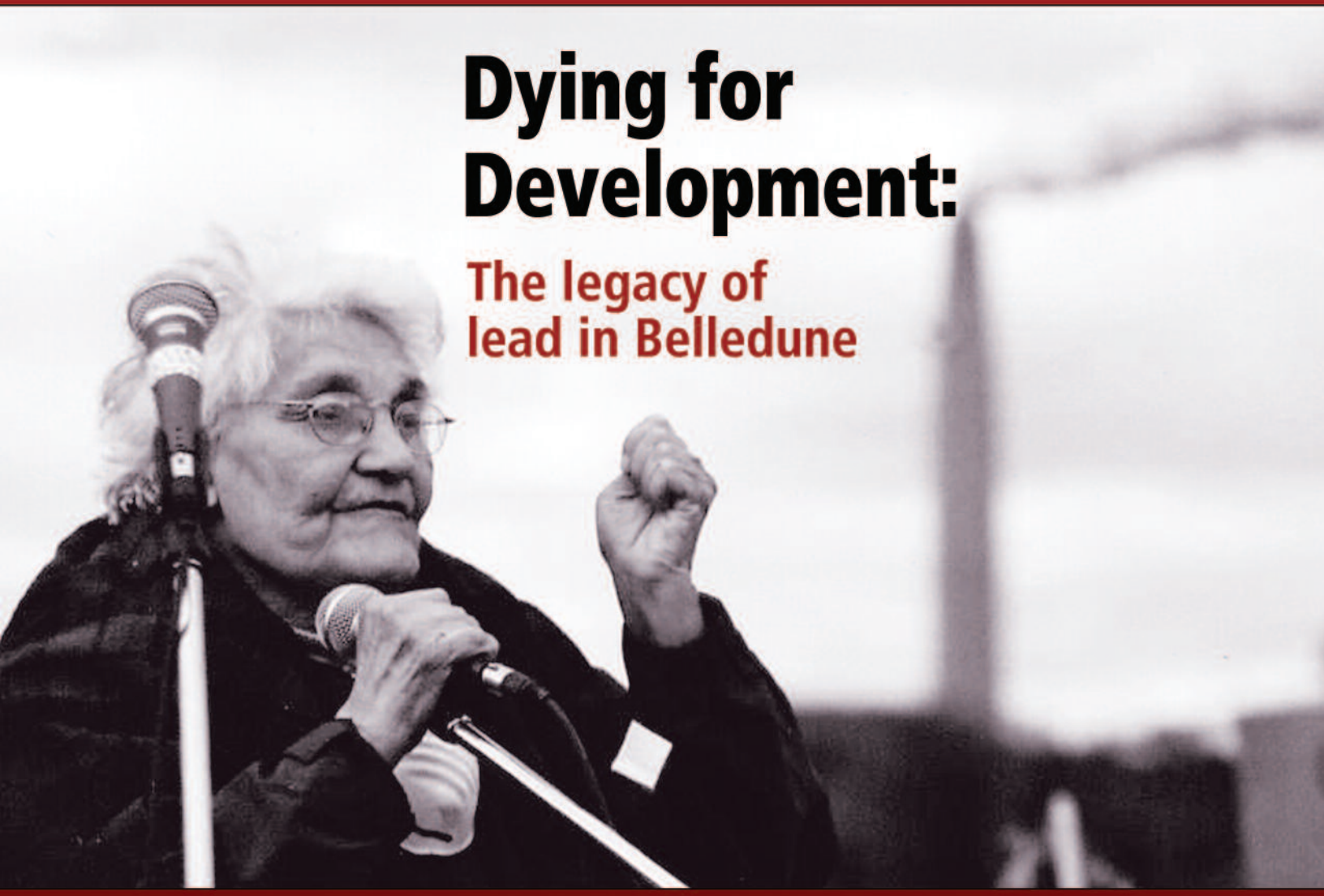

Dying for Development:

The legacy of lead in Belledune

Inka Milewski

Conservation Council of New Brunswick

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The legacy of lead in Belledune

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Table of Contents

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The story of heavy metal contamination in Belledune was revealed to me through forty years of monitoring data and thousands of pages of memos, letters and reports. I have checked and double-checked figures, dates and what was said to whom and when. If errors are found, and I hope they are not serious, I alone am responsible for them.

Inka Milewski

June 2006

... and friends around the Bay of Chaleur

Rhéal Bérubé
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Gaetan Dugas
Allain Frigault
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John Killoran
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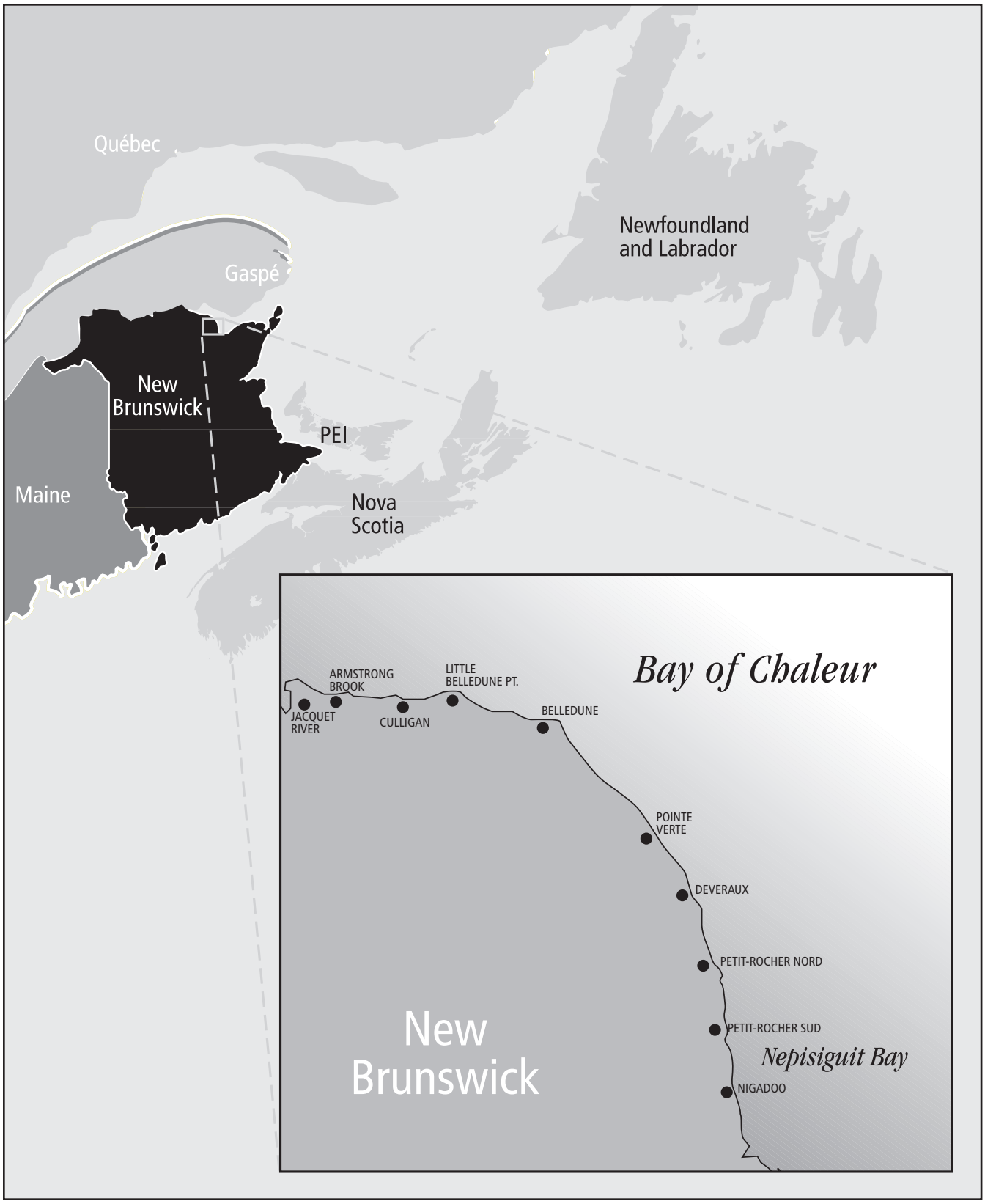
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NIGADOO
New
Brunswick

Introduction

New Brunswick's North Shore has been home to the greatest concentration of heavy industry in the province for more than forty years. These industries include mining, smelting, power generating facilities (coal, Orimulsion®), gypsum processing, chemical plants (fertilizer, acid and Canada's only mercury-based chlor-alkali plant) and pulp and paper production. The majority of these industries are linked to mining or hydrocarbon-based power generation. Therefore, the largest volumes of pollutants released from these industries are metals and arsenic. Although emissions of lead, cadmium, mercury, zinc, nickel, thallium, copper, vanadium and arsenic have been reduced (not eliminated) over the past 40 years, their smokestacks and effluent pipes have left a toxic legacy that extend well beyond plant gates.

For the past four decades, various federal and provincial government agencies have measured the levels of metals and arsenic in soils, terrestrial vegetation, marine sediments and shellfish. From time to time, their investigations revealed problem areas or 'hot spots' of contamination. Despite these findings, provincial and regional economic development agencies continued to actively recruit new 'smokestack' industries to the region.

In the summer of 2003, the New Brunswick government announced it was reviewing a proposal to build, what was popularly called, a hazardous waste incinerator in the northern New Brunswick community of Belledune. The community was already the site of a lead smelter, acid plant and coal-fired power generation station. In the context of reviewing the government-ordered health risk assessment for the project, the Conservation Council of New Brunswick requested and received thirty years of heavy metal monitoring data collected in the Belledune area from the New Brunswick Department of Environment and Local Government. The data revealed that residents were living in a community where the soil, air, vegetation, garden produce and seafood were contaminated with metals and arsenic.

Several questions immediately came to mind. What, if anything, did residents know about the contamination? What were the health impacts on residents from long-term exposure to heavy metals? What did other provincial and federal government departments know about the contamination and what did they do about it? What were the level of contaminants in other northern communities with heavy industries? And, why was the government contemplating allowing another smokestack industry for a community that was already burdened with pollution?

In an attempt to answer some of these questions, the Conservation Council began, in the fall of 2003, an investigation to characterize the extent of heavy metal contamination in communities along the North Shore. One part of the investigation involved sampling soil on public and residential properties and reviewing published scientific and government reports. The other part involved trying to piece together what government officials knew (and when did they know) about the contamination.

In the context of addressing 'whom knew what and when', thousands of pages of federal and provincial government correspondence, ministerial briefing notes, memos and unpublished monitoring reports (dating back to the early 1960's) were obtained using federal and provincial freedom-of-information legislation. These documents were obtained from Environment Canada, Canadian Food Inspection Agency, Fisheries and Oceans Canada, Health Canada and the provincial departments of agriculture, economic development, environment, health and natural resources. Government documents stored in the Provincial Archives were also reviewed.

This report chronicles the legacy of heavy metal contamination in one community, Belledune.

1. Birth of a smelter

On June 14, 1961, Liberal premier of New Brunswick, Louis J. Robichaud, gave a television address to make a dramatic announcement. New Brunswick's North Shore would be the site of a massive industrial complex that would transform its coastal skyline into something akin to "the industrial Ruhr Valley of Germany."[1] Two companies, Brunswick Mining and Smelting and East Coast Smelting and Chemical, would build a $50 million industrial complex that would include a mine, concentrating mill, smelter and an acid plant. The smelter itself was described as "a huge spread of structures." Two thousand steady jobs were predicted for the region and the project was described as an "all-Canadian and all-Canadian financed group."[2]

The announcement fulfilled a promise the Premier made during the 1960 election campaign to put New Brunswick's forest and mineral resources back "in the hands of New Brunswickers."[3] As Liberal opposition leader, Robichaud had been dissatisfied with the slow pace of development in the province's natural resource sectors. His party promised "full-scale use of Crown forests" and "appropriate legal action" to ensure mineral resources were developed in the "interests of New Brunswickers."[4]

Public disaffection with the lack of mineral and forest development in the province was not the only issue that put Louis Robichaud at the helm of the province. The fact that many foreign, particularly American, companies controlled the rights to natural resources in the province also stuck in the throats of voters and some politicians.[5] At a pre election rally in Edmundston, he told the audience, "We have told the people who have interests in mineral deposits in the Bathurst area; unless you get into production within 12 months, we will return those deposits to the people of New Brunswick."[6]

Almost immediately upon being elected Premier, Robichaud began to regain control over mineral development. He threatened to take legal action and impose tax penalties on companies he thought were footdragging.[7] He was particularly critical of M.J. "Jim" Boylen, the president of Brunswick Mining and Smelting, because of his association with the American mining giant St. Joseph's Lead Company. Boylen, owner of the largest ore body in the province (Brunswick No. 12), had optioned the rights to the deposit to St. Joseph's Lead. Several years earlier, St. Joseph's Lead had been instrumental in getting the U.S. gov-

"The plant itself will be a huge spread of structures that is perhaps more extensive than anything now existing in the Atlantic Provinces. To the skyline of New Brunswick's coast it will appear like something from the industrial Ruhr Valley of German or the English Midlands."

Premier Louis J.Robichaud, *The Northern Light*, Bathurst, June 15, 1961.

Boylen agreed to form a company, East Coast Smelting, that would build a smelter if the province guaranteed the company $20 million in bonds.

ernment to impose an import quota on base metals.[8] In an interview on July 23, 1960, with Toronto's *Globe Magazine*, newly-elected Premier Robichaud was openly critical of Boylen, saying he had sold-out New Brunswick's resources and he "wanted no more Boylens" in his province.[9] The *Northern Miner*, a mining industry trade newspaper, wasted no time in accusing Robichaud of 'demagoguery'.[10]

Boylen was also unhappy with the footdragging. The deal he had made with a Belgium company to develop Brunswick No. 12 ore body was not seeing results. His company's shares were dropping and the Premier was threatening to intervene if something didn't happen soon.[11] Living up to his reputation as a financial and mine-making wizard, he made a deal with his harshest critic, the Premier.[12] Boylen agreed to form a company, East Coast Smelting, that would build a smelter if the province guaranteed the company $20 million in bonds. Robichaud, also a savvy negotiator, agreed to the proposal on several conditions. Boylen had to get rid of St. Joseph's Lead.[13] The company had a 40 per cent interest in Brunswick Mining and Smelting and Boylen was given forty-five days to find a buyer for St. Joseph's shares. The Premier suggested his friend and 'native son' K.C. Irving, New Brunswick's leading industrialist, as a potential investor. At the time, Irving's empire, estimated to be worth $500 million, included forest products, shipbuilding, transportation, gas stations, hardware and media outlets. Irving agreed to buy-in and, with Irving's $2.5 million, Maritime Mining's $4.82 million (a Boylen company) and $3.16 million from a Bolivian company, St. Joseph's Lead was bought out.[14]

A second condition of the deal was that the smelter had to be built in the north and construction had to begin by the end of 1963. The province's northern counties (Gloucester, Restigouche and Northumberland) were viewed as the poorest regions of the province and Robichaud believed the development of mineral resources and associated industries would be a way to revitalize the region. Irving had wanted the smelter built near his base of operation, Saint John, in southern New Brunswick.[15] The port in Saint John was well established and ice-free and the city had a trained industrial workforce. Irving did not put up much of a fight over the decision. A newly created Irving company, Engineering Consultants Ltd., was given a "lucrative" contract to manage construction of the mill-smelter complex.[16]

The site chosen for the smelter complex was the tiny village of

Belledune on the shores of the Bay of Chaleur. Located approximately 30 km west of the town of Bathurst, Belledune was more of a hamlet than a village. It had a population of about 600 residents, with most people living on farms scattered throughout the countryside.[17] The area was settled in 1824, first by immigrants from France followed by a wave of Irish and Scots forced to leave the Miramichi after the great fire of 1825.[18] The province of Québec was just 15 miles (25 kilometers) across the Bay of Chaleur. Aerial photographs from the 1950s and1960s showed the area as a large patchwork of agricultural fields interspersed with woods. The coastline hinted at numerous dune formations, likely "pretty dunes" as the French translation of Belledune suggests.

A prominent coastal feature in Belledune was a lagoon, shaped like a bent knuckle sticking out into the Bay, called Belledune Point. Local residents referred to the lagoon as "the gully." In the spring, they dipped for "capelin cod" from the gully. The cod followed capelin into the lagoon as the capelin came inshore to spawn. In the summer, residents swam in the lagoon.[19]

A few hundred metres west of Belledune Point was the village centre. It was designated by a cluster of buildings including the St. John the Evangelist Roman Catholic Church and its rectory, the Filles de Jesus Convent and Belledune Consolidated School.

The economy of Belledune at the time was dominated by agriculture.[20] Most of the farms had been in family hands for generations and their ownership could be linked to land grants from British or French kings. The main cash crop was potatoes and they were grown in large quantities on farms owned by the Killorans, Landrys, Culligans and Talbots. The remnants of large in-ground cellars for storing potatoes still dot the roadside landscape and serve as a reminder of the historic importance of potatoes, and agriculture in general, to the local economy. Still other families such as the Ellis brothers raised sheep, poultry and other livestock and produced grains and hay to feed their animals. They sent their sheep via rail to markets in Montreal. Just after the second World War, New Brunswick experienced a small influx of farmers from Holland. They set up operations throughout the province including the Belledune area. If residents weren't farming, they were fishing or working in the woods, many doing all three activities depending on the season.

On November 20, 1963, Premier Robichaud turned the first sod on the smelter at Belledune Point.[21] With the arrival of the lead smelter, life was about to change.

Belledune was more of a hamlet than a village. It had a population of about 600 residents, with most people living on farms scattered throughout the countryside.

Belledune 1960

"Everyone is agreed on one point - we want a smelter, we need a smelter, and the sooner the better, and the bigger the better. But what is the best and fair way to get one? We trusted our government enough to elect it by an upset vote and now we can only continue to trust that the voice of the people will again be heeded, a voice that is saying – "The people of New Brunswick are in favour of mining, but let us not mine the people of New Brunswick."

Editorial, *The Northern Light*, November 23, 1961.

2. Smoke on the Horizon

In 1961, in exchange for having the smelter built in the north, the New Brunswick government proposed special legislation giving East Coast Smelting, the company building the smelter complex, a wide range of special rights.[22] The company was given the right to negotiate long-term tax agreements with county councils, the right to expropriate and re-zone land, a 10-year monopoly on smelting ore mined in the province, the right to divert streams and rivers and protection from nuisance prosecution.

There was considerable and sustained public opposition to these concessions.[23] When the draft legislation outlining the various concessions went before the Corporations Committee of the Legislative Assembly in November 1961, there were so many interveners that the meeting had to be moved to a larger venue.

The concession that most angered local politicians and residents were the rights given to the company that allowed them to negotiate long-term tax deals with county councils. Unlike today, education, health and social services were paid for by taxes levied and collected within a particular county. Counties with few residents and even fewer commercial or industrial operations had less tax revenue and, therefore, fewer services. This system of taxation created huge economic and social disparities, particularly between the north and south of the province where the rate of rural residency was high in the north (89% in Gloucester County) relative to the south (55%).[24] North/south divisions were also marked by cultural differences. In Gloucester and Restigouche counties, 68%-85% of the residents were of French origin, whereas in the south the population was largely English.

Gloucester residents and county officials believed these long-term deals undermined their bargaining position with the company and denied the county possible future tax revenues.

An editorial in the Bathurst *Northern Light* summed up the sentiment behind the opposition, "...the concessions asked by the promoters are a price too much to pay. Everyone is agreed on one point - we want a smelter, we need a smelter, and the sooner the better, and the bigger the better. But what is the best and fair way to get one? We trusted our government enough to elect it by an upset vote and now we can only continue to trust that the voice of the people will again be heeded, a voice that is saying – "The people of New Brunswick are in favour of mining, but

let us not mine the people of New Brunswick.""[25]

The most troubling concession for conservation and agricultural groups was the proposed exemption from prosecution and paying compensation for pollution and damage to properties. Under common law, private and public nuisance prosecutions are tools that citizens or a group of citizens can use (and have used for at least two hundred years) to protect themselves, their properties, and their communities from harm such as odours, noise, vibrations or industrial pollution.

The implication of losing access to this legal tool was of particular concern to sport fishermen. A year earlier, in 1960, the Province had failed to stop Health Steel Mines from polluting the Tomogonops River which emptied into the Northwest Miramichi River. The Miramichi Fish and Gun Club was forced to get an interim injunction served on the company to get them to stop dumping toxic water from the mine into the river.[26] Exempting companies from prosecution would put this legal remedy out of their reach.

The Miramichi Salmon Association, Northumberland Commercial Fishermen's Association, New Brunswick Fish and Game Protective Association, Farmers' Organization Restigouche Gloucester English (FORGE), Union of New Brunswick Municipalities, and the New Brunswick Prospectors and Developers Association made presentations to the Corporation Committee opposing the no-nuisance clause. In addition to concerns about the lack of legal recourse or compensation for damaging properties and polluting streams, J.J. Fenety, spokesperson for the Miramichi Salmon Association raised the issue of air pollution from the smelter and its potential impact on the province's forests. He said a commission in Ontario was about to wrap up its work on "smelters and [ways] to prevent further decimation of forests."[27]

Premier Robichaud, in his defense of the no-nuisance clause, pointed to nuisance suits filed against mining companies in the United States and noted how disruptive they were to development. He said the promoters were "stressing this section since they do not want to be the target of nuisance suits by citizens claiming damages to property." Another proponent of the bill argued that a "proper smelter with a proper stack posed no danger" to human life or wildlife saying that people were simply afraid of a "puff of smoke."[28] He also said the company expect-

"I think people appreciate what an industry like a smelter does and they do not intend to open troublesome [law] suits."

