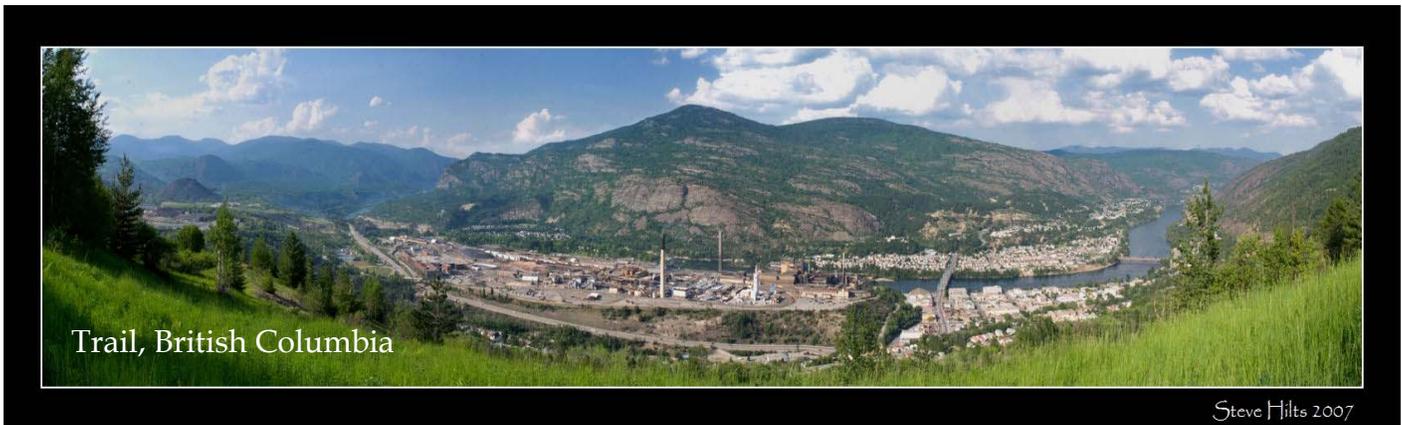


Teck Cominco Lead-Zinc Smelter, Trail, BC

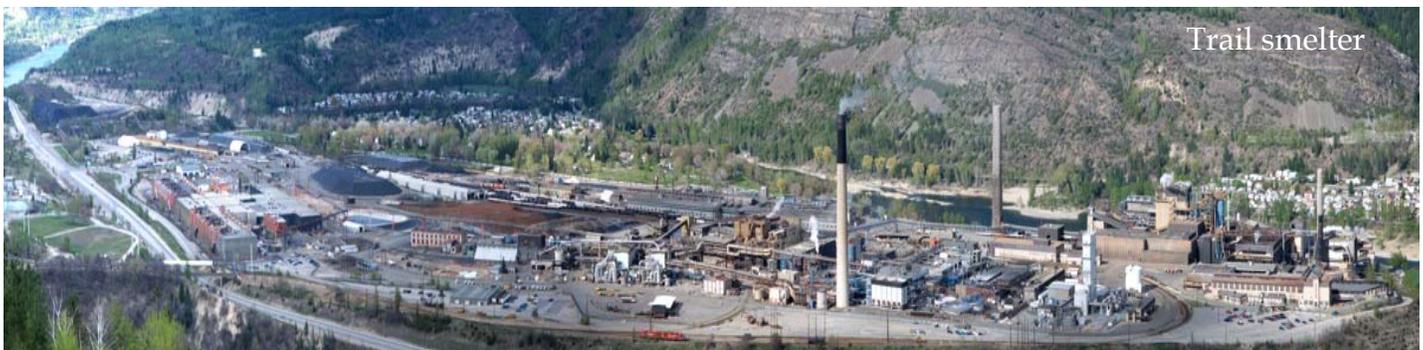


Overview

The city of Trail is located on the Columbia River in the West Kootenay region of British Columbia, Canada, about ten kilometres north of the Canada-United States border. Copper and gold smelting operations began in the area in 1896, and the Teck Cominco Metals Ltd. lead-zinc smelter that currently operates there is the largest of its kind in the world. This smelter is the largest local employer in this city of 7800 residents.

Lead contamination in the community was first found to be an issue in 1975, when a study found that a few children living near the smelter had elevated levels of lead in their

blood (40 micrograms per decilitre ($\mu\text{g}/\text{dL}$) was the level of concern at the time). A more detailed study was carried out in 1989, and at that time it was found that 39.4% of children had blood lead levels above 15 $\mu\text{g}/\text{dL}$. (15 $\mu\text{g}/\text{dL}$ became the individual level of concern in 1991.) Lead in the soil and house dust was found to be the main cause of these elevated blood lead levels, and young children were especially affected through frequent hand-to-mouth gestures causing accidental ingestion. The ecological impacts and risks associated with lead were also part of the problem caused by lead in the community, as was the aesthetic effect of the smelter in terms of appearance, noise, and odour.





Public education and consultation 4/14/2003

Innovations

The Trail Community Lead Task Force was active from 1990 to 2000 to address the lead contamination in Trail. This Task Force was composed of community groups and representatives from Teck Cominco and the local and provincial governments, and it was designed to assess and manage environmental health risks related to lead, particularly risks affecting children. Task Force funding came from Teck Cominco, the Province of BC and the City of Trail. Community representatives participated fully in research planning, communications and program development, and the Task Force employed an independent staff of qualified personnel. The scale and activities of this group were innovative and included general education for the community and specialized education for pre-school and school-aged children. Case management was another aspect of the Task Force's work, including environmental assessments of homes and in-home counselling on lead exposure reduction. Dust control in Trail was also used to control the effects of lead contamination, through methods such as greening and dust suppression. Finally, the blood of 6-60 month old children was tested for lead in September of each year to ensure these measures were making a difference to human health in Trail.

