulative expenditures occurred in Canada.

There were approximately 973 000 cumulative person hours of employment attributable to the project over that same period. Thus far, 658 persons have been engaged in the cleanup project at peak, in the provision of services, implementation, regulatory compliance and government partners’ administrative oversight.

*Note: All sums quoted are in Canadian dollars.*