Edward G. Burns, Q.C. speaking before the Corporations Committee of the New Brunswick legislature in support of removing the exemption from nuisance prosecution from draft special legislation giving special rights to Brunswick Mining and East Coast Smelting. November 29, 1961.

"It is realized that, with a tall, stack, an acid plant, and the topography concerned, there is a slight likelihood of growth damage resulting from sulphur dioxide fumigation [from the smelter]. However, experience elsewhere suggests that the matter should receive careful consideration."

C.S. Clements, Director, New Brunswick Mines Branch to Dr. J.S. Bates, Chairman, New Brunswick Water Authority. Excerpt from a letter dated June 19, 1964.

ed to be flooded with protests. The Minister of Lands and Mines and Liberal representative for Northumberland County, H.G. Crocker, echoed the belief that pollution could be controlled through proper stack controls. He was more concerned about the loss of citizens' rights to protect property and offered an amendment to the bill.

K.C. Irving, in his appearance before the Corporation Committee, acknowledged that on some days the smoke from the smelter might be a "little unpleasant." He said the company was "prepared and intended to pay for actual damages," but believed "the nuisance clause was necessary to avoid petty interference with operations."[29]

On the issue of bad odours, provincial Liberal representative for Westmorland (a riding in southeastern New Brunswick) and Chairman of the New Brunswick Electric Power Commission, D.C. Harper, had piped up to say odours from the Bathurst mill "smells like bread and butter." "When we don't smell it, we know the mill is down and 800 people are out of work."[30]

Edward Byrne, a lawyer from Bathurst who would later chair the Premier Robichaud's Royal Commission on Municipal Finance and Taxation, also intervened before the Corporations Committee. He was representing the Canadian Metal Mining Association. Byrne said "I think people appreciate what an industry like a smelter does and they do not intend to open troublesome suits." He used the example of Bathurst Power and Paper which had been operating for 50 years to illustrate the reasonable nature of people saying "the Bathurst mill at times gave off such an odor, when the digester blew, it was almost impossible to breathe, but the citizens in their reasonableness make no threat."[31] Byrne believed there was no need for a nuisance clause in the bill and thought that other existing legislation (*Judicature Act*) protected companies from 'frivolous action'.[32] He urged the committee to strike out the section. The committee compromised. The section was not removed but an amendment was made that would allow the attorney general to authorize a suit against the company if necessary.[33]

Shortly after construction began on the smelter, the provincial Department of Lands and Mines took the lead in addressing the 'smoke' issues identified during the Corporations Committee hearing. A meeting was convened in Fredericton on June 29, 1964. In attendance were scientists from federal forestry and agriculture

departments and provincial government staff and deputy ministers from agriculture and lands and mines departments.

In his letter of invitation to the meeting, C.S. Clements, Director of New Brunswick's Mines Branch, was optimistic about the amount of smoke damage that would be caused by the smelter. He wrote that, "with a tall stack [200 feet], an acid plant, and the topography concerned, "there would be only a "slight likelihood" of any damage being done to the surrounding vegetation from "sulphur dioxide fumigation."[34]

Dr. Bourchier, a plant pathologist with the Canadian Department of Forestry, said that the lack of pre fume data in Ontario had made it hard to link SO_2 releases with the damage they were seeing now. He mentioned that white pine was one of the most susceptible conifers and black spruce were less susceptible. Most of the damage was done during the early spring and during the growing season. When asked about the effects of fumes on agricultural crops, Dr. O.T. Page, a plant pathologist with the Canadian Agriculture Department, admitted that buckwheat and two weed varieties (fireweed and lambs quarters) were very sensitive to fumes, but, it was difficult to assess the effects on crops like potatoes and cereals. Page recommended both fixed and portable monitoring stations and, to make the monitoring worthwhile, he recommended gathering a lot of baseline or "pre fume" information such as the types of crops grown in the area and the amount of SO_2 in the soil. All participants agreed that pre-smelter monitoring of air and soil needed to be done.

The studies being done in Ontario were not the first to document the impacts of smelters on forests. Studies done in Europe in the 1840s, particularly Germany, had found that certain plants, trees and shrubs were vulnerable to 'smoke' or sulphur dioxide (SO_2) at concentrations as low as one part per million (one ppm). They concluded that the impacts were due to the direct contact of SO_2 with the surface of the leaves and that several factors influenced the degree of the impact such as atmospheric moisture and temperature and species of trees, with evergreens being more sensitive than deciduous trees.

By 1890, the Ruhr Valley of Germany, the model of industrial development invoked by Premier Robichaud 70 years later, was described as a 'wasteland'.[35] The term was meant to identify both its purpose and condition.

By 1890, the Ruhr Valley of Germany, the model of industrial development invoked by Premier Robichaud 70 years later, was described as a 'wasteland'. The term was meant to identify both its purpose and condition.

On the matter of claims for smoke damage from the Belledune smelter, C. S. Clements, Director of New Brunswick's Mines Branch, pointed out that if damages did arise and legal action was taken, the Attorney General's Department would be involved.

At the turn of the 20th century, the debate over the impacts of smoke from smelters had moved to North America. The first lead smelter in Canada was in Trail, British Columbia.[36] Built by American promoters in 1896, it was located in a steep valley along the Columbia River just 10 km north of the U.S. border. By 1923, with the original main stack (200 feet tall) disintegrating under increased production at the smelter, the company ordered a new and higher stack. At just over 400 feet (120 metres), the stack allowed the company to expand its production and send the smoke further down the valley. It also resulted in a doubling and tripling of the amount of sulphur dioxide (SO_2) released. By the end of 1928, 307 tons of SO_2 was being released daily and 232,000 tons annually.[37] Although the SO_2 could have been captured, turned into sulphuric acid and used for fertilizer production, the market was soft at the time for either product so the SO_2 went up the stack.[38] It would take a surge in demand for chemical fertilizers in the 1940's that would prompt the company to get into fertilizer manufacturing and, in turn, capture some of the SO_2.

Almost immediately after the new stack came online, residents 10 miles down the valley in bordering Washington State began seeing the effects of SO_2 damage on their trees and crops and they knew exactly what was happening. A few years earlier they had seen the same kind of damage when the Northport (Washington) smelter reopened. What ensued was a fifteen-year international environmental conflict, known as the Trail Smelter Investigation, between Canada and the United States. A major outcome of the conflict was the signing of a Convention (1935) between Canada and the U.S. that would become the foundation of international environmental law on transnational air pollution.

In 1961, the town of Trail would again be in the international spotlight. This time the circumstances were more positive. The local amateur hockey team had won the gold medal at the World Hockey Championships in Italy. The public nickname for the team was the Trail Smoke Eaters.[39]

On the matter of claims for smoke damage from the Belledune smelter, C. S. Clements, Director of New Brunswick's Mines Branch, pointed out that if damages did arise and legal action was taken, the Attorney General's Department would be involved.[40] Another Mines Branch official pointed out that Ontario had a "Special Sulphur Dioxide Committee" that met

annually to hear claims for damages caused to crops from SO_2 fumes and suggested a similar procedure could be arranged in New Brunswick.

The Deputy Minister of Mines, K.B. Brown, rejected the idea of a compensation committee. He told the meeting participants that the company had assured the Department there would be no risks of adverse effects to the landscape from the smelter complex. Instead, he said the company would be told that they "were being watched."[41] And watch they did.

"The smelter, the fertilizer plant... involve quantities and varieties of pollution far beyond any manufacturing complex to date in New Brunswick... The company staff are so busy with the wide variety of process and equipment problems in this great complex of modern industries that it would not be surprising if serious mistakes were made in pollution of shore waters over a wide area."

Dr. John Bates, Chairman of the New Brunswick Water Authority to L. Norbert Theriault, Minister of Municipal Affaris and D.A. Riley, Minister of Lands and Mines. Excerpt from a letter dated September 29, 1965.

3. Solution to pollution is dilution

In addition to the 20 stacks of various dimensions, the smelter-acid plant complex had at least five effluent pipes and drainage ditches that emptied into the lagoon (gully) or directly into Belledune Harbour and the Bay of Chaleur. The types and volumes of pollutant expected to be released were new to provincial officials. In addition to lead, zinc, cadmium and arsenic from the smelter, gypsum from the fertilizer plant would also be discharged into the Bay.

In January 1964, a few months after the start of construction of the smelter, Boylen and Premier Robichaud announced that a $15,000,000 chemical fertilizer plant would be added to the smelter complex.[42] Some of the sulphuric acid from the acid plant would be combined with ammonia, then added to calcium phosphate rock (from Florida) to produce a chemical fertilizer, diammonium phosphate. The by-products of the fertilizer plant would be massive quantities of calcium sulphate (gypsum) and fluorine compounds.

The New Brunswick Water Authority, a precursor to the provincial Department of Environment, was responsible for managing water supply and water pollution control issues. The Authority had been set up in 1957 and was chaired by Dr. John S. Bates (1888-1991). Prior to his appointment to the Water Authority in 1957, Bates had a long career as a chemical engineer.[43] He had held senior positions with several pulp and paper companies. He had chaired the Royal Commission on New Brunswick Forest Development and had been a member of the Board of the New Brunswick Electric Power Commission. The Water Authority had an advisory function rather than a regulatory role. There were few environmental regulations to enforce at the time.

Bates understood that the best way to deal with these issues was in the planning stages. However, the agency had only two other technical staff members and they were busy with other water supply and stream alteration issues in the province. On September 29, 1965, Bates made a direct appeal to the provincial Minister of Municipal Affairs (R.A. Riley) and the Minister of Land and Mines (L. Norbert Theriault) for funds to hire a temporary senior industrial engineer. Bates had a "suitable man" in mind who was retired and willing to work on a consulting basis.

He began his letter to the Ministers by stating the magnitude of the problem."The smelter, the fertilizer plant... will involve quantities and varieties of pollution far beyond any manufacturing complex to date in New Brunswick. Preliminary discussions have been on a very constructive basis with great hope that mutual effort will insure control of at least the massive forms of pollution affecting the Bay Chaleur salt water."[44]

He warned, "the company staff are so busy with the wide variety of process and equipment problems in this great complex of modern industries that it would not be surprising if serious mistakes were made in pollution of shore waters over a wide area."[45]

Several months later, Dr. Bates got his man, Dr. Harry J. Rowley of Fredericton. Rowley and Bates knew each other quite well. They shared similar work and academic backgrounds. Rowley, like Bates, was a chemical engineer and, like Bates, had worked in the pulp and paper industry. Bates had appointed Rowley to Chair the New Brunswick Resources Board in 1944 and both had been members (at different times) of New Brunswick's Electric Power Commission.[46]

Rowley met with company engineers and together they poured over gypsum production numbers and made calculations on the volume of water needed to push the gypsum out into the Bay of Chaleur. At "full-out" production, the fertilizer plant would generate 4,600 tonnes of waste calcium sulphate or gypsum a day (1,500,000 tonnes a year).[47] Every tonne of fertilizer generated four to five tonnes of waste gypsum. At the time, there were no markets for its use. The gypsum had the texture of wet baking soda and its high moisture content made it uncompetitive with the mined, dry gypsum which was used to make wallboard.

The options for disposing the waste gypsum were dumping it into the ocean or land-based impoundment. Federal research scientists told Bates that calcium sulphate was not "expected" to kill fish or other aquatic organisms, but they had "no experimental knowledge" of the toxic effects of calcium sulphate pollution and couldn't be certain about the consequences.[48] They suggested problems could arise from the physical effects of such a large volume of suspended solids which could smother the bottom and create poor water quality conditions that stressed fish.

Rowley reported that the company engineers were "resigned" to

Five metals were expected to be released from the smelter complex – copper, silver, lead, cadmium and zinc.

disposal at sea. Land disposal would require at least 400 acres of land because, based on daily fertilizer production, the waste gypsum would cover an acre of land at a depth of one foot every day.[49] The company had decided that piping the gypsum to the Bay of Chaleur was the "practical" method.

The engineers envisioned a rubber-lined iron pipeline 2 feet (0.6 metres) in diameter extending 1,800 to 2,000 feet (550 - 600 metres) out into the Bay on the east side of Belledune Point. The smelter engineers had estimated the waste gypsum would dissolve within 3600 feet (1100 metres) from the outfall. Federal scientists at the St. Andrews Biological station challenged the consultant's calculations, suggesting dispersal would not be so great.[50] An earlier estimate by another consultant had suggested that the pipeline needed to be eight feet in diameter and twice the length in order to dissolve and disperse the gypsum. Time would prove them right.

Five metals were expected to be released from the smelter complex, copper, silver, lead, cadmium and zinc. In 1965, federal scientists had pointed out that measuring toxicity on animals was complex because different stages in an animal's life cycle differed in their "resistance to a poison" and different species differed in their resistance.[51] They said that the differences between species could be in the range of four or five orders of magnitude and provided several examples to illustrate the point. For copper, one part per million (ppm) was considered lethal for marine fish. For adult invertebrates, the lethal value was 0.2 ppm and for the larvae of a shellfish (like scallops or lobsters) and other marine invertebrates the value was 0.05 ppm.

They determined the toxic level for each metal and pointed out that the presence of several metals in the effluent would probably require that the allowable concentration of each metal would have to be lowered because the additive effect of multiple metals increased the toxicity of each individual metal. It would take more than a decade before the federal government set regulations on metal releases from smelters and mining operations.

4. Lead Intoxication

In 1966, upon hearing that the smelter and the acid plant were operating, Dr. Harry J. Rowley, consultant to the provincial Water Authority, drove to Belledune for a tour. The Imperial Smelting Method used to refine the lead and zinc involved a series of steps. Before the ore concentrate was put into the blast furnace, the concentrate was first mixed with sand and limestone then heated (sintered) to create a material (sinter) that helped to extract the metals in the blast furnace more efficiently. Heating the ore-sand-limestone mixture removed the sulphur in the concentrate and converted it to SO_2.

Rowley filed an optimistic and glowing report. He gave the facility "high marks" for pollution control as he neither smelled nor saw SO_2. "So much for air pollution," he concluded.[52]

Two months later, Rowley returned to the smelter, this time with Dr. John Bates, Chairman of the Water Authority. They arrived on December 15, 1966 to witness a series of mechanic problems and breakdowns which Rowley said were "usual" during the startup of new and large plants.[53] On this visit, the suction fan on the air scrubber and the mechanical 'knocker' on the sintering grate were stuck. There were a lot of fumes in the air and everyone was required to wear a gas mask.

A few days after Bates and Rowley experienced the fumes at the smelter, the Elevator Inspector for the Department of Labour reported a similar experience. He called the fumes in the smelter "excessive."[54] At the time of his inspection, he was told about a man that had been caught in a stalled elevator and collapsed because of the fumes. The elevator didn't have a respirator which was required by law.

The Labour Department sent another inspector to investigate, this time the Industrial Safety Inspector. He too found "excessive" amounts of "noxious fumes" but said he wasn't qualified to "render an interpretation on these conditions." He also couldn't do anything about it because the Department of Labour had "no jurisdiction in the smelter proper."[55] That job fell to the Mines Branch.

On December 29, 1966, a Mines Branch inspector was sent to the smelter and found nothing wrong. The smelter was not operating at the time, but his report failed to mention that detail.[56]

"The plant with (its) 200 ft. stack is visible for a mile or more as one approaches from Bathurst... at no time outside or inside the plant was SO_2 odour noted. So much for air pollution just now with sintering and acid making underway."

Dr. Harry J. Rowley, consultant to the New Brunswick Water Authority, describing his visit to the smelter. October 18, 1966.

A short history of lead

Lead's place in human history dates as far back as 5000 BC. It is thought to be one of the first metals known to humans and has been called the 'enduring metal'. Its early use was in its raw form as lead sulphide (galena). The gray rock was easily ground and mixed with other minerals for use in pigments such as eye-makeup in 4000 BC. The properties that made lead so useful are its malleability and flexibility, the fact that it is resistant to corrosion and it mixes well with other metals to create alloys.

Source: C. Warren, C. Brush with Death: A Social History of Lead Poisoning. (Baltimore: John Hopkins University Press, 2000); Nriagu, O. Lead and Lead Poisoning in Antiquity, Environmental Science and Technology Series, ed. Robert L. Metcalf and Werner Stumm (New York: John Wiley & Sons, 1983).

"We arrived on a day of mechanical troubles and breakdown – usual for some time following startup of new and large plants... Much SO_2 was naturally in the air and all workers and visitors employed gas masks."

Dr. Harry J. Rowley describing a follow-up visit to the smelter with Dr. John Bates, Chairman of New Brunswick Water Authority on December 14, 1966.

A short history of lead

In the first part of the 20th century, lead was used in pigments, batteries, paint, plumbing and ceramics manufacturing. The occupational health hazards from working with lead had been known for almost three centuries. In 1921, the president of the National Lead Company in the United States wrote to the dean of Harvard Medical School to say that, based on 50 to 60 years of experience, lead manufacturers had agreed that "lead is a poison when it enters the stomach of man" and it didn't matter whether it came from mines or smelters or was in the form of lead oxides or lead sulfides.

Source: Markowitz, G., and D. Rosner. 2000. "Catering to the Children": The role of the lead industry in a public health tragedy, 1900-1955. American Journal of Public Health, 90(1): 36-46.

In early January 1967, the first rumours of lead poisoning at the smelter reached the Premier's Office. A smelter worker, supported by his family physician, had made a claim to the Workmen's Compensation Board for lead poisoning. Charles Forsyth, executive assistant to the Premier, called the smelter's manager to give the company a heads-up.

The manager responded by sending the Premier's executive assistant a letter expressing appreciation for the "call alerting us to this situation" and provided him with a copy of the company's press release on the matter[57]. The release denied any cases of lead poisoning at the Belledune smelter and outlined the steps the company was taking "to ensure occupational hazards inherent in this type of plant would be kept to a minimum."[58] These measures included an on-site company doctor whose job it was to look after the health of workers and respirators for workers. If cases where excessive "lead absorption" were detected, workers were transferred as a "precautionary measure" to other areas of the plant until blood tests showed that their lead levels had dropped to levels considered acceptable. The company said workers were "for the most part" following safety procedures and that smelters "all over the world" used the same procedures as those used in Belledune.[59] No mention was made of the measures being taken to control dust levels.

The Chief of Mines Inspection for the New Brunswick Department of Labour, R.W. Warren, was dispatched to investigate the lead poisoning rumor. Warren reported that, according to the company, the case of lead poisoning reported in the newspaper was not lead poisoning and the symptoms of lead poisoning like weakness, sore joints and loss of weight "could be similar to many other ailments or diseases."[60] Warren noted that the "danger point" for lead absorption in blood was 50 µg/dl. The company was using 90 µg/dl as the threshold value. He noted that the company's attitude toward health and safety was "good." The company had gone to "great lengths" to educate and train the workers and the company had ordered equipment for dust sampling.

Over the next several months, the New Brunswick Department of Labour received requests from workers to investigate conditions at the smelter. Although the Department had no responsibility for workplace health and safety, it did oversee the Workmen's Compensation Board and the Board was seeing an increasing number of claims from smelter workers. According to Mines

Branch records, out of 450 employees working at the smelter in January 1967, 33 employees had been relocated to other work areas due to high blood lead levels and another 32 had been issued warnings.[61] Employees were relocated when their blood lead levels reached 90 µg/dl and issued warnings at 60 µg/dl. By the end of the year, the Workmen's Compensation Board paid out ten claims to smelter workers for lead absorption problems totaling $6,182.93. At the end of 1968, the number of pay-outs would jump to 31 and cost the Board $14,205.41[62].

In July 1967, ownership of Brunswick Mining and East Coast Smelting changed hands. The Imperial Smelting Method praised earlier was not effective in refining Brunswick ore. The lead-zinc minerals in the ore were so finely crystalline that it made it difficult to separate the metals. The smelting process had to be modified many times and this meant construction changes, delays and, ultimately, cost overruns.

One year into construction, the cost of building the smelter had mushroomed from its original estimate of $20 million in 1962 to a high of $70 million by 1966.[63] By the time the smelter was finished, it had a working capital deficit of $60 million.

In early January 1967, worried about the future of the smelter, Premier Robichaud asked his trusted advisor and chief architect of the Equal Opportunity legislation, Edward Byrne, to begin looking (secretly) for a new investor for the smelter.[64] A new investor would be difficult to find given its current debt load, but, the Premier and his government needed to protect the project. It had become key to his economic development strategy for revitalizing the north and the government was willing to negotiate with any potential investor. Robichaud's ally in this covert action was Boylen, who like Robichaud, had become estranged from Irving.[65] Irving's growing debt on the smelter project was jeopardizing his company's (Brunswick Mining) financial position.

Several large mining companies - Falconbridge, Consolidated Mining and Smelting Company Ltd. (Cominco) - turned down the opportunity. In the end, Noranda was persuaded to take over the project but not without negotiating a few concessions of their own.

Noranda was a good choice for the project. They had a great deal of experience in mining and smelting and were operating a smelter just across the Bay of Chaleur in Murdochville on the

A short history of lead

Virtually the only source of support for lead research between1925-1970 came from the lead industry and whose principal spokesperson was Dr. Robert Kehoe (1893-1992). Kehoe was a director of the Kettering Institute which was funded in large part by the Ethyl Corporation, makers of tetraethyllead (TEL), the anti-knock compound in gasoline. By the mid-1950s, approximately 100,000 metric tonnes of lead was being used to make TEL in the United States alone.

Source: Nriagu, J. 1998. Clair Patterson and Robert Kehoe's paradigm of "show me the data" on environmental lead poisoning. Environmental Research, section A, 78: 71-78; Nriagu, J.O. 1990. The Rise and Fall of Leaded Gasoline. The Science of the Total Environment 92: 13-28.