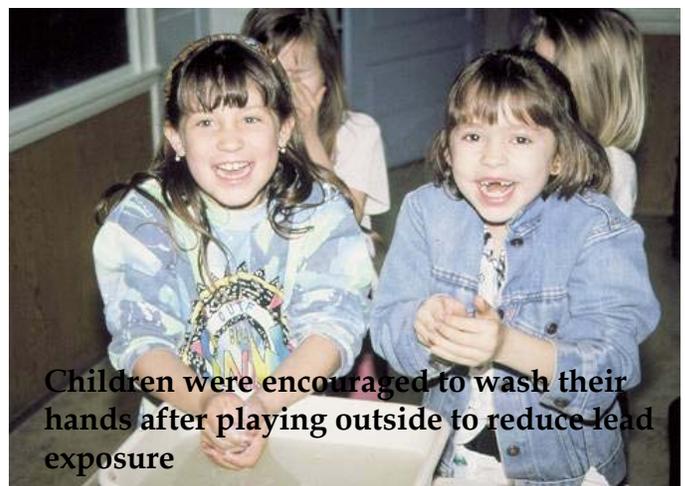
A new lead smelter came into use at the Trail site in 1997. This KIVCET flash lead smelter

resulted in reduction of lead emissions by about 80%, and a reduction in fine, mobile dust lead loadings by about 50%. Average blood lead level in children also declined about 50% in the next few years after the introduction of the new smelter.

The aesthetic issues caused primarily by the old smelter plants were addressed in part by a \$25 million program of demolition, painting, and greening. Odours related to the smelter were usually related to slag fuming furnaces, and flue gas capture processes were managed and improved in response to the problem.

In 2001, the Trail Health and Environment Committee was formed. Chaired by the mayor of Trail and having a similar composition as the earlier Task Force, the committee's goal is to continue the work of the Task Force and ensure continuing progress toward its goals.

Noise at the site has been an ongoing top concern for Trail residents, especially once air quality was improved in the 1990s. Most of the noise was due to steam venting, fans, and alarms. An internal Task Force was formed in 2006 to assess and monitor the problem and come up with possible solutions. A number of improvements have been made recently and the company continues to monitor noise and identify opportunities for further improvement.



Children were encouraged to wash their hands after playing outside to reduce lead exposure

The smelter emission reductions and dust control measures have been effective in reducing children's exposures to lead in dust. The lead in soil has been managed on a case-by-case basis to date. Families with young children have been assisted in improving ground cover or replacing soil in cases where soil appears to be an important potential contributor to their exposure. New land development projects have been facilitated with assistance from Teck Cominco on risk-based management of metal-contaminated soil as needed.

In 2008, Teck Cominco, with support from the Trail Health and Environment Committee, began conducting some more systematic residential soil sampling to identify properties with soil lead concentration exceeding the proposed 'upper cap' number for lead under BC Contaminated Sites Regulation draft Protocol 12. Four properties near the smelter were also part of a residential soil remediation pilot project. The residential soil remediation pilot project involved removing and replacing the top 30 cm of soil in the yards. In vegetable gardens, the top 60 cm was replaced. Existing plants and trees were saved if possible, and homeowners were left with clean soil around their homes.



Residential soil remediation -- front yard, after 30 cm stripped



Residential soil remediation -- garden area taken to 60 cm depth



Residential soil remediation -- topsoil being placed and levelled and a restored plant bed

Since traditional chemical-by-chemical risk analysis used for smaller sites was not feasible at the scale of the Trail site, an alternative ecological risk assessment approach had to be used. A large-scale seven-year formal ecological risk assessment was begun by Teck Cominco in 2000. This weight-of-evidence (WOE) risk assessment included both the aquatic and terrestrial environments in a broad area around the smelter site. It involved both "bottom-up" and "top-down" approaches to risk assessment: risks were estimated both by measuring contaminants found in soil, water, and sediment, and by looking at the health and abundance of plants and animals in the area.

A new method called the Sequential Analysis of Lines of Evidence (SALE) method was used to take into account all lines of evidence for risk when building the WOE. The SALE method began with toxicity modelling, most appropriate for screening purposes, and then evaluated field-based evidence. Each line of evidence was assessed for three things: magnitude of the response, strength of cause/effect link with the smelter, and uncertainty caused by natural variability and lack of knowledge in the exact way that natural processes work in the area. These three factors were examined together when characterizing the degree of risk associated with emissions from the smelter. Risk management was considered when the magnitude of the response is great and the cause/effect link is strong. The overall approach used for the ecological risk assessment at Trail was reviewed by a Technical Advisory Committee, a Public Advisory Committee, and other external reviewers.

Key challenges and lessons learned

The key challenges associated with this remediation project initially were building and maintaining the trust of Trail residents and others involved. Keeping people up-to-date and interested over the duration of the project was another factor.

Issues that continue to be addressed include further reducing emissions and noise coming from the smelter, determining acceptable risk levels for the contaminants and completing the human health and ecological risk assessment work for the site.

Overall, remediation of such a large and highly populated area was the greatest challenge facing this site, and the process yielded useful remedial approaches that can be applied to other sites in the future.

Note: This summary is solely for the convenience of the reader. Site investigation/remediation reports and ministry file records should be consulted for complete information.

For more information, contact the Environmental Management Branch at site@gov.bc.ca