The smelter manager, T.R. Wearing, made it clear to the health officers that, while they were "welcomed at the plant," the company was responsible to the Mines Branch for the health and safety of the employees not the health department.

A short history of lead

Kehoe's research provided the lead industry with the evidence they needed to uphold the distinction between "lead absorption" and "lead poisoning" which was used to define what was, and what was not, eligible for worker's compensation. Kehoe believed that 1) lead was a "natural" component of the human body, 2) the body kept lead in a natural balance by excreting most of the absorbed lead, and 3) there was a 'threshold value' for lead in the body below which no ill effects occurred. He used 80 µg/dl (microgram per decilitres) because he had not seen worker with any acute, debilitating symptoms of lead poisoning like kidney damage, anemia and neurological dysfunction. As long as there was a balance between lead absorption and elimination, workers would have no health problems.

Source: Warren, C. Brush with Death: A Social History of Lead Poisoning. (Baltimore: John Hopkins University Press, 2000)

Gaspé Peninsula. The deal between Noranda and the province was that Noranda would pay off Brunswick's $50 million debt and loan $10 million to finish the smelter.[66] In return Noranda would control 51 per cent of the company and the province would guarantee another $20 million bond for the project.

Soon after taking control, Noranda managers identified major engineering problems at the smelter, specifically with the smelting process designed to extract zinc from the ore concentrate and with the ventilation system. In October 1967, Noranda officials met with representatives of the Union, the Workmen's Compensation Board, the Department of Lands and Mines and the Department of Labour to discuss lead poisoning at the smelter, safety issues and the company doctor.[67] In January 1968, the company hired a ventilation consultant, H. Rozovsky, and, for a short time, a consulting hygienist, K. Raht.

As the number of compensation claims increased, the provincial health department got involved. On February 29, 1968, two provincial public health officers, one from Fredericton (Dr. St. Pierre) and the other from Bathurst (Dr. Mazerolle), toured the smelter with a mine inspector. The smelter manager, T.R. Wearing, made it clear to the health officers that, while they were "welcomed at the plant," the company was responsible to the Mines Branch for the health and safety of the employees not the health department.[68] The health department officials were there to investigate a case of "lead intoxication." The family physician of one of the smelter's employees had ordered a blood transfusion for his patient in an attempt to reduce his blood lead levels.

The health officers were taken to meet Dr. R.D. Smith, the company doctor and registered nurse, Mrs. Junia Culligan. Smith explained that the company had been using 90 µg/dl as the maximum safe level but it had been lowered to 80, then 70 µg/dl. According to Smith, the rationale for lowering the threshold level was to encourage the supervisors and employees to clean up the working area.

Provincial health officials paid a visit to the Belledune school which was sandwiched between the fertilizer plant and the smelter just a mile west of the smelter. The school housed students from grades one through 12. A stone's throw from the school was the Filles des Jesus convent which also served as a school. The school principal told provincial officials he was

unaware of any dust problems but the janitor thought there was more dust in school than the previous year.

St. Pierre and Mazerolle also met the president of the Union local, Norman Doucet. Doucet said that many of the employees were showing symptoms of lead poisoning. He said that one individual, who normally had excellent teeth, experienced "lead rings" on his teeth that caused them to break off.

According to occupational health guidelines set by provincial agencies at the time, there were two categories of occupational health effects from lead exposure, lead absorption and lead poisoning or intoxication.[69] Lead rings along the gum line were viewed as an indication of lead absorption not poisoning. Similarly, increased blood lead, increased urinary lead, and a reduce or falling hemoglobin was viewed as evidence of lead absorption – nature's way of eliminating a 'natural' element in the body.

A diagnosis of chronic (small doses over long periods of time) lead poisoning was made when workers exhibited clinical symptoms such as headaches, weakness, constipation, and sluggishness. The symptoms of acute (a large single dose) lead poisoning or "lead intoxication" were vomiting, severe colic, tremors and convulsions. Government and industry information sheets on lead poisoning at the time incorrectly stated that "lead was a normal constituent of blood."[70]

On Thursday, March 7, 1968, A.G. DeVillier and C.R. Ross from the Occupational Health Branch of the federal Department of National Health and Welfare arrived at the smelter to begin an investigation.

According to the *Northern Light*, the local weekly newspaper, the federal study had been requested by the Steelworkers Union because previous meetings with the company had failed to result in a study of the pollution problems inside and outside of the smelter.[71] Union officials told the newspaper that they had taken their concerns to the provincial Minister of Labour, H.H. Williamson, and had sent a telegram to Norbert Theriault, the provincial Minister of Health.

The smelter manager, T.R. Wearing, had a different view of the federal investigation. He told the reporter that the investigation was simply a "proper precautionary measure" and that some of the lead poisoning cases were due to "accidents or neglect."[72]

A short history of lead

There was no serious challenge to Kehoe's views until 1965. Dr. Clair Patterson (1922-1995), a geochemist, dismissed Kehoe's claim that lead in the body was 'normal.' In a 1965 scientific paper on lead in the environment, Patterson said that the lead found in the human body was not 'normal' or 'natural' but 'typical' and that it was the result of human activity. Patterson also said that simply because lead was commonly found in the body didn't mean it was 'natural' or without harm.

Patterson's research was focused on the geological age of the earth. Wherever he tested (e.g, ice cores, lakes, oceans, etc), he kept finding higher than predicted levels of lead. He thought he had a contamination problem in his lab and set about to develop his "clean room" methods which broke new ground in analytical chemistry and revolutionized the study of heavy metals in the marine environment.

Source: Patterson, C.C. 1965. Contaminated and natural lead environments of man. Archives of Environmental Health, 11: 344- 359. Needleman, H.L. 1998. Clair Patterson and Robert Kehoe: Two views of lead toxicity. Environmental Research, section A, 78:79-85.

"Pollution of the atmosphere and ground waters outside of the smelter by large discharges of lead were also considered to be sufficiently serious to necessitate further investigation."

Conclusion from the May 17, 1968 federal Department of National Health and Welfare report on lead hazards at the smelter in Belledune.

A short history of lead

Lead was banned from paint in the early 1970s. At about the same time, a phase-out of lead in gasoline was being discussed. By the mid-1970's, the concept of differentiating lead absorption from lead poisoning was in disrepute. The effects of lead were now being described in terms of chemical toxicity (biochemical effects without symptoms) and clinical toxicity (with symptoms) with the understanding that "one merges into the other."

Source: Jaworski, J.F. 1979. Effects of lead in the environment - 1978: Executive Summary. National Research Council Canada, Ottawa. NRCC No.16745, p. 12-13

Wearing also disputed the number of workers who had been hospitalized for lead poisoning. A Union official said 12. The smelter manager said two or three. The Union believed workers were experiencing dangerous levels of lead in the air, levels above the occupational health standard of 0.2 milligrams per cubic metre. Wearing said the 0.2 level was the level at which workers could operate without respirators or filters. Above that level, workers used respirators.

Accompanied by a mine inspector, federal health officials took air samples in the sinter building, the screening and crushing plant, the blast furnace area, the lead and zinc refinery and the plant engineering building which housed the lunchroom. They attached air samplers to several workers. They had lunch and chatted with workers. One employee working in the blast furnace area told DeVillier and Ross that his blood level was 180 µg/dl.[73] Air quality tests would show that the lead-in-air levels in his work area were as high as 60 times above the 0.2 milligrams per cubic meter limit referred to by the smelter manager.[74]

They also reviewed blood lead test results with the company's head chemist. He told them that the highest blood lead readings in the past several months had been 180 and 160 µg/dl. These values were higher than the highest previously reported readings of 120. The lowest readings were 20 - 40 but the average lead level in the employees was 60 to 70 µg/dl, levels that were above the acceptable (at the time) industrial hygiene standards of 50 µg/dl.

The Department of National Health and Welfare submitted the first of two reports to the Province on May 17, 1968. The first report began by describing the production and processing facilities at the smelter and the surrounding community. According to the report, there were 1,000 people living within a 1-2 mile (1.6–3.2 km) radius of the smelter and it noted the close proximity of the school to the smelter.[75] Within a 10-mile (16 km) radius of the smelter, there were 5,700 people. Stack tests by the company showed that lead discharges to the atmosphere were in the range of 5000 pounds (2.2 metric tonnes) per day.

Twenty-one air samples were taken in various parts of the smelter. Two samples were reported lost. Of the 19 samples processed, only two test results were within acceptable limits. In one area of the plant, lead levels were 800 times above safe limits.[76] In other areas, they were 2, 8, 10, 60, 80 or 400 times

over safe limits. Although masks were mandatory in most areas of the smelter, former smelter workers say they were ineffective in keeping lead from being inhaled. The respirators they used at the time had poor seals. When they removed their masks, there would be two black streaks around their noses and mouths.

The federal report outlined measures the company was taking to reduce workers' exposure to dust and fumes. These included a ventilation system which federal health officials said was inadequate and defective, routine blood tests, dust respirators which federal officials said were difficult to work with and not very effective, clean overalls supplied twice a week, lockers to separate clean and dirty clothes and a ventilation consultant. They made eight recommendations to improve working conditions that included: improving the standard of housekeeping; medical examinations for evidence of lead toxicity; assessing the health hazards of other contaminants like cadmium, zinc and carbon monoxide; installing equipment to limit the release of lead into the atmosphere; and a health education program for employees.

The federal health department followed up their first visit to the smelter with a second visit just a month later.[77] Although their second air tests showed some improvement in air quality, the lead levels in various parts of the smelter still exceeded acceptable standards by, in some cases, 25 times. The ventilation still needed improvement, as did the housekeeping efforts. They recommended that drink and food dispensers be relocated to the lunchroom and that the lunchroom be provided with a filtered air supply.

The province responded to the federal report by striking a committee. It was called the Joint Information Committee on Lead Hazards and it was chaired by Dr. St. Pierre, coordinator of Public Health Services with the province's Department of Health. Members of the Committee included representatives from the company, Union and provincial labour and natural resources (mines) departments.[78] The committee took a month to review the first federal report then issued a press release.

Rather than release the federal report, the Joint Information Committee announced the release of their own report. Dr. St. Pierre, the committee's chair, said the purpose of their report was not to make recommendations to government "but just to let the employees and the public know exactly what the situation is."[79] He said the Committee wouldn't be making recommenda-

The respirators they used at the time had poor seals. When workers removed their masks, there would be two black streaks around their noses and mouths.

tions to any source unless there was a serious health problem at the smelter. As far as St. Pierre knew, no one at the plant had been permanently affected by lead poisoning.[80]

The report from the Joint Information Committee highlighted some of the recommendations made by federal officials and provided an update on the progress made to clear up "poor housekeeping" and "ineffective equipment." The report acknowledged that in several areas of the smelter, lead levels were "grossly higher than accepted standards."[81]

Their report made no mention of dust levels in the community. The federal investigation had found high levels of lead inside the school (2000 parts per million - ppm) and outside the school (5200 ppm).[82] Federal officials expressed concern that the large discharges of lead from the smelter were causing air and water pollution in the community and recommended further investigations.[83] The Joint Information Committee chairman, St. Pierre, had a different view of the matter. He didn't believe there were any health problems at the school, "It's a mile away and the prevailing wind is away from it."[84] The federal report, including the results of air testing in the smelter, was never released publicly.

As a result of the federal report, East Coast Smelting was directed to do medical examinations on the employees.[85] The Workmen's Compensation Board and the provincial health department decided to help the company with the examinations.[86] Blood tests were done on every employee (404) and clinical examinations were done on 385 men. Sixty men had blood lead levels above 90 µg/dl and none of the men had any "objective evidence of lead poisoning." [87] The final report from the Chief Medical Officer for the Workmen's Compensation Board to the office of the Minister of Labour stated, "there is evidence of excessive exposure to lead and also of excessive absorption of lead in a large percentage of workers. Workers who show blood levels consistently exceeding 0.8 parts per million or 80 micrograms per 100 millimetres of blood have an increased risk of developing lead poisoning. If the degree of exposure persists, cases of lead poisoning are bound to continue."[88]

He concluded by saying "more rapid progress must be made to decrease the lead exposure, and an intensive educational program should be instituted in order to educate the men to observe better personal hygiene. In other words, there must be a

The final report from the Chief Medical Officer stated, "there is evidence of excessive exposure to lead and also of excessive absorption of lead in a large percentage of workers."

A short history of lead

By the 1970's, children had been identified as "a special case" when it came to the health risks associated with lead exposure. Children were viewed as more vulnerable to lead because they had:

- a higher rate of lead absorption than adults (10% for adults versus 50% for children);
- a higher metabolic rate than adults and their developing organs and rapidly growing tissues were more easily affected by toxic substances;
- a higher rate of breathing and they eat more than adults which increased their exposure to contaminated air, water and food; *and*
- a hand-to-mouth behaviour that exposed them to lead on non-food items like soil.

Source: Jaworski, J.F. 1979. Effects of lead in the environment - 1978: Executive Summary. National Research Council Canada, Ottawa. NRCC No.16745, p. 12-13 . For the NRCC's full 778- page monograph, Effects of lead in the Canadian Environment - 1978, see their publication number NRCC No. 16736.

twofold attack on the problem. Management and employees should cooperate and work fully together in order to solve this serious problem." [89] The Joint Committee on Lead Hazards was dissolved four months after it was formed.

Four years later the Joint Committee would be called back into service. The "lead absorption" problem at the smelter was getting worse.

In a letter to R. E. Logan, Minister of Labour, dated June 4, 1972, the Chairman of the Workmen's Compensation Board, R.G. Jones, said the Board was "becoming increasingly alarmed at the number of compensation claims" for "lead intoxication."[90] As of May 1972, there were 57 cases reported to the Board.[91] By the end of the year this number would rise to 104 and cost the Board almost $100,000 in payouts.[92]

...the Chairman of the Workmen's Compensation Board, R.G. Jones, said the Board was "becoming increasingly alarmed at the number of compensation claims" for "lead intoxication."

Jones told Logan that smelter officials had said that the claims for lead intoxication were higher in New Brunswick than the entire mining community in Canada. Jones acknowledged the Department of Labour had no jurisdiction in the smelter but pleaded with Logan and his colleagues "to undertake a vigorous campaign for the elimination of the hazards in the Smelter," the same plea made four years earlier by Compensation Board officials.[93]

A month later, the Minister of Labour convened a meeting. He had invited provincial health, labour, mines branch, Union and company representatives to discuss the situation. After listening to their comments, the Minister concluded there were four problems.[94] Topping the list was the difference in opinion on how the blood test results were interpreted by the smelter and the Compensation Board. At issue was what constituted lead poisoning, lead intoxication or over-exposure. These distinctions were critical in deciding what was and what was not a compensatory claim. The other problem was that only about 50 percent of the referrals to the Compensation Board were coming from the company doctor, the rest were being made by the family physicians of workers.

The last problem identified by the Minister was the ventilation system. The Union representative had suggested that the smelter's changeover from processing lead and zinc to just lead was the reason for increased number of compensation cases. The smelter's manager defended the company by saying that the

The Union representative pointed out that, even though the company had a policy of relocating workers with high blood lead levels, workers were still being exposed to lead in the relocation areas.

company had spent three-quarters of a million dollars modernizing the ventilation when it took over the operation six years ago. He said the company was now planning a $10 million expansion which will include another one million on ventilation, but, it would take time to be installed. He said he would like to close the plant down and install the equipment immediately, but, that's impossible.

As for the number of compensation cases, the smelter manager said the Compensation Board was not looking at the "higher picture."[95] He said there were far more workers being relocated within the smelter for high lead blood levels than there was going on compensation. The Union representative pointed out that, even though the company had a policy of relocating workers with high blood lead levels, workers were still being exposed to lead in the relocation areas.

The Labour Minister's plan of action was to call back the Joint Committee on Lead Hazards, provide more worker training courses, and have officials with the Compensation Board and industrial hygiene experts meet with local physicians.

Over the next year, the Joint Committee on Lead Hazards looked into how other jurisdictions, Compensation Boards and companies defined lead intoxication and handled compensation claims. Several subcommittees were also formed and they discussed the definitions and threshold values for acceptable and unacceptable lead-in-dust levels. The smelter's manager, P.L. Fowler, sent information to the Labour Minister on how occupational lead exposures were dealt with in England. Based on this information, he suggested a way for lowering the number of workers receiving compensation for high blood lead levels.

> "You will notice that they [Medical Service Division, Department of Employment, London, England] take a different attitude towards whether or not a person can continue in his normal employment when his blood lead levels are somewhat elevated. The emphasis is upon medical opinion based only in part upon blood lead levels. Further there is no indication that the employee should be necessarily re-employed in low exposure areas unless his blood lead levels reaches 120 mcgms.per 100 ml blood. In contrast a level of 80, and sometimes below is accepted in New Brunswick as being compensable."

> Based upon this information in this leaflet [from England] all of our employees currently on compensation or relocated to low exposure work would probably be permitted to work at their normal occupation if they were in England. As a matter of fact only 20% of our present compensation cases and 22% of our employees working, but relocated to low exposure areas, presently exceed the 80 mark."[96]

Fowler said that this type of approach should not "in any way cause us to relax in our efforts to provide the best environment for our employees that we can." But, he concluded, more stringent ways of evaluating exposure need to be established so that "compensation is only granted to those who are validly incapacitated as a result of their exposure."[97]

The medical subcommittee, of which the company doctor was a member, appeared to be on the same page. They reviewed the information from England and the province's Workmen's Compensation policy which said that when blood lead levels reach 80 µg/dl or more and there was a diagnosis compatible with lead absorption, a worker's claim would be accepted.[98] The medical subcommittee suggested an alternative policy.

If an employee tested high for lead, the employee should not be advised or told not to work, unless there is a "distinct clinical impression [their emphasis] of lead intoxication."[99] If that was the case, the company physician should be contacted, "preferably by phone" to look at the history of lead levels in the employee before deciding on a course of action.

By September 1973, the number of compensation claims paid out was beginning to drop. The previous year, 104 claims had been paid out. In September 1973 only 28 had been paid out.[100] Urine testing would begin at the smelter and lead levels in the smelter would be tested several more times by independent researchers over the next twenty years.

In 1987, a joint (industry-province) occupation health and hygiene study was done by McGill University. The study found that workers throughout the smelter were overexposed to levels of dust, SO_2, lead, cadmium, and arsenic.[101]

Three years later, Dr. Rosemary Marchant from Dalhousie University conducted a clinical health study of smelter workers.[102] She found that 26.3% of workers had lung abnormalities,

A 1990 study by a Dalhousie researcher, Dr. Rosemary Marchant, found that 26.3% of workers had lung abnormalities, 24% had unacceptable levels of lead, cadmium and arsenic in their blood, 69% had hearing problems, 23.6% complained of chest pains, 24.5% had joint and muscle pains, and 19.8% had severe itching of the skin.

24% had unacceptable levels of lead, cadmium and arsenic in their blood, 69% had hearing problems, 23.6% complained of chest pains, 24.5% had joint and muscle pains, and 19.8% had severe itching of the skin.[103] Marchant said it was difficult to predict what effects the metals would have in the long run, but, she pointed out that arsenic could cause lung cancer, cadmium could result in kidney disease and a combination of the metals could affect skin, lungs, kidneys, gonads, nerves, bones and muscles.[104]

The Dalhousie study resulted in more than 100 workers being flown by company plane to a special clinic in Baltimore for further examination. When they returned, several workers were put on long-term disability.

Despite the discovery of high lead levels in and around the Belledune school by the federal Department of Health and Welfare in 1968 and despite their recommendation for further investigations into lead pollution in the community, nothing of the sort would happen until 1982.

5. Fall-out

Louis Robichaud's Liberals lost the 1970 provincial election to Conservative leader Richard Hatfield. The following year, in the face of widespread public concern about environmental problems in the province and intensive efforts by the Conservation Council of New Brunswick, Hatfield created an environment department. It took a couple of years for the department and the staff to find its organizational and regulatory legs. By 1973, various legislation began rolling out (*Clean Environment Act* 1973, *Endangered Species Act* 1973, *Pesticide Control Act* 1973). The federal department of environment was also created in 1971.

Part of the leg-work that went into developing the province's first air quality regulations involved touring industrial facilities and gathering monitoring information. T.S. (Scott) Munro, an air quality engineer with the newly-formed department, was assigned the smelter.

After touring the smelter and reviewing the company's monitoring data, he submitted his report to David Besner, then Chief of the province's Air Quality Section. In his March 1973 report he said the company's data was difficult to interpret and was only useful in providing information on general trends. For example, the dustfall data showed that dust deposition was "highest southeast of Belledune," but, the data could not be compared to "any known standards."[105] He said no other jurisdiction calculated lead in dust like Noranda.

Munro also said the method used to measure SO_2 deposition was unreliable. When averaged over the entire year, SO_2 deposition was not a problem around Belledune Point. Although, he pointed out, during some months SO_2 levels were above the standard set by the Ontario Air Management Branch.[106] Several months later on a follow-up visit to the smelter, Munro reported "a very evident smell of sulfur dioxide downwind from the sulfuric acid plant at a range of about one half to one mile" and "a very dark plume associated with the lead refinery stack."[107] He noted there were no visible emissions from the stack with a new baghouse.

According to company data, the annual dust Fall-out within a kilometer of the smelter in 1971 was 624 tons per square mile,

Approximately one thousand people lived within a 3-km radius of the smelter. The Belledune school was less than a kilometre from the smelter.

Daily dust and lead released to the atmosphere from the Belledune smelter (kilograms/day)

	Dust	Lead
1968	3,500	2,270
1972	2,800	1,800
1975	1,000	500
1979	351	154

Source: New Brunswick Department of Environment and Brunswick Mining & Smelting Environmental Effects Monitoring Data

Annual air releases of arsenic, cadmium and zinc from the Belledune smelter (metric tonnes)

	Arsenic	Cadmium	Zinc
1975	23	6	41
1977	7	6	16
1979	4	6	10

Source: Brunswick Mining & Smelting Environmental Effects Monitoring Data obtained from New Brunswick Department of Environment

Lead in soils 1.6 km southeast of smelter parts per million (ppm)

Soil Depth	1975	1978	1980
0-5 cm	450	925	1135
5-10 cm	304	655	540
10-15 cm	290	605	275

Source: Brunswick Mining & Smelting Environmental Effects Monitoring Data obtained from New Brunswick Department of Environment

Guidelines for lead levels in soils parts per million (ppm)

Ontario Ministry of Environment Phytotoxicology Excessive* Levels for Surface Soils

	Urban	Rural
1978	600	200
1982	600	150
1989	500	150

**Excessive did not necessary mean toxic, but was evidence of contamination above normal levels.*

Canadian Council of Minister of the Environment Soil Quality Guidelines

	Residential	Agricultural
1990	500	375
2003*	140	70

**These are health risk-based guidelines.*

44 tons of that Fall-out was lead.[108] Within a 3-km radius of the smelter, the annual dust Fall-out was 212 tons per square mile of which 3.6 tons was lead. After the smelter was converted to a lead smelter and a new central baghouse was installed in 1973, dust Fall-out from the smelter dropped by 10% but lead levels increased by 25%. It was not until 1980 that more significant drops in dust and lead levels were recorded.

Approximately one thousand people lived within a 3-km radius of the smelter. The Belledune school was less than a kilometre from the smelter. In the fall of 1972, six years after the smelter began operating, the school was converted to a community centre and a new school was opened approximately 6 km west of the smelter.

SO_2, lead and dust were not the only pollutants routinely released from the stacks of the smelter. The earliest available information on releases of zinc, arsenic and cadmium was 1975, after pollution control measures were upgraded. According to company data, 24 tonnes of arsenic, 8 tonnes of cadmium and 41 tonnes of zinc were released into the atmosphere in 1975.[109]

As a result of the smelter's stack emissions, metals were building up in the soil. The provincial Agriculture Department, with the help of the federal agriculture department, had set up a soil sampling program in 1966.[110] Although there were farms one kilometer from the smelter, no soils were sampled within 8 km of the smelter. The sampling sites closest to the smelter were at Culligan (8 km west northwest) and Green Point or Pointe-Verte (8 km east southeast). The other six sites ranged from 10 to 43 km away from the smelter. The lead levels sampled at all sites ranged from 8.0 – 19.6 ppm. The two sites closest to the smelter, Culligan and Pointe-Verte had lead levels of 10.5 ppm and 11.4 ppm, respectively. Cadmium and arsenic levels were also sampled but none of this data appeared in published departmental reports.

Nine years later (1975), the sites were re-sampled. Lead levels at the Culligan site had tripled from 10.5 ppm to 31.3 ppm and zinc levels had increased from 91 ppm to 120 ppm. Downwind at Pointe-Verte, lead and zinc levels had almost tripled as well. Lead levels had increased from 9.6 ppm to 25 ppm and zinc had increased from 85 ppm to 227.5 ppm. Of all the metals measured and reported, only lead and zinc showed dramatic

increases. The agriculture department was not alarmed by these increases since the levels of lead in the soil were not high enough to kill or affect plant growth.[111]

In the absence of sampling sites near the smelter complex, there was no information about lead levels in soils where one thousand people lived within a 3-km radius of the smelter.

In 1973, company scientists began testing soil. They choose sites closer to the smelter as well as areas farther away. Initially they sampled soil using the same protocols as the province (testing soil down to 6 inches below the surface), but by 1975, they "felt that airborne contaminants would probably remain in the top soil" and modified their method.[112]

They sampled a top layer of soil two inches from the surface, a second layer 2-4 inches from the top and, a third layer, 4-6 inches from the surface. Consistently, lead, cadmium, zinc and arsenic levels in surface soils were two to eight times higher than levels at middle and lower depths depending on distance from the smelter. Test results were reported for all three soil depths until 1985.

Consistently, lead, cadmium, zinc and arsenic levels in surface soils were two to eight times higher than levels at middle and lower depths depending on distance from the smelter.

In 1986 and for all subsequent years, only one value for each soil sample was reported. (In 1988, smelter officials informed the province that the 1986 results had been "scrapped" and they were changing their sampling procedure to comply with Noranda, Ontario and U.S. methods and to stand up to "legal scrutiny."[113]) Like the provincial agriculture department, company scientists were not concerned with the rising metal levels in the soil since the values were well below the levels that could damage plants.[114]

Company scientists also began sampling grasses (forage crops) used to feed livestock in the area. Lead levels in forage varied throughout the growing season. In early spring and mid-summer, lead levels in forage was lower than in the fall. For example, lead levels in first growth forage sampled in 1973, 2-3 km east of the smelter, was 270 ppm (milligrams per kilogram). Forage crops harvested in the fall, for the same area, had lead levels of 1001 ppm.[115]

The reason for the increase in lead through the growing season was that lead, and other metals, accumulated within the plant tissues, as well as on the surface of the plant.

While lead levels in the soils of Belledune were not high enough to damage plants, the impact on those who ate the plants was an altogether different matter.

This point was made in a landmark study by D.W. Rains and published in the journal *Nature* in 1971.[116] The study was prompted by the death of 13 horses grazing in a pasture near a lead smelter 40 km northeast of San Francisco. Rains demonstrated that airborne lead can be absorbed through the plant leaves and transported to other parts of the plant like the stem, seeds, and roots. He sampled plants (wild oats) growing near a lead smelter. At the end of the growing season, the tops (seeds) of wild oats had 500 ppm lead. No amount of plant washing could remove the lead.

Belledune 1972

Subsequent research would find that plants with rough hairy leaves absorb 10 times more lead than plants with smooth waxy leaves.[117] Lead (and other metals) can also be taken up by the roots and moved to other parts of the plant. Factors that effect the absorption of lead through the roots included the organic content and the acidity of the soil. Plants grown in soil with a high percentage of decomposed plant matter (like manure or compost) will absorb more lead.

While lead levels in the soils of Belledune were not high enough to damage plants, the impact on those who ate the plants was an altogether different matter.

In 1973, the still new provincial environment department was contacted about dead sheep on a farm in Belledune.[118] The deaths were attributed to "fluoride and/or lead poisoning." The farm, owned by George Ellis, was located 2 kilometres downwind from the smelter. Ellis had noticed an increase in the number of lambs born sick and eventually dying since 1971. The sheep

also had a range of symptoms like involuntary muscle spasms, loss of appetite, decayed teeth and loss of wool. In 1972, nine lambs had died and in 1973, eight lambs had died.

Three years later, the environment department was approached again about dead sheep. The department tested the ponds on Ellis's property and the agriculture department sampled grain from a farm opposite the smelter. There was no evidence of elevated fluoride levels in the pond water, but, lead levels in the April pond samples were six to fifteen times higher than drinking water objectives for humans and two to seven times higher than water quality objectives for livestock.[119] The lead levels in the grain portion of the oats measured 120 ppm and 630 ppm in the stem portion.[120] The International Lead and Zinc Organization believed the minimum toxic/lethal concentration for lead in forage for cattle was 200 ppm and 160-900 ppm for sheep.[121] A month later, environment officials were informed that a veterinarian had stopped the sale of Ellis's sheep.[122]

When George Ellis was forced to stop selling sheep in 1976, environment staff recommended steps be taken to address the problem. A memo sent to the deputy minister of the environment department said the problem with Ellis's sheep had gone on long enough and was past due "for some action."[123] The memo recommended that the Department of Agriculture be designated the lead agency on this issue and that the environment department's role would be to monitor the forage on Ellis's farm and supply more information on the "air-forage-cattle chain."

The environment department would also take action to get more reliable information on SO_2 levels in the area. In a June 1978 letter to the smelter, John MacRae, an air quality engineer with the Department of Environment's Pollution Control Branch, asked the company to purchase new sulphur dioxide monitors. MacRae said the smelter's air quality monitors had been "virtually inoperational" for several years and when they did work the data was "somewhat less than reliable."[124] He said the department was flexible on the location and type of monitor, but the new equipment was "a necessity to monitor the effects of the smelter operation."

Lead in harvested forage (grasses) in Belledune parts per million (ppm)

distance (radius) from smelter	1973	1974	1975
0 - 0.8 km	1474	730	1668
0.8 - 1.6 km	239	256	311
1.6 - 3.2 km	226	183	347
3.2 - 8.0 km	98	94	93
8.0 - 16.0 km	136	45	49

Source: Hatch Associates Ltd. 1981. Environmental Impact Assessment for Proposed Electrolytic Zinc Reduction Plant, Belledune, New Brunswick. page 129

Minimum toxic/lethal concentration for lead in forage parts per million (ppm)

Cattle	200
Sheep	190

Source: Dugdale and Hummel 1978

"This [heavy metal contamination] problem has been followed by Fisheries Management and Environmental Protection Service for over a decade. Recent data provided by Noranda Research Centre indicate a critical worsening of the problem in so far as levels of cadmium and lead in certain commercial species are concerned."

Source: Briefing notes prepared by the Inspection & Technology Branch, Fisheries and Oceans, Ottawa, dated April 28, 1980 and obtained from Fisheries and Oceans Canada under federal *Access to Information Act.*

6. There's something about cadmium

On February 20, 1979, provincial newspapers announced that the province and the federal government were putting up funds for the design-phase of a zinc plant that had been proposed at the smelter since 1972.[125] The plant, proposed by Noranda, was technically called a zinc electrolytic plant for the type of processing method used to refine the ore concentrate. The site, just south of the lead smelter, had been selected in 1974 and a consultant (Hatch and Associates) had been hired to do a feasibility study.

Unlike when the lead smelter was built, the province now had a formal environmental impact assessment (EIA) policy. Instituted in 1975, the purpose of the EIA process was to give government officials and the public an opportunity to review the social, economic and environmental impacts of a proposed project before a final "go-no-go" decision was made on the project. Not all projects had to undergo an EIA. Major projects that were being sponsored or financed by government departments, Crown corporations or Commissions of the Province did require an EIA.

A little more than a year after the announcement about the proposed zinc smelter, W.C. (Bill) Ayer, Chief of the province's Environmental Impact Section, attended a meeting (April 10, 1980) with company officials and representatives of Environment Canada. The meeting had been called by the company to discuss the lead smelter's latest monitoring results. Their 1979 results showed an increase in the cadmium and lead levels in seafood, particularly lobsters and mussels.

Ayer was also shown a copy of a 1978 report by company's scientists that summarized four years (1972-1975) of monitoring data on lead and cadmium levels in marine life and garden produce in the Belledune area. The 1978 report was part of the published proceeding from an industry-sponsored cadmium symposium held in San Francisco in 1977. It was the first year for such a symposium. Ayer and his departmental colleagues had never seen the San Francisco report and it was the first time they had ever seen the company's seafood monitoring data.[126]

According to the smelter manager, Alan Young, the high cadmium levels in lobsters appeared "suddenly" in 1979, although,

they had noticed increasing levels of cadmium in mussels and clams the previous two years.[127] Perhaps one reason for the sudden increase in cadmium was that until 1978, the company had only been sampling lobster flesh. Those results had indicated that lead and cadmium were below or slightly above what the company identified as Canadian Food and Drug Directorate (CFDD) standards (10 ppm for lead and 1 ppm for cadmium). In 1979, the company began sampling the digestive gland (tomalley) of lobsters as well as the flesh. The 1979 results indicated that cadmium levels were 80 times above Canadian Food and Drug Directorate (CFDD) standards.

DFO was alerted to the situation and for the next two weeks confidential memos and correspondence passed between senior DFO and Health Canada officials. According to briefing notes prepared by DFO Inspection Branch officials, the metal contamination was not a new problem, "[t]his problem has been followed by Fisheries Management and Environmental Protection Services for over a decade. Recent data provided by Noranda Research Centre indicate a critical worsening of the problem in so far as levels of cadmium and lead in certain commercial species are concerned."[128]

The lobster season opened in early May and DFO needed to make a decision on whether the area around Belledune should be closed to lobster fishing and whether the cadmium levels in the lobsters posed a human health risk. DFO was concerned that closing "even a small portion" of the Belledune area would have short- and long-term consequences for lobster fishermen and other fisheries in the area. In the short-term, fishermen affected by a closure would likely have to be compensated. The bigger issue for DFO was the "severe socioeconomic and ecological consequences" if high levels of cadmium were confirmed. "Any sustained focus on cadmium in foods could result in developing regulated tolerance levels which could effectively remove a variety of fishery products, particularly lobsters over a wide area, from the market place. High levels of cadmium could raise havoc in European and U.S. markets."[129]

The company didn't deny it was responsible for the cadmium in the lobsters. The smelter manager said, "we're not disputing the fact the cadmium is a result of us."[130] Young believed the contamination was restricted to the harbour and that the lobsters had migrated into the area because spills from the fertilizer plant into the harbour had encouraged plant growth that attract-

"It's [Belledune Harbour] a bit of a haven. It's protected from the seas. You get fertilizer spill(s). This encourages undergrowth, plant life. That then attracts other animals and lobsters come in, as well, to feed. Unfortunately it sort of backfired on us."

Alan Young, Smelter Manager, *The Northern Light*, May 7, 1980.

"If the high levels of cadmium are confirmed, this could have severe socio-economic and ecological consequences... Any sustained focus on cadmium in foods could result in developing regulated tolerance levels which could effectively remove a variety of fishery products, particularly lobsters over a wide area, from the market place. High levels of cadmium could raise havoc in European and U.S. markets.

Source: Briefing notes prepared by the Inspection & Technology Branch, Fisheries and Oceans, Ottawa, dated April 28, 1980 and obtained from Fisheries and Oceans Canada under federal *Access to Information Act.*

ed other marine life. These animals in turn attracted the lobsters. Young said the harbour had inadvertently become "somewhat of the apple in the garden of Eden" thanks to the smelter's "sister company," Belledune Fertilizer.[131] He said he didn't know what levels of cadmium were dangerous to human health but a company scientist in Montreal had determined that "70 contaminated lobsters would have to be eaten before there would be any apparent increase in cadmium levels in an individual."[132]

In a confidential memo from the head of DFO's Fisheries and Environmental Research Section in Halifax to the Director of his section, Dr. Jack Uthe pointed out that the traditional way of eating lobsters was to eat the flesh and the tomalley.[133] According to his calculations, a person eating one lobster from Belledune harbour would ingest 2.5 - 7.5 milligrams (mg) of cadmium. He noted that the maximum intake of cadmium recommended by the World Health Organization was 0.4 -0.5 mg per week. He said it was extremely difficult to judge the effects of "slug doses" of 2.5-7.5 mg of cadmium ingested "a relatively small number of times per year but all essentially consumed within the short period of the lobster season."[134]

He pointed out that the kidneys were the main organs affected by cadmium and suggested that an immediate assessment of urinary protein [which was diagnostic of chronic cadmium-induced kidney damage] for individuals eating lagoon and harbour lobster was warranted.[135] He made a long list of recommendations including closing the harbour and lagoon to lobster fishing, having National Health and Welfare assess the human health hazard associated with eating lobsters from Belledune, reviewing metal discharges from the smelter and investigating metal levels in shellfish.

On May 8th, 1980, DFO closed the harbour and lagoon to fishing, declaring a one-mile area beyond the harbour a controlled fishing area. There was no public reaction from fishermen to the closure reported in the media. However, a Liberal opposition member of the provincial legislature, Rayburn Doucett, called on the provincial environment minister (Eric Kipping) and fisheries minister (Jean Gauvin) to provide assurances that lobster caught in the Bay were safe to eat.[136] Kipping responded by declaring publicly that he would eat the lobster "even within the one-mile control zone." He thought a person would have to eat lobster "a few times a day, every day of the year in order to be affected by the cadmium levels in the lobster."[137] DFO had a different view

of the matter. They said there were risks associated with eating five or six lobsters a week from within the control zone."[138]

Two weeks later after further sampling by DFO, the control zone was expanded to four miles. DFO bought all the lobster (25,000) caught within the four-mile zone.[139] The smelter took another 4,138 lobsters (equivalent to 6,780 pounds) from the lagoon and 22,100 lobsters (equivalent to 18,500 pounds) from the harbour and buried them. DFO had estimated there were 100,000 lobsters inside the harbour.[140] Although DFO viewed the company as being responsible for the contamination, they didn't think it was necessary to "hit responsible companies on the head" so they split the cost of compensating the fishermen.[141]

The lobsters bought by DFO were sent to a local fish processing plant. The plan was to process the lobsters separately but somehow the Belledune lobsters were processed and canned with other lobsters. DFO sampled the processed product and found cadmium levels above the action level of 0.1 ppm but decided to release the product for sale.[142] Publicly, DFO declared the lobster caught and processed were "totally safe."[143]

Staff with the Food Directorate at Health and Welfare Canada spent considerable time with Fisheries and Oceans staff trying to determine the safe levels of cadmium in lobsters. A year after the cadmium in lobsters was discovered, provincial environment officials were told that federal health officials "no longer considered [the CFDD Guidelines] as "guidelines" but "levels of concern."[144] Noranda was told that the department had never specified an "absolute tolerance" for cadmium in fish and shellfish.[145]

When asked by the media about the safe levels of cadmium for humans, Health and Welfare officials cited the "provisional tolerable daily intake" levels set the World Health Organization standard of 57 - 72 micrograms (µg) per adult.[146] Health and Welfare officials did not view this as a legally binding standard but a guideline for "making decisions" on whether to intervene if there is an unusual increase in cadmium content in food.[147] They had estimated that lobster digestive gland containing up to 40 µg/g (ppm) of cadmium (wet weight) posed "little consumer danger."[148] They did not identify safe levels of lead in lobster.

"I would, as an individual, eat the lobster even within the one-mile control zone... There are no standards of cadmium levels yet set. I think a person would have to eat lobster a few times a day, every day of the year in order to be affected by the cadmium levels in the lobster."

Eric Kipping, Minister, New Brunswick Environment Department. *The Northern Light*, May 14, 1980.

Mean Cadmium Level in Cooked Lobster Tomalley (Digestive Gland) Inside and outside controlled lobster fishing zone ppm wet weight (ppm)

	Inside Pointe-Verte (8 km southeast of smelter)	Outside Petit-Rocher (15 km southeast of smelter)
1981	54.6	not sampled
1982	23.4	14.0
1983	20.7	9.02
1984	17.3	7.90

Source: Uthe, J.F. and C.L. Chou. 1985. Cadmium in American lobster (Homarus americanus) from the area of Belledune Harbour, New Brunswick, Canada - a summary of five years study. Canadian Technical Report of Fisheries and Aquatic Sciences 1342: vi + 20 p.

Lead and Cadmium Levels in Blue Mussel Pointe-Verte (8.0 km southeast of smelter) ppm wet weight

	Lead	Cadmium
1972	10	0.6
1977	29	2.6
1978	15	2.2
1979	16	4.0
1981	17.1	5.9

Source: Report by R.L. Levaque Charron, Noranda Research Centre. May 1980. Ecological survey for Brunswick Mining and Smelting Corporaton Ltd, Belledune, New Brunswick; Brunswick Mining & Smelting Environmental Effects Monitoring Data obtained from New Brunswick Department of Environment.

1970 Canadian Food and Drug Directorate Guidelines "Poisonous Substances in Food" Sect. B 15.002 parts per million (ppm)

Lead	10 ppm
Cadmium	1 ppm

2005 Canadian Food Inspection Agency Action Levels for Fish and Fish Products parts per million (ppm)

Lead	0.5 ppm
Cadmium	no level specified

As for other seafood like mussels, there was a significant local commercial market, as well as a recreational harvest for personal use in the area.[149] Sampling by the company showed that lead and cadmium levels in mussels from Belledune harbour ranged from 50 to 100 times above CFDD guidelines. Further sampling showed that cadmium levels in mussels exceeded the guidelines as far away as 23 km east (down current) from the smelter. Food safety standards for lead were exceeded 13 km down current. Although mussel harvesting was banned in Belledune Harbour and Petit-Rocher due to fecal coliform contamination, areas between these points remained open to harvesting.

The discovery of the cadmium contamination of marine life in Belledune Harbour launched two decades of studies, monitoring and research in Belledune. A 1988 report on the status of metal build-up in the sediments of the Bay of Chaleur identified an area of high cadmium (and mercury) concentrations in the sediments at the mouth of the Bay.[150] The area of high cadmium coincided with the location of a unique oceanographic feature of the Bay known as a gyre.[151] Gyres are created when two currents from opposite directions intersect to create a whirlpool-like circulation pattern in the surface waters. The gyre entrains and traps contaminants, as well as phytoplankton, zooplankton and fish larvae. As a result, the metals sink and accumulate on the bottom.

More would be written about cadmium contamination in lobsters than any other contaminants from the smelter even though lead (and arsenic) releases were significantly higher in volume, involved more pathways for human exposure and covered a larger geographic area. In 1998/1999, as part of their 'Metals in the Environment (MITE)' initiative, the Geological Survey of Canada sampled the marine sediments in the Bay of Chaleur. The study found that emissions from the smelter had raised the concentration of lead, at least three to four times above pre-smelter levels, in surface sediment throughout the entire Bay of Chaleur as far away as 100 km east of the smelter.[152]

DFO officials hoped that within three years the controlled fishing zone would be decreased or completely eliminated once the pollution sources were identified and corrected. The harbour and lagoon were never reopened to lobster fishing and the lobsters caught in these waters are now incinerated at the smelter. Federal officials never issued any public bans on consuming clams or mussels between Belledune and Petit Rocher based on

metal contamination. They never told residents to refrain from eating lobster tomalley. To this day, Health Canada has not set enforceable standards for cadmium residues in seafood. They regulate levels of some metals (e.g., lead, arsenic, mercury, tin) in some foods (e.g., fish protein).[153]

"There's no question, we're not disputing the fact the cadmium is a result of us."

Alan Young, Manager, Brunswick Mining and Smelting. The *Northern Light,* May 7, 1980.

7. EIA policy put to the test

With dead sheep and contaminated lobsters in their wake, the company was pushing forward with plans to build a zinc plant and the consultants were pushing the province for an 'approval-in- principle' on their preliminary environmental assessment of the project.[154] Provincial environment officials had known about the zinc project since 1977 and, based on the information they had at the time, they thought the project needed an EIA (Environmental Impact Assessment).

They believed an EIA would be useful in "setting standards of operation for both smelters."[155] They had pointed out that the existing lead smelter had been in operation before the province's air quality regulations had come into effect (1973) and, therefore, the lead smelter was not subject to current approval procedures. The department was working with the company to upgrade the smelter's pollution control, particularly the acid plant, where SO_2 emission at times sent the monitors "off scale." They were also aware that if the zinc project went through a full EIA, they might discover problems, "specifically... lead," in the existing environment that could require regulations that would affect the "cost and possibly, feasibility" of the zinc project.[156] Still, they thought an EIA should be done.

Company consultants (Hatch and Associates) filed a preliminary description of the project and an environmental impact statement (EIS) in October 1979.

David Besner, now the director of the province's Environmental Services Branch, didn't mince his words in his review of the EIS. He said "the document virtually lacks even the crudest attempt to analyze the potential impact of these emissions, albeit they may [his emphasis] be minimal."[157] He was particularly disturbed by the fact that the report did not look at the interactions of SO_2 from the proposed zinc smelter with the existing lead smelter. Five months earlier, he had discussed the SO_2 problems at the smelter with company officials and he had expected to see these issues addressed in the preliminary assessment. An official with the province's department of Labour and Manpower thought it "interesting" that SO_2, dust, arsenic, cadmium and zinc levels outside the plant would be higher than those permitted inside the plant.[158]

With the "recent information on heavy metal build up in the ecosystems of the area" in mind, Bill Ayer, Chief of the Environmental Impact Section, prepared a memo to David Besner, "strongly" recommending a full EIA for the proposed zinc plant because the "possibility of project blockage and political difficulties is real" if it wasn't done.[159] He also outlined three options for avoiding an EIA.[160] These included grandfathering the project, ignoring the EIA policy or claiming funds provided by the province were not used for the project itself but for a feasibility study, which would not trigger an EIA.[161] If the "no-EIA" route was chosen, the staff recommended the project be grandfathered, exempting it from the EIA policy. Ayer noted this approach would not weaken the policy for future applications.

Ayer supported the staff's recommendation for a full EIA by suggesting that if the public found out about the heavy metal contamination in the shellfish, they "could block the project completely." He also noted that reversing or ignoring the EIA policy could be publicly "awkward." On the other hand, his memo noted that avoiding an EIA would save time on the project, avoid the loss of the smelter project if the markets for zinc changed and fulfill the promise of jobs and the smelter to the area if the project moved ahead.

The project did undergo an EIA as recommended by Ayer and his staff. On January 1981, Hatch Associates submitted their EIA report for review. According to the 220-page EIA, the new facility would be "state of the art" and the environmental controls on the facility would use "the most environmentally advanced" technology.[162]

The EIA acknowledged that the zinc smelter would be located in an area where the existing lead smelter and fertilizer plant had "caused stress on the air quality and marine biota in the environment."[163] It stated that heavy metals (including cadmium) in Belledune Harbour were "significantly higher than background levels." SO_2 levels were within maximum allowable limits but exceeded the 1-hour desirable limit 35 times in an 8-month period and lead, cadmium and other heavy metals in soil, garden produce, forage and other plants and animals near the Belledune were "elevated above natural background concentrations."[164]

The consultants believed the new project had been designed with these "sensitivities" in mind and predicted that the zinc

It is the recommendation of the staff that the possibility of project blockage and political difficulties is more real if an EIA is not conducted [on the zinc smelter]. ***Thus, an EIA is strongly advised."*** *[his emphasis]*

W. C. Ayer, Chief Environment Impact Section, Environment New Brunswick to David Besner, Chief Air Quality Section. Excerpt from a memo dated April 30, 1980, Subject: Belledune Zinc Smelter.

"The electrolytic zinc reduction plant will be superimposed on what is already a highly contaminated local environment; one which conservatively cannot be expected to improve through natural processes for many decades. ...[Belledune Mining and Smelting Corp. Ltd.] must assume major responsibility for the present contamination of the Belledune area and additionally they are required to convince the regulatory agencies that the project being proposed will not further deteriorate an already "stressed" environment."

Intergovernmental General Review Statement for the Environmental Impact Assessment on the Proposed Electrolytic Zinc Reduction Plant in Belledune, New Brunswick. February 1981. 43 p.

plant could be integrated into the environment without "significantly increasing the level of the current stress."

An inter-departmental and inter-governmental committee reviewed the EIA. Their comments were detailed in a 43-page report.[165] The opening paragraph of their review began by stating "there is an air of overstated optimism in this report which is neither in keeping with the purpose of an EIA nor with the facts which pertain to the existing problem at Belledune. Much of this optimism is based upon improvements being made to effluent treatment at the existing lead smelter which have nothing to do with the added stress that the proposed zinc industry will place on the local environment."[166]

The reviewers went on to say, "the electrolytic zinc reduction plant will be superimposed on what is already a highly contaminated local environment; one which conservatively cannot be expected to improve through natural processes for many decades." They concluded that because Brunswick Mining and Smelting were the owners and operators of the lead smelter, they had to "assume major responsibility for the present contamination of the Belledune area."

Government reviewers said that the seriousness of the environmental "stress" in the Belledune area had been "downplayed" in the consultant's report and that the "gravity of the situation" was not made apparent to anyone reading the EIA. They said the description of the existing environment in Belledune was "deficient and suspect" in several areas and that the facts were summarized in a manner that "incites the reader to wrong conclusions."

They singled out poor air quality and said that unless the company took action to improve the existing SO_2 conditions in the Belledune airshed, the provincial environment department might not be able to issue an air quality approval for the proposed zinc smelter.

The residents of Belledune area did get a chance to comment on the project at a public meeting held on August 26, 1981. According to the local newspaper, 200 people attended the meeting. The EIA document was largely unchanged from the report reviewed by the inter-governmental committee. Ten written briefs and several oral comments were made before a five-member panel composed of two representatives from Noranda

and two representatives of the provincial government and chaired by Lorio Roy, then assistant director of the Bathurst Campus of the New Brunswick Community College.

Earlier in the year, Noranda had arranged for a tour of a similar zinc plant in Valleyfield (Québec) for representatives of local groups. During the EIA public meeting, Edmond Vienneau, a representative of the communities of Madran, Alcida and Dauversire, reported on his tour of the Valleyfield facility. He said he toured the plant with his best suit on (presumably in reference to the cleanliness of the facility), visited a farmer half a mile from the plant and interviewed fishermen, sportsmen and plant employees. He said he was giving Noranda his vote of confidence.

Senator Michel Fournier of Pointe-Verte, speaking on his own behalf, noted that the technology and controls on the plant were "the most advanced available today" and said he relied on the contents of the environmental report." The Liberal Member of the Legislative Assembly for Nigadoo-Chaleur, Pierre Godin said he was "totally convinced" that because of the company's goodwill and the vigilance of government authorities the environment of Belledune could accommodate the zinc plant without fearing its ecological impact.[167]

The newspaper did not detail the environmental concerns raised by some presenters but made a point of reporting that these presenters also supported the project.

On November 13, 1981, Noranda issued a press release to announce a joint project with Heath Steel Mines Ltd to build a zinc reduction plant in Belledune. Despite the concerns expressed by inter-governmental review committee, the province signed off on the EIA and stated it would be contributing $13.25 million towards the $360 million project. The federal government would contribute $21.75 million. Premier Hatfield said it was "one of the best pieces of news for New Brunswick in many years."[168] Federal Finance Minister, Allan MacEachern, described the project as "the most important investment ever made on New Brunswick's north shore."[169] According to Pierre Marquis, President of the Chaleur Regional Industrial Commission, the project would have an "immediate economic impact of up to 1500 construction jobs over two and one half years and 400 permanent jobs thereafter." The start-up for construction was scheduled for May 1982.

"..lead levels in lettuce are more elevated than those of comparable background specimens, and particular care should be afforded the washing of this leafy vegetable."

P. Dugdale and B. Hummel, Brunswick Mining and Smelting and Noranda Research Centre. International Cadmium Symposium, San Francisco, January 31 - February 2, 1977.

8. Phantom health study

Provincial environment officials first learned of lead contamination in locally grown vegetables during the EIA of the proposed zinc smelter in 1981. Unbeknownst to the Minister and his staff, the smelter company scientists had been monitoring garden vegetables in Belledune since 1972.

The company had concluded that the garden produce was safe for consumption although the levels of lead in lettuce, beets and cabbage were over the Canadian Food and Drug Directorate standards.[170] They acknowledged that lead levels in lettuce were more "elevated" and had suggested to the delegates of an international conference that "particular care should be afforded the washing of this leafy vegetable."[171] They also acknowledged that their sampling program served as "a fair indicator of the extent of lead contamination by the smelter on the surrounding areas."[172]

And unbeknown to provincial environment officials, provincial health officials already knew about the heavy metals in vegetables and seafood in Belledune and had concluded there was a lead problem in Belledune.[173] Like the company, they did not inform residents of the contamination.

Provincial environment officials met with the province's assistant deputy minister of health, Dr. H.W. Wyile, to discuss the health implications of lead in garden vegetables in Belledune. Wyile told environment staff that he had been discussing the situation with Health Canada officials and they were concerned about the lead levels as well.[174] He said the population most susceptible to lead toxicity were children and pregnant women.

Wyile had asked federal health officials to assess the health implications of the lead contamination in Belledune based on the company's test results on lead levels in vegetables and seafood. He also asked to meet with them to discuss the protocols for doing "a full study of the effect of lead in the Belledune Area."[175] Wyile was contemplating a provincial-federal study that would involve random population blood sampling for lead analysis and extensive measurements to determine the total intake of lead by area residents. No mention was made in the memo of informing the residents of the health hazards of lead.

At the time Wyile made his request for information on health study protocols, there were hundreds of reports on the health and environmental impacts of lead in the scientific literature.[176] The long held belief that lead was a "normal" part of the environment and a natural constituent of the human body held in equilibrium by "absorption" and "elimination" had been dismissed. There were also dozens of studies on the impacts of lead smelters on human health.

Research had shown that lead levels in air, soil, plants, animals and human blood dropped with increasing distance from a smelter depending on local meteorological and geographic conditions. Children and adults living close to smelters had higher blood lead levels than those living further away.[177] Children of smelter workers had higher blood lead levels than children living the same distance from the smelter.[178] Studies done on smelter workers indicated they were at increased risk of respiratory and digestive tract cancers and had higher death rates from kidney and heart diseases.[179] Adults living near smelters had more than twice the rate of hospital treatment for heart disease and diseases of the circulatory and urinary system. Women had twice the rate of pregnancy and childbirth complications than a control population.[180]

On August 7, 1981, R.O. Read, Director of the federal Bureau of Chemical Safety at Health and Welfare Canada, sent Wyile the results of their assessment. They concluded that "a potential health risk to Belledune residents from lead exposure does exist" and the need to reduce the source of lead contamination was "of the utmost importance in the ultimate resolution of this problem."[181]

"As you will note, we have concluded that, based on all available information, a potential health risk to Belledune residents from lead exposure does exist. ... In the interim, the need to reduce the source of lead contamination appears to be the utmost importance in the ultimate resolution of this problem."

R.O. Read, Director, Bureau of Chemical Safety, Health and Welfare Canada to Dr.H.W. Wyile, Assistant Deputy Minister, Personal Health Services, New Brunswick Department of Health. Excerpt from a letter August 7, 1981.

Shortly thereafter, instead of a federal-provincial health study, the provincial health department decided to do a study on the heavy metal content of food and water in the Belledune region. They hired Dr. Don Ecobichon, a toxicologist in the Faculty of Medicine at McGill University. Ecobichon's co-investigator in the study was Ron Hicks, the province's Director of Public Health Inspection.

By the summer of 1984, environment officials began wondering about the status of the Belledune "health study" (as it was called by provincial officials). It had been three years since it had been announced and they hadn't heard a word. The Deputy Minister of Environment, B.B. Barnes, sent a memo to the

"The results reveal no significant contamination of water, vegetable and bovine milk samples in the Belledune region with the possible exception of zinc residues in leafy portions of vegetables."

D.J. Ecobichon and R. Hicks. 1986. Heavy Metal Content of Food and Water in the Belledune Region. Excerpt from the Summary.

Deputy Minister of Health, Claire Morris, requesting an update.[182] Morris responded by explaining that the samples collected in 1981 had not been analyzed because the refrigeration equipment in the Ottawa lab had broken down.[183] As a result, all of the department's samples, with the exception of well water, had been lost.

The study was re-launched in August 1985 and new samples were collected.[184] The majority of the garden vegetables, well water, human breast milk and cow's milk were collected away from Belledune. For example, only two samples of well water were collected within a 7-km radius of the smelter.[185] Garden vegetables were collected 8 km west of the smelter and 27 km southwest of the smelter near the village of Dunlop, west of Bathurst. The cow's milk was taken from bulk tanks that collected milk from 4-5 regional farms 8-10 km west of the smelter. Human breast milk was collected from 5-10 volunteers living 24 km southeast and 32 km southeast of the smelter. Teeth were collected from 15 children in an area they called the "Belledune region." They identified Harvey Station as their control site and had the well water, vegetables, cow and breast milk and children's teeth collected and sampled for the area.

Not surprising given the distance they sampled from the smelter, Ecobichon and Hicks concluded that there was "no significant contamination of water, vegetable and bovine milk samples in the Belledune region."[186]

The results of their study were shared with the Environment Minister's Belledune Environmental Monitoring Committee. Committee members recommended the study be peer-reviewed and sent to Health Canada for comments.[187] After reviewing the report, the director of Health Canada's Bureau of Chemical Safety said it was difficult to draw any conclusions from the study because there were problems with the sampling and analytical methods used in the study. The Director said, "the methodology utilized in the analysis of human milk has limits of detection for lead, arsenic and cadmium which are several orders of magnitude higher than recent literature values. A similar situation, albeit not to the same extent, would apply to the results for lead, arsenic and cadmium in bovine milk and cadmium in well water."[188] (Most scientific studies were measuring and reporting lead and cadmium in well water at levels above 0.005 and 0.002 milligrams per litre respectively. The methods used by Ecobichon and Hicks were not sensitive enough to

measure lead and cadmium at these levels.)

The Director of Environmental Protection Service for Environment Canada concurred with Health Canada's assessment of the study and said "the report does not provide evidence that a health hazard does not exist."[189]

The results initially revealed that the teeth from Belledune area children had moderate-to-higher levels of lead than those from Harvey Station.[190] Ecobichon and Hicks compared the Belledune results with teeth analyzed from Saint John and Fredericton and found high lead levels in these teeth as well. They suspected they had a laboratory error and re-analyzed the teeth using a new method. The results placed the lead levels in the teeth of New Brunswick children well below the results reported in nine other studies in six countries.[191]

The report remained a "Draft Report" and was never published. It continued to be referred to as a "health study" of the Belledune area. The residents of Belledune never saw the report.

"... the report does not provide evidence that a health hazard does not exist. ... Based on this review, I suggest that we hold off on recommending that this report be published until it is supported by data from future monitoring as described in the letter from Health and Welfare Canada."

John de Gonzague, Director, Environment Canada, New Brunswick District, to Cathy MacLaggan, Chairperson, Belledune Environmental Monitoring Committee, New Brunswick Department of Municipal Affairs and Environment. Excerpt from a letter date December 12, 1986.

9. Eyes wide shut: the monitoring years

The Belledune Environmental Monitoring Committee (BEMC) that reviewed the Ecobichon and Hicks report had been set up in 1981 by the province's environment minister, Eric Kipping, following the EIA for the zinc smelter. The first meeting was held in March 1982 and, according to the minutes, the Committee had been established "at the request of the general public for access to more information about the Belledune area."[192] Membership on the committee included representatives of the provincial health and environment departments, Fisheries and Oceans Canada (DFO), Environment Canada and Noranda officials.

The objectives of the Committee were to exchange monitoring information (e.g., air emissions and surrounding air quality, effluent quantity and quality, soil, vegetables and forage, lobsters and mussels, toxicity tests) coordinate requests from the public for information and make recommendations to the provincial environment minister and other government agencies concerning monitoring. It was expected that the improved coordination among agencies would result in an improved response time "between detection of environmental and/or health concerns and mitigatory action."[193]

The provincial environment department had responsibility for enforcing air quality standards under the province's *Clean Air Act* and for ensuring that the smelter met the operating conditions outlined in their Approval to Operate. Environment Canada had responsibility for enforcing the *Guidelines for Liquid Effluents from Existing Metal Mines*. The guidelines were part of federal government's *Metal Mining Liquid Effluent Regulations* (SOR/77-178) under the *Fisheries Act* which came into force on February 25, 1977. The guidelines outlined the allowable levels of arsenic, copper, lead, nickel, zinc, radium 226 and total suspended solids in the effluent, as well as the allowable limit on the effluent's pH. The provincial environment department required the smelter to meet the federal guidelines by including them in the smelter's Approval to Operate. The smelter's permit to operate came up for review and renewal every five years.

The DFO had responsibility for enforcing various sections of the

Fisheries Act including the habitat alteration or destruction provisions of the *Act*, section 35. They also had responsibility for testing seafood for chemical, drug and pesticide residues. In April 1997, this responsibility was transferred to a newly created federal agency, the Canadian Food Inspection Agency.

BEMC met faithfully every year for the next 15 years. The meeting minutes were not publicly circulated or released, although it was the Committee's stated policy that minutes would be released if a request was made. Soil, garden produce, seafood, air quality and effluent monitoring results and the results of company and government-sponsored studies were shared at these meetings. The company reported changes in management, upgrades on the lead smelter and progress on the development of the zinc plant. The company also reported spills, leaks, equipment failures and inefficient pollution controls at the smelter and acid and fertilizer plants. Exceedances (violations) of provincial and federal guidelines were also reported.

The smelter had a particularly difficult time meeting the federal effluent guidelines even though a new effluent treatment system was installed in 1980 after the cadmium contamination of lobsters was discovered. The new system significantly reduced the amount of lead, zinc, cadmium and suspended solids discharged into the Bay but arsenic discharges remained relatively high.[194] Twice a year, Environment Canada sampled the various effluent sources at the smelter (e.g., East Ditch, West Ditch, cooling water discharge, clarifier overflow and final effluent pipe to the Bay) and conducted toxicity tests on the final effluent entering the Bay. Each year, the effluent failed one or both of those tests. Either the metal levels (particularly arsenic) and/or the pH levels were high and/or the effluent failed the toxicity test.[195] In 1987, perhaps exasperated by the slow pace of improvement in the smelter's effluent quality, Roy Parker, head of Environment Canada's Mineral Industries and Toxic Studies Section in the Atlantic Region, made a suggestion to the BEMC members. He said there was a need to evaluate why monitoring was being done.[196] In his view, the purpose of non-compliance monitoring was to test a hypothesis or reach a stated objective.[197] Presumably for Environment Canada, the objective of monitoring was to assess progress towards achieving compliance with regulations.

The smelter's effluent continued to violate federal standards in 1988, 1989, 1990 and 1991.[198]

Annual metal releases from the smelter to the waters of the Bay of Chaleur metric tonnes (mt) per year

	1980 Prior to new treatment system	1981 After new treatment facility
Lead	8.30	0.25
Cadmium	24.67	0.74
Arsenic	27.33	6.00
Zinc	62.60	2.52
Suspended Solids	854.00	17.08

Source: Hildebrand, L.P. 1984. An assessment of environmental quality in the Baie Des Chaleurs. Environment Canada. EPS- 5-AR-84-8., p. 51.

"... the compliance sampling conducted by Environment Canada at the Belledune lead smelter in 1991 showed the final effluent to be highly toxic to rainbow trout. ...Environment Canada considers those results to be unacceptable under section 36(3) of the Fisheries Act. Appropriate actions must be taken to make sure this situation is corrected."

André Gauthier, Project Engineer, Mining Industries & Toxic Studies section, Environment Canada to Mike Murphy, New Brunswick Department of Environment. Excerpt from a letter dated December 9, 1991.

In December 1991, Environment Canada sent a letter to the province's environment department stating that it considered the results of compliance sampling at the smelter to be "unacceptable under section 36(3) of the *Fisheries Act*" and that "appropriate actions must be taken to make sure this situation is corrected."[199] The letter went on to say that "to be consistent with our "one-window" approach to environmental compliance, we would like to discuss this further and review available options with you. Since we feel it is important at this time to notify BMS [Brunswick Mining and Smelting] officials of our concerns, we are also sending a copy of this letter to them."[200]

Earlier at the October 1991 meeting of BEMC, the company acknowledged having difficulty "achieving desirable results" and said that water management problems were "very complex" and required "extensive capital expenditure and time."[201] They said they were organizing an "immediate action plan" to solve the problems.[202]

The smelter's effluent failed toxicity tests in 1992, 1993, 1994, 1995 and 1996.[203]

In May 1996, Environment Canada began a nationwide multi-stakeholder consultation to examine its options for reducing the release of toxic substance (metals) to air and water from the base metal smelting sector.[204] Nationwide, lead releases to the air and water between 1988-1995 were higher than any other metals released. Under the *Fisheries Act*, the concentration of metals permitted to be discharged had not changed since they were first established in 1977. Since then, lead, mercury, inorganic arsenic compounds, inorganic cadmium compounds, and various nickel compounds had been declared toxic under the *Canadian Environmental Protection Act (CEPA)*. Arsenic and nickel compounds had been declared a human carcinogen and cadmium was found to be a probable carcinogen. Longer-term exposure to organic or inorganic mercury was found to cause permanent damage to the brain, kidneys and developing fetuses. Chronic exposure to lead, even in small amounts, was found to cause blood, kidney problems and neurological disorders.

In addition under *CEPA*, both the federal ministers of environment and health were responsible for the "effective management of substances declared toxic under *CEPA*."[205] Environment Canada was responsible for reducing releases and impacts to the

environment and Health Canada was responsible for reducing human exposure to toxic substances. Following the May 1996 meeting, consultants were hired and more consultations were convened.[206] The effluent regulations remained unchanged.

Smelter effluent failed toxicity tests in 1997, 1998, 1999, and 2000.[207] On January 31, 2001, Environment Canada issued a warning letter.[208] The effluent failed the toxicity in May 2001 and finally passed tests in 2002 and 2003.[209] The metal effluent regulations for base metal smelters are still unchanged.

The effluent from the smelter was not the only discharge in the Bay of Chaleur from the complex of industries owned by the company. The adjacent fertilizer plant also discharged metals and arsenic into the Bay. Between 1974-1977, the annual metal and arsenic discharges to the Bay were approximately 17 tonnes.[210] By 1980, the amount of arsenic, copper, lead and zinc discharged dropped in half but there was less improvement in cadmium releases.[211] By far, the largest volume of pollutants from the fertilizer plant was gypsum (calcium sulphate). For each tonne of fertilizer produced, four tonnes of gypsum were discharged into the Bay.[212]

The effluent from the smelter was not the only discharge in the Bay of Chaleur from the complex of industries owned by the company. The adjacent fertilizer plant also discharged metals and arsenic into the Bay.

In 1965, company engineers building the plant had been optimistic that the massive volumes of gypsum would dissolve quickly and disperse widely in the Bay. The federal fisheries department gave the plant an approval to discharge on the condition that, if there was evidence the effluent was endangering "fisheries resources," a treatment facility had to be installed.[213]

Two years after the fertilizer plant began operating, an underwater survey around the harbour found that gypsum was accumulating at the end of the effluent pipe. The pipe was located just outside the breakwater at the Belledune Point wharf. The gypsum had coated the bottom in a 200-metre radius of the discharge pipe.[214] A toxicity test showed the gypsum was extremely toxic to marine life.[215] A 1980 consultant's report found that the benthic (bottom) community within 230 metres of the outfall had been seriously affected by the smothering effects of the gypsum. Changes in the habitat had occurred 400 metres from the outfall but they were considered "not major."[216]

By 1985, the gypsum bed covered 31 hectares. This included a 14-hectare "mixing zone" containing 1-10% gypsum.[217] The gypsum pile or delta (as it was sometimes called) had a volume

"As you are aware, the growing gypsum pile is getting much larger and more visible and there are strong concerns by the local fishermen about this that are being registered in this office and in Ottawa. This problem has been addressed every year for the past 6 years at the BEMC [Belledune Environmental Monitoring Committee] meetings and the company has continually made promises to find a solution... and still no results. As mentioned at the meeting, this cannot continue! [his emphasis]"

John A. Legault, Head, Habitat Planning and Inventory, Fisheries and Oceans Canada, Moncton, to Insoon Lee, General Manager, Brunswick Mining and Smelting Corporation Ltd. Excerpt from a letter dated September 27, 1989

of 600,000 cubic metres (m^3). The depth of the gypsum at the end of the effluent pipe was 12 metres. According to company officials, the bed was growing in size at a rate of one hectare per year and the volume of the bed was increasing by 35,000 m^3 a year.[218] The suspended solids in the gypsum were five times higher than earlier (1965) tests. The fluoride concentrations in the gypsum were 5–10 times higher than predicted in 1965.[219]

As part of cost-cutting measures, the fertilizer plant proposed making changes to their manufacturing process.[220] In 1985, Environment Canada did a study on the potential impacts of these proposed changes and predicted that fluoride concentrations in the effluent would increase.[221] The amount of suspended solids would increase as well. Toxicity tests done prior to the changeover in production indicated that the effluent was acutely lethal to amphipods and lobster larvae.[222] There were no federal effluent standards for fertilizer plants for Environment Canada to enforce. The change-over went ahead anyway.

At the June 1989 BEMC meeting, the company reported that the gypsum pile on the bottom of the Bay of Chaleur had increased in volume from 860,000 m^3 to 950,000 m^3 over a five-month period (June to November 1988).[223] The increase in volume was attributed to a leak in the line which had taken some time to find. Frustrated with the lack of progress in the solving the gypsum problem, DFO sent a letter to the company's general manager, Insoon Lee. John Legault, Head of DFO's Habitat Planning section, wrote, "As you are aware, the growing gypsum pile is getting much larger and more visible and there are strong concerns by the local fishermen about this that are being registered at this office and in Ottawa. This problem has been addressed every year for the past 6 years at the BEMC meetings and the company has continually made promises to find a solution... and still no results. As mentioned at the meeting, this cannot continue! [his emphasis] These issues will have to be addressed and the company could be obligated to find other disposal techniques... to alleviate the problem of the pile."[224]

At the time, the company was using scallop draggers to shift the volume of the gypsum pile. DFO disapproved of the method but acknowledged there was no other alternative.

In 1996, the fertilizer plant stopped operating and the company converted the facility to a battery recycling facility. The volume

of the gypsum pile was estimated to be 1,000,000 m^3. Prior to the plant closing, DFO met with company officials and Ports Canada officials to discuss how to deal with the gypsum pile. The company agreed to apply to DFO for an authorization under the habitat alteration or Section 35(2) of the *Fisheries Act* which would require them to develop a "compensation plan" for the damage.[225] The company proposed constructing an artificial reef to create new lobster habitat in exchange for the area (25 hectares) smothered by the gypsum.

In order to proceed, Ports Canada had to acknowledge in writing the existence of the gypsum pile on their property. According to the minutes of a meeting between DFO and company officials, Ports Canada had yet to acknowledge the presence of the pile and it appeared they were unlikely to do so, "fearing that responsibility for the pile would rest with [the port] rather than BM&S [the smelter company]."[226] DFO was not concerned with who accepted responsibility, they simply wanted to "bring closure to the issue of habitat destruction" and "satisfy DFO's policy of No Net Loss of fish habitat."[227] A compensation plan is still being negotiated.

On a calm day, residents say that the large expanse of the gypsum bed on the bottom of the Bay of Chaleur can be seen by peering over the side of a boat. The sea bottom is white and looks as if it were paved with concrete. What the residents couldn't see were the results of metal monitoring in their seafood.

"Regardless of whether or not the Province or CPC (Canada Port Corporation) eventually accepts responsibility for the [gypsum] pile, DFO's main concern remains the compensation for the fish habitat impacted by BM&S' [Brunswick Mining and Smelting] fertiliser plant. M. Allain [DFO] stated that the artificial reef would hopefully bring closure to the issue of habitat destruction for all parties involved and satisfy DFO's policy of No Net Loss of fish habitat."

Excerpt from notes of a meeting between DFO and Brunswick Mining and Smelting in Moncton. January 16, 1998.

10. More smoke on the horizon

In 1987, Frank McKenna swept into political power. Canada and New Brunswick were experiencing a wave of increased public environmental awareness. While the zinc plant was still under development, the Province announced plans to build two coal-fired power plants in northern New Brunswick. Just days after the EIA for the power plant was submitted for departmental review, and prior to its public release, the Chairman of New Brunswick's Electric Power Commission, Rayburn Doucett, announced that Belledune would be the site for the power plants.

According to Doucett, Belledune had been chosen because the cost of building the plants in Dalhousie would have been higher and the environmental impacts on Belledune residents from the new power plant would be limited.[228] Dalhousie already had a coal-fired power plant and Saint John had been ruled out because of environmental concerns. Doucett was confident the new plant would meet a federal-provincial agreement to reduce emissions causing acid-rain by 1994. As for the EIA process and public hearing, Doucett hoped it would be completed in time for cabinet to give the project a go-ahead. Elizabeth Weir, leader of the province's New Democratic Party, criticized the decision to announce the project before the EIA process had run its course. Weir said it "undermined the integrity of the EIA process."[229]

The power plant project in Belledune was described as "one of the largest in the province's history" and was estimated to provide 1,200 construction jobs and a permanent workforce of more than 300, including jobs related to the docks where coal would be unloaded.[230] Donald Bishop, general manager of the Chaleur Regional Development commission said the project would be "a magnet," bringing new people, new technology and new business to the region. He said it would be difficult to deny that the Bathurst-Belledune region was due to become "a major industrial player in the province." The first plant would start operating in 1993 and the construction of the second unit would depend on the power market. According to Doucett, NB Power officials were "beating the bushes in New England" trying to get firm contracts to justify building the second unit.[231]

Like the zinc smelter, the EIA for the coal-fired power plant was reviewed by inter-governmental and inter-departmental committees.[232] Consultants who prepared the EIA for the power plant, Washburn & Gillis, concluded there would be no impacts to the environment and there would be no violations of the province's one-hour air quality standards for SO_2.[233] As for metals from the plant, the consultants said the power plant's emissions would be a fraction of the metal emissions from the smelter and "may not be detectable against existing background."[234]

The province and the federal government had signed an acid rain agreement in 1987 that limited New Brunswick to the release of 185,000 tonnes of SO_2 by 1994, of which N.B. Power had been allocated 130,000 tonnes. Environment Canada was concerned the province would not meet that target and that the facility might not meet the federal government's air quality guidelines for new power plants.[235] They pointed out that even without the addition of the power plant, current provincial SO_2 air quality guidelines were being violated in Belledune.

Environment Canada's meteorologist for the Atlantic Region, B.L Beattie, repeatedly pointed out that the EIA's predictions of total sulphur deposition in the area were wrong because it failed to consider background levels.[236] Just like the EIA for the zinc smelter, the EIA for the power plant made predictions about air quality and contaminant releases to the area as if the power plant was the only pollution source in the area. Beattie said that "even though individual sources may not exceed the target loading [for SO_2], the total predicted wet deposition in the area definitely does."[237] Environment Canada did acknowledge that the power plant was not responsible for the high background levels of SO_2, but it could be the "straw that breaks the camel's back."[238]

Environment Canada officials were also concerned that sulphur releases from the power plant could have transboundary effects, pushing sulphur loading in Québec over target levels. They recommended the consultants examine alternatives for reducing SO_2 loading other than limiting the sulphur content of fuel and constructing a 168-metre stack.

The provincial environment department's response to Environment Canada's was to say that NB Power was committed to meeting the air quality standards legislated by the province, not the federal standards.[239] As for the incorrect predictions for

"Given the fact that provincial sulphur dioxide ambient air quality objectives are currently being exceeded in the Belledune area, the proponent should discuss the SO_2 components of the Thermal Power Generator emissions - National Guidelines for New Stationary Sources. The proponent is encouraged to comply with the SO_2 provisions of this document."

Excerpt from Environment Canada's technical review of the EIA for the proposed Belledune coal-fired power plant. May 9, 1989.

total sulphate deposition for the area, they had no comment.

Consultants for the power plant dismissed the need for installing scrubbers because it wasn't cost effective. They said that for the small amount of SO_2 that would be removed, it would be an "unreasonable and unjustifiable cost burden to electricity consumers."[240]

Unlike the low-key public consultation for the zinc plant, the power plant proposal attracted significant public attention because of concerns over air quality in the region. Two days of public hearings were held at the Belledune Community Centre, formerly the school, in October 1989. Representatives from twenty-eight environmental, economic, trade and social groups in New Brunswick and Québec made presentations.[241] They were almost unanimous in their opposition to the project unless the plant was required to install scrubbers.[242] A senior NB Power official, Darrell Bishop, told the hearing participants that the amount of SO_2 generated from the plant, without scrubbers, would be like "taking a teaspoon of sulphate and sprinkling it over a hectare of land once a week."[243] Because of Belledune's close proximity to the ocean, Bishop also said much of the SO_2 would end up over ocean waters which have "excellent buffering capability."[244]

On November 16, 1989, Premier McKenna announced the construction of one power plant, with a scrubber.[245] Despite the scrubber, violations of the province's one-hour SO_2 standard were an annual occurrence in Belledune.[246] Under the province's *Clean Air Act*, the permissible SO_2 levels in Belledune are twice the level permitted in southern New Brunswick.

As for the zinc smelter, $10 million was spent clearing the site and laying the foundation for the facility before the company quietly abandoned the project in 1990 due to poor economic conditions.

"... operating the [proposed coal-fired power] plant without a scrubber would be akin to taking a teaspoon of sulphate and sprinkling it over a hectare of land once a week."

Darrel Bishop, Director of Planning and Environmental Affairs, NB Power, speaking at a public hearing in Belledune to review the EIA for the proposed power plant. *Telegraph-Journal*, October 13, 1989.

New Brunswick SO_2 Air Quality Standards parts per million (ppm)

	Saint John	Belledune
1 hour	0.17	0.339
24 hour	0.113	0.056
1 year	0.012	0.023

11. Inconvenient truth

The 1987 federal-provincial acid rain agreement ushered in a new public and governmental awareness of the environmental impacts of air pollution. The province established an air quality monitoring network throughout the province including the Belledune area.

The air quality monitoring network, as well as staff changes, prompted a review of the monitoring information available in the Belledune area. The goal of the review was to summarize the data and identify gaps where additional information or analysis was needed. Wilfred Pilgrim, a technician in the department's air quality section, was put in charge of compiling and reviewing the monitoring data for Belledune. He had done field work in the area and was familiar with the department's work in the area.

In the first draft of the report, Pilgrim pulled together a wide range of government and company monitoring data from the Belledune area.[247] He reviewed the results of the 1986 Ecobichon and Hicks report, which he characterized as a "community health study," and said the small sample size in their study made the results inconclusive. He included information from the 1990 occupational health study by Dalhousie University as well as information from the scientific literature on the impacts of smelters on human health. In the first draft of his report, Pilgrim said that the "heaviest contamination was restricted to within 2.2 km of the smelter, but elevated levels of lead and cadmium were observed at one site 9 km from the smelter and excessive lead and zinc within 30 metres of the railway."[248] Lead and zinc ore concentrates had been transported in open rail cars to the smelter and port in Dalhousie for years before the problem was identified and later solved.

Pilgrim concluded his 1991 draft report by stating that "although atmospheric emission of contaminants by Belledune smelter operations meet the emission guidelines, the perception that this implies a healthy environment is not accurate."[249] He went on to make several specific recommendations including:

- testing lead and zinc dust levels in homes within a 10-km radius of the smelter and homes within 100 metres of the railway;

"Information gathered by the New Brunswick Department of the Environment has confirmed contamination from the lead smelter at Belledune of vegetation and snow by heavy metal air emissions and railway transport of lead concentrate. Heaviest contamination was restricted to within 2.2 km of the smelter but elevated levels of lead and cadmium were observed at one site 9 kilometers from the smelter and excessive lead and zinc within 30 meters of the railway."

Excerpt from the summary of Pilgrim's 1991 report on Monitoring Heavy Metals Near Belledune Lead Smelter 1980-1991.

"There is clearly evidence that there is a problem in the Belledune area.

"Publication [of Pilgrim's report] may bring about the desired result (which I assume is support for further study) but the process could be long and messy, with a lot of casualties. I would not rule out the possibility of legal action by Brunswick Mining and Smelting."

Excerpts from a memo from Paul Monti, Senior Policy Advisor Department of Environment, to Jim Knight, Director, Air Quality Management Section regarding Pilgrim's 1991 Belledune Bio Monitoring report. September 12, 1991.

- testing body burdens of lead in residents living within a 10-km radius of the smelter;
- a joint study between provincial health and environment departments;
- enclosing railway cars;
- establishing a 100-metre buffer to separate farms from railway tracks;
- an animal health survey for farms along the railway;
- a wildlife monitoring program to sample for heavy metals; and
- a company-funded public education program to increase residents' and workers' awareness on contamination prevention.

The report went through a departmental review. Paul Monti, the environment department's senior policy analyst, raised concerns about the "structure" of the report and its conclusions. In a memo to the manager of the department's air quality section, Monti acknowledged that Belledune was "one of the most seriously polluted areas of the province."[250] He said there was "clearly evidence that there is a problem in the Belledune area" and that "substantial additional investigation" was justified.[251] None of this information had been passed on to local residents.

Monti went on to say the report as written could be "open to misinterpretation by the press and the public, and criticism by those who are implicated as responsible." He said that publication of the report may bring about the desired result, which he assumed was support for further study. However, he said, "the process could be long and messy, with a lot of casualties. I would also not rule out the possibility of legal action by Brunswick Mining and Smelting."[252]

Pilgrim produced a second draft of the report on October 1992.[253] Gone from the summary was any reference to elevated lead and cadmium levels 9 km from the smelter. The sections providing general information on lead and cadmium toxicity in humans and animals were also gone from the report. The recommendations remained largely unchanged from the first draft.

The second draft was sent to the provincial health department for review and comments. Mark Allen, Director of the province's

Community and Environmental Health Unit, sent the report to D.J. Ecobichon, the McGill University professor hired by the department to do the 1986 study in Belledune. Ecobichon was still on the government payroll and he suggested to Allen that Pilgrim's health conclusions and recommendations be changed because he was concerned about what the report might "commit us to do."[254]

Ecobichon saw no need for further human health studies and said that all of Pilgrim's health recommendations should be deleted. Despite having done no studies on the health risks from metal contamination in the Belledune area, Ecobichon suggested changing Pilgrim's conclusion from, "There is a need to continue and expand studies on the chronic and acute effects of lead on community residents of the Belledune area, and to further explore arsenic and cadmium levels in humans.," to read, "There is little current evidence that the heavy metals (lead, zinc, cadmium) and arsenic are posing any hazard to human health at the concentration found in water, vegetables and milk (bovine, human)."[255]

Mark Allen from the province's Community and Environment Health Services sent a memo to Jim Knight, head of the environment department's Air Quality Planning Section about Pilgrim's report. Allen reiterated Ecobichon's recommendations. He told Knight that he was concerned about the "expectations" the report's "conclusions and recommendations may create." He saw no need to conduct further studies in the Belledune area. He was unaware of "any acute effects of lead exposure" in the region and didn't think there was a need for more health studies.[256] He supported Ecobichon's proposed changes to the conclusions.

At the October 1993 meeting of the Belledune Environmental Monitoring Committee, Pilgram made a motion that the Committee recommend to the Minister of Environment (then Jane Barry) his report be released.[257] The motion was carried, but, smelter representatives said they wanted to see a copy before it was released. The Committee agreed.

The final version of the Pilgrim report bears the date 1995.[258] As suggest by Ecobichon and endorsed by Mark Allen, the conclusions about human health in Belledune were changed and the original detailed health recommendations were deleted. The conclusion about human health in the Belledune area said that

"There is a need to continue and expand studies on the chronic and acute effects of lead on community residents of the Belledune area, and to further explore arsenic and cadmium levels in humans."

Human health conclusion and recommendation in W. Pilgrim's October 1992 draft report on heavy metals monitoring in Belledune.

"There is little current evidence that the heavy metals (lead, zinc, cadmium) and arsenic are posing any hazard to human health at the concentration found in water, vegetables and milk (bovine, human)."

Dr. D. Ecobichon's suggested change to the conclusion in Pilgrim's report as outlined in his memo to Mark Allen, Director, Community and Environmental Health Unit. May 26, 1993.

"Community health studies conducted by [New Brunswick Department of Health and Community Services] in the Belledune area in the early 1980s did not identify any risks to community residents."

Final version of the conclusion in Pilgrim's report (1995).

the "community health studies" done by the provincial health department "did not identify any risks to community residents."[259]

A portion of Wilfred Pilgrim's report was published in a scientific journal in 1994. Pilgram and a colleague in his department, Robert Hughes, published the results of lead, cadmium, arsenic and zinc in snow and grass in the Belledune area and along the railway between Bathurst and Dalhousie.[260] They reported that cadmium and lead levels in grasses were above acceptable levels 4 km northwest of the smelter. No test results were reported 4 km southeast of the smelter. Lead and cadmium in snow were above the 'upper limit of normal' up to 5 km from the smelter. The conclusion in Pilgrim's and Hughes' paper simply repeated the officially sanctioned conclusion that a "community health study" done in "early 1980 did not identify any risks to community residents."[261]

12. Digging up the dirt

Four decades after Premier Louis Robichaud cut the ribbon on the Belledune smelter heralding a new era in the economic growth of northern New Brunswick and a decade after the construction of the Belledune coal-fired power plant, another economic development project for the region was announced in 2003 – Renviro Park.

The political leadership of the province was now back in Conservative hands led by Premier Bernard Lord. Like the lead smelter, zinc smelter and power plant before it, Renviro Park was expected to bring "millions of dollars and thousands of jobs to the area."[262] The purpose of the Park, announced in March 2003, was to attract companies involved in 'recycling', whether tires, cars or contaminated material. Rayburn Doucett, president of the Park's board of directors said, "with this facility, I believe we have created a new blueprint for commercial growth and development."[263] In a promotional flyer, the genius of Albert Einstein and vision of American essayist Wendell Berry were invoked to promote the new "blueprint."[264]

The centerpiece of Renviro Park, located on land formerly owned by the smelter and the nearby federal Port Authority, would be a high temperature thermal oxidizer (popularly known as a hazardous waste incinerator)[265] owned by Bennett Environmental. The project was exempted from the provincial EIA process after a last minute change transformed the proposal from a facility burning PCBs, similar to their facility in Saint-Ambroise (Québec) and one they had proposed in Kirkland Lake (Ontario), to a facility that would burn creosote and non-chlorinated hydrocarbons. Instead of an EIA, the provincial environment department imposed a series of conditions the company had to meet in order to get an operating license.

Danny Ponn, then Vice President Engineering and CEO for Bennett Environmental, received a draft copy of the conditions and discussed them with staff from the province's economic development department (Terry Steeves and John Thompson). Ponn told them that he, and their consultant (Jacques Whitford), preferred doing a health and environmental assessment on the "incremental" contribution of the facility's emissions and not a cumulative assessment which would take into account impacts from the smelter and other operations in the Belledune area as

well as their own facility.[266] Ponn said that some results from their human health risk assessment (NHRA) had already been completed and that the "real HHRA" would be done sometime in the future when "real test burn and or operating data from the facility" were available.[267] He asked Steeves and Thompson whether "we can get consensus" from the departments of environment and health on this condition. Consensus was achieved. The final conditions issued by the Environment Minister required an "incremental impact" assessment of emissions from the Bennett facility and not a cumulative impact assessment.[268]

The Conservation Council of New Brunswick, the province's oldest and internationally-recognized environmental group, was approached by a citizen's group in the area to review the studies done for the incinerator. Conservation Council staff identified several concerns and brought them to the attention of the environment and health ministers.

A key concern was the source of the data used to represent background levels in Belledune. According to the consultants, background levels in Belledune were based on soil and air data obtained from "underdeveloped areas (e.g., woodlot, rural parkland) away from any known point sources of pollution."[269] They said that the "risk attributed to 'background' were calculated by eliminating the facility emissions and then running the human health risk assessment (HHRA) exposure model based on ambient soil and air concentrations obtained from various jurisdictions, including southern New Brunswick and northern Ontario."[270]

The Bennett health risk assessment concluded that emissions from the facility were "less of a risk than the current background [SO_2 and particulate] air concentrations."[271] The study predicted a high human intake and, subsequently, a high health risk associated with certain background levels of contaminants (arsenic, dioxin and benzo-a-pyrene). The consultants attributed these predictions to the conservative nature of the risk assessment model and dismissed the results as an over-prediction by the model.[272]

The health department again brought in Dr. Ecobichon to peer-review the HHRA. Ecobichon suggested making pie-charts to make it easier for the public and media to understand the health risk from the Bennett facility.[273] The pie charts were used by the consultant to demonstrate to health department officials that the risk portion to residents from the Bennett facility was small com-

pared to the health risks associated with existing contamination.[274]

Bennett's consultants were asked by a provincial inter-departmental committee set up to review the project to provide more information on the cumulative health effects of the Bennett facility. In a 32-page reply dated August 1, 2003, the consultants presented data on heavy metals in soil and forage in the Belledune area and noted that the 1986 Ecobichon and Hicks study had found no health risk associated with these levels, something the 1986 study never stated.[275]

As part of their analysis of the Bennett studies, the Conservation Council asked the province for all the environmental monitoring data collected by the smelter since it began operating in 1966.

The data, received in June 2003, revealed that lead levels close to the smelter had been as high as 1000 times above 1966 levels (8.0 - 11.5 ppm) reported by the province's agriculture department. Within the Belledune village limits, lead levels had been recorded as high as 100 times above historic levels, depending on whether the samples were taken upwind or downwind of the smelter. Lead, cadmium and arsenic levels in a 6-10 km radius of the smelter exceeded Canadian Council of Ministers of the Environment (CCME) soil quality guidelines. Metals and arsenic levels in grasses, garden produce and shellfish had exceeded national and international food standards and guidelines and, in some cases, still did.

At the end of August 2003, the Conservation Council publicly released the monitoring data at a press conference and, two weeks later, presented the results at a public meeting in Belledune. Although the smelter had been testing the soil and garden produce on some residential properties for decades, the Conservation Council's presentation was the first time they had seen any testing results.

Then provincial environment minister, Brenda Fowlie, accused the Conservation Council of "scare tactics" and trying to "fear monger."[276] The smelter company (now owned by Falconbridge) sent an open letter to Belledune residents saying it was not their intent to "get into a public debate with the Conservation Council."[277] The letter went on to acknowledge that three sampling stations in 2003 showed heavy metal levels above Canadian guidelines: townsite #1 where equipment from the smelter was used to plough roads and where smelter workers once

"If it wasn't for the Conservation Council out there trying to fear monger (the people of Belledune wouldn't be afraid)."

Brenda Fowlie, then Minister of Environment and Local Government, responding to the public release of heavy metal monitoring data (1975-2002) from the Belledune area by the Conservation Council of New Brunswick. August 28, 2003. *Telegraph-Journal*, August 29, 2003.

"While the many years of operating the smelter have created areas in close proximity to the smelter that exhibit elevated levels of heavy metals, the levels and impact appear to be limited to an area that is, for the most part, owned and controlled by Noranda and in industrial use."

Brenda Fowlie, then Minister of Environment and Local Government, responding to the Conservation Council's request for a clean-up of the heavy metal contamination in Belledune. Excerpt from a letter to the Conservation Council dated October 16, 2003.

lived; the smelter property itself; and a property adjacent to the smelter used by a contractor who had also worked at the smelter.

Most of the company's soil testing had been done on private properties owned by Noranda or properties located many kilometres beyond the plant gates. There was very little, if any, data on metal and arsenic levels on public and private properties.

In the fall of 2003 the Conservation Council began a two-year investigation of the heavy metal contamination in northern New Brunswick that included testing the soil on schoolyards, playground and private properties in the Belledune area. Residents volunteered to have their properties tested.

The results indicated high levels of lead, cadmium and arsenic on private and public properties in at least a 6-km radius of the smelter. Some of the highest levels were found at the Belledune elementary school. The school yard was eventually cleaned-up, twice. The first clean-up failed because not all of the contaminated soil was removed and contaminated fill was used to replace contaminated soil.

Based on the extent of the contamination it had uncovered, the Conservation Council sent a letter to Minister Fowlie asking her to order a clean-up of the Belledune area. Fowlie replied saying the high arsenic levels in the Belledune area were "not an uncommon occurrence" in New Brunswick due to the province's geology.[278] She said that "while the many years of operating the smelter have created areas in close proximity to the smelter that exhibit elevated levels of heavy metals, the levels and impact appear to be limited to an area that is, for the most part, owned and controlled by Noranda and in industrial use."[279]

Concerned about the health impacts of long-term exposure to heavy metals in Belledune, the Conservation Council also asked the health Minister, Elvy Robichaud, to order a community health assessment for Belledune and a blood lead testing program for children in the area. This request was acted upon, but a clean-up of the area would prove to be a more elusive goal.

In the meantime, a Belledune Citizen's Committee was formed. It was headed up by Junia Culligan, retired community and occupational health nurse and longtime resident of Belledune.

In September 2003, the Citizen's Committee launched an appeal before the province's Assessment and Planning Appeal

Board challenging the decision made by the Belledune Planning Commission to issue a building permit for the Bennett facility.[280] Their appeal was made on the grounds that the Commission had not taken into consideration the impact of the Bennett facility on property value.

While waiting for their appeal to be heard, Culligan had the soil on her property tested, as well as her blood and urine, for heavy metals. Soil tests on her property indicated the presence of lead, cadmium, thallium, zinc and arsenic. Her blood and urine tests showed that she has cadmium and arsenic in her body. All levels were above acceptable national health and environmental guidelines.

Belledune residents and their Gaspé neighbours were growing skeptical about the Bennett project. They worried about the health impacts of another potential source of pollution to the area and they worried about possible pollution crossing the Bay of Chaleur. Rayburn Doucett, the Chairmen of Renviro Park, responded to their concerns by telling residents of Belledune it was time they "woke up" to the fact that the Bennett project was a "good one" for Belledune."[281] In a letter to the editor of the Moncton-based *Times & Transcript*, Doucett said he had always wanted what was best for the Chaleur region. He pointed to the fact that the coal-fired power generating station was the first plant of its kind in Canada to have a scrubber.[282] He did not mention that, as Chairman of NB Power at the time, he approved the original proposal to build the power plant without scrubbers. It was the overwhelming public outcry that forced Premier Frank McKenna to order the power plant be built with scrubbers.[283]

Revelations that the Belledune area was already contaminated and growing distrust of the company proposing to build the incinerator resulted in the formation of a coalition of community groups, including First Nations communities, from around the Bay of Chaleur. A very public battle to prevent the incinerator from operating ensued. It reached into Ontario, Québec and Nova Scotia and involved meeting with politicians, petitions and countless demonstrations including perhaps the largest environmental demonstration ever seen in Atlantic Canada when 2,500 people converged on Belledune in November 2003.

On December 16, 2003, the Minister of Health and Wellness, Elvy Robichaud, announced a health study for Belledune.[284]

*"The **health status pattern** for the [Belledune] study area is **different** from that found in the surrounding health regions ... and for NB overall for the time periods of 1989 -2001. There is a **statistically significantly elevated** incidence of **oral respiratory and prostate cancer** (stomach cancer was found to be statistically significantly **elevated** in both study area and [Health Region] 5 & 6 [northwest and north central New Brunswick]; and elevated (albeit not statistically significant) incidence of **kidney and colorectal cancer** above expected. There is a **higher mortality rate** than expected, and there are more deaths than expected due to circulatory disease, cancer and to "**other causes**" such as accidents and suicide." [Bold and italics are the report's emphasis.]*

Excerpt from the Summary Report of the Belledune Area Health Study, November 2005, page VI.

13. Health crisis exposed

On May 18, 2005, a year and a half after the Belledune health study was announced, the health minister released the results of the study. He opened the press conference by saying, "this study has provided us with more information than has ever been available on the environmental impact of industry in and around the Belledune area as well as the health status of residents."[285]

According to the study's findings, the incidences of oral, respiratory, prostate, kidney and colorectal cancers were higher in the Belledune area than any other health region in the province.[286] The risk of males developing malignant respiratory cancer was 83 per cent higher in Belledune than the rest of the province. For females, the risk was 33 per cent higher. Although the available departmental data on the health of children was limited, the study did find that the rate of childhood cancer and congenital anomalies were double the expected rate in the province. Belledune-area residents also had higher non-cancer related deaths and disease rates than the rest of the province. The death rate among males in the Belledune-area was 40% higher than the rest of the male population in New Brunswick.

Dr. Celine Pinsent, the spokesperson and lead investigator for the consultants (Goss Gilroy) doing the study, acknowledged that the high rates of cancer were not typical for the tiny community saying "it's unusual to the extent that this small area is seeing higher rates of cancer compared to... their neighbours."[287]

The health department had also asked the consultant to investigate whether children in the neighbourhoods closest to the smelter showed signs of lead exposure. Twenty-three children from Townsite # 2 and Lower Belledune (the two neighbourhoods closest to the smelter) had their blood tested. These children represented 70% of the eligible children in those two neighbourhoods. The average lead level in the blood of ten 3-6 year-olds was 4.35 micrograms per decilitre (µg/dl). The average lead level in the blood of thirteen 7-15 year-olds was 3.78 µg/dl.[288] These levels were higher than the levels recently reported in children in other communities in Canada, but lower than Health Canada guidelines of 10 µg/dl which is referred to as a "medical concern level" and triggers medical intervention.[289]

Two children in Belledune had blood lead levels above the medical concern level. Above 10 µg/dl, lead affects organs like kid-

neys, nerve transmission and blood formation. Below this level, hundreds of studies have reported intellectual and developmental impairment in children, drops in IQ, behavioural problems, delayed puberty, slow growth and hearing impairment, all symptoms associated with chronic exposure to lead levels below the "medical concern level".

The second part of the study – the human health risk assessment – took up the lion's share of the 900-page report. It did find that residents had been exposed to lead, arsenic and cadmium from industrial activity in the area. Their exposure was the result of breathing in air and eating vegetables and seafood contaminated with heavy metals. The study found that cancer risks from exposure to cadmium and arsenic in neighbourhoods closest to the smelter exceeded provincial guidelines for the entire four decades of the smelter's operation. The non-cancer health risks from lead and cadmium exposure also exceeded the guidelines. The study, however, failed to find an "identifiable link" between the higher disease rates in the area and emissions from industrial activity. The Minister repeats this conclusion saying, "Undoubtedly, some will try to link the higher disease rates in the area with industrial activity. However, this is not borne out by the results of the human health risk component of the study."[290]

The same day that the health study was released, the federal Department of Fisheries and Oceans placed a temporary ban on shellfish harvesting near Belledune. Liberal member of the provincial legislative assembly for the Belledune-area riding, Roland Haché, rose in the legislature to ask the Minister of Health why he hadn't warned people earlier about the dangers of eating locally harvested shellfish and vegetables. The Minister said he had notified federal officials about the health study results in March (just two months before the study's release).[291] The Canadian Food Inspection Agency responded by saying that all they received in March was a pile of data and they didn't get the full report until just ten days before the press conference.[292] Meanwhile, the acting District Medical Officer of Health for the Belledune area, Dr. Ann Roberts, said she would have no qualms about eating mussels and potatoes from Belledune, "I wouldn't hesitate for a moment. I'm a good Newfoundlander and I love my mussels and potatoes."[293] She expressed less confidence about eating mussels if she were pregnant.

*"... **children's average blood lead levels** in the potentially most impacted communities indicate that... they are **higher than what have been recently measured in other communities.**" [Bold and italics are the report's emphasis.]*

Excerpt from the Summary Report of the Belledune Area Health Study, November 2005, page VI.

"Undoubtedly, some will try to link the higher disease rates in the area with industrial activity. However, this is not borne out by the results of the human health risk component of the study."

Elvy Robichaud, then Minister of Health and Wellness, commenting on the findings of the Belledune Health Study. *Telegraph-Journal,* May 25, 2005.

The study's failure to link poor health status with metal releases from the smelter were met with disbelief and concern. “I don't know where they're coming from,” said Junia Culligan, a former nurse at the smelter and longtime community health nurse in the area.[294] The Conservation Council renewed its call for province’s environment minister to immediately order a clean-up of contaminated private and public properties in Belledune.[295]

Editorial cartoon in the Saint John-based Telegraph-Journal, May 28, 2005, following the release of the Belledune Area Health study. Reprinted with permission from Josh Beutel.

Based on the recommendations made by the Belledune study team, the Health Minister announced another study that would test locally harvested clams, oysters and finfish, as well as root vegetables grown in backyard gardens. He said, “like residents of the area, we want to know what is contributing to this situation [high cancer, disease and mortality rates] and how it can be addressed.”[296] He also ordered further blood lead testing for children in the area.

In the early stages of the health study, the Minister announced the hiring of Dillon Consulting (at a cost of $30,000) to peer review the Belledune health study.[297] According to the Minister, the peer review was necessary to help reassure residents that the department was serious about putting together a well-researched and balanced study and to “strengthen the credibility

of the study."[298] However, the peer reviewers were never used for this purpose.

In their final 30-page review, the peer reviewers fell short of saying the health study team didn't know how to do risk assessments saying, "it appears that a fundamental misunderstanding of risk characterization exists in this set of interpretations."[299] They said errors in methodology and omissions in the analysis and interpretation of data had resulted in underestimates of exposure and health risk to certain contaminants, particularly arsenic. They said the health study failed to assess the potential exposure of toddlers (the most vulnerable age group) to non-carcinogenic contaminants. And, they said the study had downplayed key findings in the community health assessment that suggested "strong associations" between living in Belledune and the risk of developing a cancer. They concluded by saying the study's recommendations were inadequate and if followed "would not be very helpful in moving us closer to establishing causative relationships."[300] The peer-reviewers recommendations for fixing the study were ignored by the health study authors and government officials.

Belledune 1997

The Conservation Council believed there was sufficient information in the study to make a link between industrial emissions and the occurrence of certain health problems in Belledune. They hired Dr. David Pengelly, an internationally recognized expert in air pollution assessment, to review the Belledune Health Study. Pengelly was no stranger to provincial health officials. He had been hired to review the health risk assessment

Blood lead levels considered to be elevated by the U.S. Centers for Disease Control and Prevention

Micrograms per decilitre (µg/dl)

1960s	**60**
1970s	**40**
1980s	**25**
1990s	**10**
2000s	**10**
2010s	**?**

Source: Adapted from Rogan, W.J. and J.H. Ware. 2003. Exposure to Lead in Children - How low is low enough? New England Journal of Medicine, Vol 348(16) 1515.

done for the Irving Oil refinery upgrade and he had been hired by the Belledune Citizen's Committee to review the Bennett health risk assessment. Buried in hundreds of pages of the Belledune Health study, Pengelly found evidence for a link between lead, arsenic and cadmium releases from industry and disease rates in the area.[301] Adult exposure to cadmium and arsenic from the smelter had significantly increased residents' risk of respiratory and possibly prostate cancer and, in fact, the incidence of respiratory and prostate cancers were higher in Belledune than New Brunswick as a whole. Adult exposure to cadmium had also significantly increased their risk of kidney damage. The incidences of circulatory and urogenital diseases (often associated with lead exposure) were higher in Belledune than New Brunswick as a whole. And overall, Belledune area residents had a higher mortality from cancer and circulatory diseases than the province as a whole.

Since the Belledune Health Study did not assess the health status of children, the Conservation Council decided it would. In the winter of 2005-2006, the Conservation Council conducted a children's health survey in the Belledune area. Seventy-six children in fifty families were surveyed. The survey results indicated that twenty-six (26) children living closest to the smelter had more health issues associated with their nervous system, skin, bladder/kidneys and stomach/digestive system than the fifty (50) children living 6-18 km from the smelter.[302] Cadmium is known to affect the kidneys, liver and stomach. Lead causes nervous system, stomach and kidneys disorders while arsenic is known to cause skin, respiratory, stomach and nervous system disorders in children.[303]

Overall, children living close to the smelter had more health issues per child than children living 6-18 km away. None of the children surveyed had diabetes, which is often used as an indicator of poor lifestyle choices (e.g. poor diet and lack of exercise).

On June 1, 2006, the province released the results of soil, fish and produce sampling in the Belledune area ordered by the health minister a year earlier as a follow-up to the health study. Soil testing confirmed the results of sampling done by the Conservation Council three years earlier. Most properties within a 6 km radius of the smelter had levels of lead and cadmium

above federal soil quality guidelines set for agricultural soils (70 ppm for lead and 1.6 ppm for cadmium) by the Canadian Council of Ministers of the Environment (CCME).[304] As a result, garden produce in the Belledune area had significantly higher levels of lead and cadmium than produce grown in Fredericton, a city with no heavy industry. In several cases, swiss chard, rhubarb, raspberries and potatoes exceeded Health Canada maximum food residue guidelines for lead (0.5 ppm), particularly downwind from the smelter in Lower Belledune.[305] For example, raspberries and rhubarb had lead levels 2-4 times above the Health canada Guidelines. (No federal food residue guidelines exist for cadmium.)

Publicly, the Health Minister, Brad Green, declared there was "no health risk" associated with the higher lead and cadmium levels in soil and produce. Yet, at the same time, he recommended that "people with vegetable gardens in the region wash their produce well before consuming it, wash their hands after working in the garden and try not to track dirt into [their] homes."[306] Based on the study results, the province was ruling out lead and cadmium as the cause of the high cancer rates in the area.[307] The provincial epidemiologist, Christofer Balram said "other things" like family history, smoking and places of employment could be the reason.[308] A research team from Memorial University was hired by the province to find out why people in the Belledune area are sick and dying.

At the time of writing, the provincial government had still not ordered a clean-up of Belledune.

In 1968, just two years after the lead smelter began operation, high lead levels were discovered by the federal Department of Health and Welfare in and around the Belledune school. Their recommendation of further investigations into lead pollution in the community was ignored by both provincial and federal governments.

14. Sacrifice Zone

Premier Louis Robichaud's vision for transforming the north shore into an industrial landscape like the Ruhr Valley in Germany was partially realized, but not in the manner he intended. New Brunswick's north shore did not become an economic powerhouse. Instead, like the Ruhr Valley which by the turn of the 20th century had become an environmental wasteland, by the end of that century Belledune Harbour and the surrounding area would become "one of the most serious areas of environmental contamination in the Atlantic region."[309]

Worse, this deplorable and dangerous state of affairs unfolded with full knowledge and complicity of the industry, regulators and politicians of the day, while the community was kept in the dark.

In 1968, just two years after the lead smelter began operation, high lead levels were discovered by the federal Department of Health and Welfare in and around the Belledune school. Their recommendation of further investigations into lead pollution in the community was ignored by both provincial and federal governments.

In 1973, provincial environment officials received reports of dead sheep in Belledune, which they suspected to be associated with a heavy metal problem. Yet because the victims were sheep, the department shuffled the problem off to the Department of Agriculture. Nothing more was done.

Before the smelter came on line, federal fisheries scientists suspected that the effluent from the smelter might be a problem in the Bay of Chaleur. By 1970, they knew the bay and its fish were being harmed. Instead of clamping down on the smelter, the pollution continued until DFO closed the lobster fishery in Belledune Harbour in 1980. By 1979, Environment Canada knew the smelter's effluent did not meet federal guidelines. No charges were laid. Rather, habitat managers and scientists tested, monitored, ordered studies and discussed the problem.

Documents show that prior to 1980, Department of Health officials including an Assistant Deputy Minister of Health knew that garden vegetables and seafood in Belledune were contaminated with heavy metals and concluded there was a lead contamination problem in the area. They also knew by that time that chil-

dren and pregnant women were especially susceptible to lead toxicity. Yet no public health warnings were issued.

In the spring of 1980, smelter officials informed Department of Environment staff of the heavy metal contamination in garden produce and seafood. The department did not inform the community of the problem and no clean-up was ordered.

In the summer of 1981, R.O. Read, Director of the Federal Bureau of Chemical Safety at Health and Welfare Canada, alerted the provincial Department of Health that the lead contamination in Belledune posed a health risk to the people of Belledune. Nobody told the citizens of Belledune that they were at risk and no measures were taken to reduce their exposure.

While the dangers of heavy metal pollution may not have been fully appreciated when the smelter came on line in the 1960s, that situation changed quickly. By the mid-1970s, lead had been banned in paint and was being phased-out in gasoline. In November 1973, the Ontario government issued a stop-work order on a Toronto-based lead smelting company (Canada Metal) because residents around the plant had high blood lead levels.[310] This decision, which received national media coverage, did not go unnoticed in New Brunswick. The executive assistant to the Minister of Labour wrote to the producer of CBC Radio's "As it Happens," for a taped copy of their coverage of this story.[311]

By 1979, the National Research Council of Canada had published a massive monograph on the known effects of lead in the environment and on human health, and blood lead testing had been done on residents living near the only other primary lead smelter in Canada at Trail, British Columbia. All this was the prelude to the August 1981 communication from the Director of the Federal Bureau of Chemical Safety at Health and Welfare Canada to the Province that they had a potential health problem on their hands in Belledune. Still no action was taken.

Ten years later, in 1991 provincial health and environment officials were presented with yet another report, this time by a provincial environment department employee, outlining the extent of heavy metal contamination in the Belledune area. Documents show that environment officials worried that the company would sue the government if the report was published as drafted, and so it was altered. Health department officials dismissed the report's recommendations for blood or dust testing in Belledune, and testing was not done.

In the summer of 1981, R.O. Read, Director of the Federal Bureau of Chemical Safety at Health and Welfare Canada, alerted the provincial Department of Health that the lead contamination in Belledune posed a health risk to the people of Belledune. Nobody told the citizens of Belledune that they were at risk and no measures were taken to reduce their exposure.

Despite nearly four decades-worth of evidence and long-standing knowledge of the harmful effects of lead, the environment department has still not ordered a community-wide clean-up.

It was not until the Conservation Council of New Brunswick, a membership-based non-profit organization, began its own soil testing in 2003 and releasing the results publicly that the government began to move, still very reluctantly. A school ground was excavated – twice – to remove heavy metal contaminated soil and the health department ordered a health study which found that Belledune area residents had higher death, disease and cancer rates than the rest of the province.

Despite nearly four decades-worth of evidence and long-standing knowledge of the harmful effects of lead, the environment department has still not ordered a community-wide clean-up. All that has happened is the health department has provided an information pamphlet and ordered more testing of soil, vegetables and seafood. Some residents have abandoned their gardens, banned children from their yards and sought medical help.

Company officials have never denied that the smelter is responsible for the lead and cadmium contamination. In fact, the company acknowledged responsibility for the problem at an industry conference in 1977 and again (publicly) in 1980.[312] Yet while the company is culpable for the pollution from its smelter, the distinct failure to protect the environment and public health in the north shore rests with provincial and federal regulators over the decades.

Throughout Belledune's forty-year industrial history, government planners, scientists, managers and policy makers met, reviewed environmental impact statements, discussed the smelter's monitoring results, and recorded its violations of provincial and federal air, water, soil and food standards and guidelines. These professional civil servants who are supposed to work on behalf of the public, not private interests, understood and acknowledged the implications of heavy metal contamination on human health and the environment. They filtered information from field staff and offered up creative ways to circumvent existing policies. They approved deficient environmental impact assessments and commissioned deficient studies, which they then used to downplay or deny the problems. Equally serious, they deliberately kept the victims of the heavy metal pollution in the dark.

The 2005 Belledune health study reveals the outcome of a series of implicit and explicit decisions by public servants and politicians that Belledune residents should, without their knowledge, continue to live in a contaminated environment.

Respective ministers of environment failed to impose sanctions, restrictions or penalties on the smelter when air quality and effluent standards were violated, leaks and spills occurred and monitoring equipment was not operating.[313] Such violations (or as officials euphemistically call them, "exceedances") were not restricted to the smelter's so-called break-in period. They were a frequent occurrence throughout the entire history of the smelter and continue to this day.

Respective ministers of health either ignored, denied, or actively avoided their responsibility to protect the health of north shore citizens from contaminants that were clearly associated with serious health problems.[314]

Respective ministers of health either ignored, denied, or actively avoided their responsibility to protect the health of north shore citizens from contaminants that were clearly associated with serious health problems.

Whether the ministers of health and environment were ill-advised by their senior staff, who have a responsibility to perform their duties ethically and in the public interest, or whether they willfully ignored or overrode the responsible advice of their professional staff, we may never know. In all likelihood, it was a combination of both over the years. Regardless, those ministers are ultimately accountable to the public for what amounts to a willful dereliction of their duty, under the laws of New Brunswick, to protect both public health and the environment, from harmful pollution.

Next Steps: Restitution and an Environmental Bill of Rights

There has been a gross miscarriage of justice in Belledune. The legacy of successive governments' willingness to sacrifice Belledune on the altar of industrial development is heartbreaking – the failure of children to achieve their potential, the personal and family burden of ill-health, and lives cut tragically short. The lesson of Belledune is that regulatory agencies charged with protecting environmental and public health are rendered dysfunctional by the political drive for economic growth and deference to corporate interests.

Clearly there is a need for restitution. Yet, unlike dealings in the private sector, exacting personal accountability from those civil servants and politicians who implicitly and explicitly allowed this community to be poisoned over a period of 40 years is a daunting, and likely impossible, prospect.

Besides an immediate widespread clean-up, at the very least compensation should be provided for those families with contaminated yards and individuals with health problems associated

Restitution for harm done is not enough. Another Belledune pollution and public health scandal - for that is what it is - must never be allowed to happen again. To prevent it will require the adoption of a new ethic by government officials and politicians charged with protecting public health and the environment.

with heavy metal exposure. A public inquiry into the scandal would go much further to expose the breakdown of the public trust relationship between citizens, civil servants and politicians.

Restitution for harm done is not enough. Another Belledune pollution and public health scandal - for that is what it is - must never be allowed to happen again. To prevent it will require the adoption of a new ethic by government officials and politicians charged with protecting public health and the environment. This new ethic must be grounded in the principle that every citizen and community has a right to clean water, air and soil; a right to be informed promptly and fully of any environmental or health risk that may affect them and to have full access to information about environmental hazards in or proposed for their community; and a right to participate fully, equally and directly in decisions-making regarding the type of development and environmental risk they are willing to accept in their midst.

This principle must be entrenched in a legally-binding *Environmental Bill of Rights* that requires government officials and politicians to conduct themselves and the affairs of their departments such that these rights are respected. An *Environmental Bill of Rights* must provide citizens with accessible and affordable legal remedies when government officials fail to uphold their responsibility to protect citizens from environmental contamination and degradation. It must also protect civil servants who 'blow the whistle' on government inaction that threatens the health and well-being of citizens and the environment.

By vesting citizens with the right to protect themselves and their children, civil servants with whistle-blower protection, and all government officials with the obligation to protect the public interest, New Brunswick can move out of the dark ages mentality of economic growth at-all-cost and into an enlightened, 21st century commitment to environmental, social and economic justice, the cornerstone of sustainability.

Endnotes/References

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[2] Ibid, *North Shore Leader*, June 16, 1961, p.1.

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[4] Ibid.

[5] Most of the information on the history of the smelter in this report comes from James L. Kenny's doctoral dissertation, *Getting the Lead Out: State, Capital and the Development of New Brunswick's Base metal Industry, 1952-1972* (Carleton University 1994) which offers a thorough history of the development of New Brunswick's base metal industry and policy from the early 1950s to 1970s and a journal article based on this thesis, Kenny, J.L. 1997. A New Dependency: State, local capital, and the development of New Brunswick's base metal industry, 1960-1970. In *Canadian Historical Review* 78 (March 1997) 1-39.

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[9] "New Brunswick's Precocious Prophet", *The Globe Magazine*, Toronto, July 23, 1960, p.14

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2. Smoke on the Horizon

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[29] Ibid., p. 7-8.

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[31] Ibid., p. 9.

[32] Ibid., p 9.

[33] New Brunswick, *Statutes*, 1961-62, 444, 484

[34] Letter to J.S. Bates, Chairman, New Brunswick Water Authority, from C.S. Clements, Director of Mines Branch, dated June 19, 1964. Provincial Archives of New Brunswick (PANB), East Coast Smelting, RS 314.

[35] F.J. Bruggermeier, "The Rhur Basin, 1850-1890: A case of Large-Scale Environmental Pollution," pp. 210-25 in *The Silent Countdown: Essays in European Environmental History* P. Brimblescombe and C. Pfister eds., (Berlin, 1990) cited in James Allum, *Smoke across the border: The Environmental Politics of the Trail Smelter Investigation.* (Queen's University: 1995), p.101.

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[39] Allum (1995), p. 1.

[40] Minutes of the meeting held on June 29, 1964, Department of Forestry, Fredericton, NB. PANB, East Coast Smelting, RS 314.

[41] Ibid., p. 5.

3. Solution to Pollution is Dilution

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[43] Details on his professional career were drawn from a 132-page autobiography that Bates self-published. John S. Bates, *By the way: 1888-1983*. (Hantsport: Lancelot Press, 1983).

[44] Letter to L. Norbert Theriault, Minister of Municipal Affairs and D.A. Riley, Minister of Lands and Mines, from J. Bates, Chairman, NB Water Authority, dated September 29, 1965. PANB, East Coast Smelting, RS 314.

[45] Ibid.

[46] Information on Rowley's history with Bates can be found in Bates's autobiography (see Note 43). Bates also wrote to the manager of the engineering firm building the fertilizer plant, E.B. Hymmen, on November 26, 1965 to provide him with a brief history of Rowley's background. PANB, East Coast Smelting,, RS 314.

[47] Report by H.J. Rowley to the New Brunswick Water Authority dated December 7, 1965 and titled, "Discussion with Mr. C.W. Hills regarding polluting agents from the future East Coast Smelting operations at Belledune Point and their disposal". PANB, East Coast Smelting, RS 314.

[48] Letter to Bates, from J.L. Hart, Director of the Fisheries Research Board of Canada Biological Station, St. Andrews (New Brunswick), dated April 27, 1965. PANB, East Coast Smelting, RS 314.

[49] Rowley's report to NB Water Authority, December 7, 1965. See note 47.

[50] Letter to Bates from J.B. Sprague, Pollution Studies, Fisheries Research Board of Canada Biological Station, St. Andrews, dated August 3, 1965. PANB, East Coast Smelting, RS 314. In addition to providing comments on the consultant's proposal, the federal scientists were given the task of assessing the toxicity (lethality) of gypsum and the associated fluorine compounds and determining the "allowable" limits for metals discharged from the smelter. Using small locally caught winter flounder as their test subjects, they found that between 20 and 50 percent of the flounder died when concentrations of gypsum approached the limit of solubility 2700 parts per million (ppm). Below 1000 ppm there were no mortalities in a week of exposure. At concentrations that killed fish (above 2700 ppm), the waters were "creamy" with suspended gypsum. The suspended solids eventually settled out and covered the flounders resting on the bottom of the experimental tanks, only their eyes and gill openings would be visible. According to their studies, the mortality associate with the gypsum was due to the acidic nature of the gypsum/fluorine mix. When fluorine concentrations in the gypsum slurry were high (56 and 65 ppm), the acidity increased (pH 4.0 and 3.7). (The pH scale ranges from 1 to 14. A pH of 1 or 2 indicates extremely acidity, 7 is neutral and a pH of 13 or 14 indicates an extremely 'basic' or alkaline solution.)

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[65] There are many popular biographies of Louis Robichaud and K.C. Irving that chronicle the relationship between Robichaud, Irving and Boylen. The history of these relationships are handled differently depending on the author(s). For biographies of Louis J. Robichaud see: Michel Cormier, translated by Jonathan Kaplansky, *Louis J. Robichaud: A not so quiet revolution* (Saint-Nicolas: Faye Editions, 2004); Della Stanley, *Louis Robichaud: A decade of power* (Halifax: Nimbus 1984) and John Edward Belliveau, *Little Louis and the Giant K.C.* (Hantsport: Lancelot Press 1980). For biographies on K.C. Irving see: Douglas How and Ralph Costello, *K.C.: The Biography of K.C. Irving* (Toronto: Key Porter Books 1993); John Demont, Citizens Irving: *K.C. Irving and His Legacy: The Story of Canada's Wealthiest Family* (Toronto: Doubleday 1991); and Russell Hunt and Robert Campbell, *K.C. Irving: the Art of the Industrialist* (Toronto: McClelland and Stewart 1973).

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Withers followed up on the press release issued by the provincial Joint Information Committee on Lead Hazards and interviewed its chairman, St. Pierre. The Joint Information Committee did not release the federal report, however, copies were leaked to some reporters, including Withers. St. Pierre was asked by Withers when the federal report would be released and about some of the test results. St.Pierre said the federal health department was doing a follow-up study and his Committee would wait for that report before deciding on whether to release any of the reports."I can't say what will be decided at that time. At this date we certainly think it would be unfair to publish the first report giving only the bad side of the picture when things may already be improved." Withers asked St. Pierre about some of the high values in the air test results. St. Pierre's response was defensive and dismissive, "That's just one of the reasons the committee felt it shouldn't release details. What does that 167 [milligrams of lead per cubic metre] figure mean to the layman? We know the recommended safe level for exposed personnel is 0.2 [milligrams of lead per cubic metre] but even we don't know what the safe level is for protected workers. The wearing of dust respirators and other protection is compulsory at the plant and conceivably a properly dressed worker could be perfectly safe at extremely high concentrations."

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5. Fall-out

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[106] Ibid., p.2.

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[123] Inter-Office Memo, from J.W. S. Young to B.B. Barnes, Deputy Minister, Environment, dated September 30, 1976. Subject: George Ellis, Belledune, N.B. PANB Environmental Planning and Sciences Branch Records, RS 839.

[124] Letter to Insoon Lee, Environmental Control Engineer, Brunswick Smelting, from John MacRae, Air quality Engineer, Pollution Control Branch, New Brunswick Environment Department, dated June 21, 1978. PANB Environmental Planning and Sciences Branch Records, RS 839.

6. There's something about cadmium

[125] "Design funds lined up for zinc smelter", *Times & Transcript*, Moncton, February 20, 1979; "Ottawa Will Put Up $1.5-M For New Smelter", *Telegraph-Journal*, February 20, 1979, p.3.

[126] Inter-Office Memo from Bill Ayer to John Mallory, Environment Department, dated April 23, 1980. Subject: Noranda Report on Heavy Metals at Belledune. PANB Brunswick Mining & Smelting, RS 417.

[127] "Company Takes Blame For Cadmium Content," *Northern Light*, May 7, 1980, p.9.

[128] Briefing notes (2 pages) prepared by the Inspection & Technology Branch, Fisheries and Oceans dated April 28, 1980 and obtained from Fisheries and Oceans Canada under federal Access to Information Act. A hand-written note signed by R.W. Bond, A/Director of Inspection Branch on April 28, 1980 said "Held for discussion with HPB on April 29, 1980". The heading on the briefing note said: "Problem: Heavy Metal Contamination Associated with the Belledune, N.B. Smelter (Brunswick Mining and Smelting)."

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[132] Ibid., p. 9.

[133] Memorandum marked Confidential from J.F. Uthe, Head, Fisheries & Environmental Research Section - Halifax Component, Department of Fisheries and Oceans, to J.E. Steward, Director, Resource Branch , Fisheries & Environmental Sciences, Department of Fisheries and Oceans, dated April 21, 1980. Re: Ecological Survey for Brunswick Mining and Smelting Corporation Limited, Belledune, New Brunswick - The Belledune Report. Obtained from Fisheries and Oceans Canada under the federal *Access to Information Act*.

[134] Ibid, Appendix 1, p. 1-2.

[135] Ibid., p. 4-5.

[136] "Belledune Lobster Fishermen Clammed", *Northern Light*, May 14, 1980, p.4.

[137] "Lobster Safe Minister Says", *Northern Light*, May 14, 1980, p. 2

[138] Ibid.

[139] Details on the 1980 lobster fishing closure in Belledune and the processing of lobster caught in the controlled fishing zone were outlined in the minutes of a meeting in Ottawa between representatives of Fisheries and Oceans Inspection and Technology Branch and Health Canada's Bureau of Chemical Safety held on April 7, 1981. Subject: Cadmium in Lobster - Belledune Harbour, N.B. Obtained from Fisheries and Oceans Canada under federal *Access to Information Act.*

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[141] "Curtailed Lobster Fishery Explained", *Northern Light*, May 14, 1980, p.7.

[142] Ibid., p. 3.

[143] "Belledune Lobsters said "Totally Safe", *Northern Light*, June 11, 1980, p. 1.

[144] Inter-Office Memo from Janice M. LeBlanc placed on file with the records for the zinc smelter project (File # 4564-1-4-1 Volume 2) dated April 22, 1981. Subject: Heavy Metal Levels in Forage and Garden Produce in Belledune, N.B. PANB Brunswick Mining & Smelting, RS 417.

[145] Conference and Interview Summary between a representative of Noranda (name of person removed) and D.C. Kirkpatrick and D.A. Bryant with Health and Welfare Canada, dated May 12, 1981. Subject: Trace Elements in Food. Obtained from Health Canada under federal *Access to Information Act.*

[146] Record of telephone call between D.C. Kirkpatrick and Telegraph Journal reporter (name deleted), dated December 8, 1981 Subject: Cadmium (with reference to Belledune, N.B. and Lobsters).Obtained from Health Canada under federal *Access to Information Act.*

[147] Letter to A.J. Gervais, Chief, Inspection and Technology Branch, Fisheries and Oceans, from E. Sandi, Head, Food Contaminate Section, Toxicological Evaluation Division, Health and Welfare Canada, dated June 25, 1982. Subject: Cadmium in Lobster, Belledune, N.B. 3 pages. Obtained from Health Canada under federal *Access to Information Act.*

[148] Minutes of Meeting with Members of the Department of Fisheries and Oceans [and Food Directorate Staff]. April 29, 1980 to Discuss Cadmium in Lobster From Belledune, N.B. 3 pages + 2-page report titled Tolerable Amount of Cadmium in a Lobster. Obtained from Fisheries and Oceans Canada under federal *Access to Information Act*.

[149] Memorandum marked Confidential from J.F. Uthe, Head, Fisheries & Environmental Research Section - Halifax Component, Department of Fisheries and Oceans, to J.E. Steward, Director, Resource Branch , Fisheries & Environmental Sciences, Department of Fisheries and Oceans, dated April 21, 1980. Attachment III. See Note 132. Obtained from Fisheries and Oceans Canada under the federal *Access to Information Act.*

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[153] Health Canada. 2006. Canadian Maximum Residue Limits. Table I of Division 15 from the Food and Drug Regulation C.R.C., c.870. Canadian Food Inspection Agency. 2006. Appendix 3. Canadian Guidelines for Chemical Contaminant and Toxins in Fish and Fish Products.
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7. EIA policy put to the test

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[155] Inter-Office Memo from J. Choate, Environment, to O.V. Washburn dated November 10, 1977. Subject: Zinc Smelter. PANB Brunswick Mining & Smelting, RS 417.

[156] Ibid.

[157] Inter-Office Memo, from D.I. Besner to Janice M. LeBlanc, Environment Department's EIA Project Manager for the zinc smelter proposal, dated October 31, 1979. Subject: Proposed Electrolytic Zinc Reduction Plant in Belledune. PANB Brunswick Mining & Smelting, RS 417.

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[159] Inter-Office Memo, from W. Ayer to D. Besner, Environment, dated April 30, 1980. Subject: Belledune Zinc Smelter. 4 pages. PANB Brunswick Mining & Smelting, RS 417.

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[165] Intergovernmental General Review Statement for the Environmental Impact Assessment on the Proposed Electrolytic Zinc Reduction Plant in Belledune, New Brunswick. February 1981. 43 p. Copy on file at the Gulf Regional Library, Fisheries and Oceans, Moncton.

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[168] "Smelter 'Best News In A Long, Long Time' ", *Northern Light*, November 18, 1981, p. 1.

[169] "Employment Boom Seen With Smelter", *Northern Light*, November 18, 1981, p. 1.

8. Phantom Health Study

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[171] Ibid, p. 62.

[172] Ibid., p. 58.

[173] Inter-Office Memo from Janice M. LeBlanc, Environment Department, placed on file with the records for the zinc smelter project (File # 4564-1-4-1 Volume 2) dated April 22, 1981. Subject: Heavy Metal Levels in Forage and Garden Produce in Belledune, N.B. PANB Brunswick Mining & Smelting, RS 417.; Inter-office Memo from J. LeBlanc, Environment Department to File (4564-1-4-1 Volume 3) dated May 13, 1981. Subject: Health Implication of Heavy Metal (Lead) levels in garden vegetables in the Belledune area. PANB Brunswick Mining & Smelting, RS 417.

[174] Inter-office Memo from J. LeBlanc, Environment Department to File (4564-1-4-1 Volume 3) dated May 13, 1981. Subject: Health Implication of Heavy Metal (Lead) levels in garden vegetables in the Belledune area. PANB Brunswick Mining & Smelting, RS 417.

[175] Letter from H.W. Wyile, Assistant Deputy Minister, Personal Health Services, New Brunswick Department of Health to R.O. Read, Director, Bureau of Chemical Safety, Food Directorate, Health Protection Branch, Health & Welfare Canada, dated May 5, 1981. Obtained from Health Canada under the federal *Access to Information Act.*

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[181] Letter to H.W. Wyile, Assistant Deputy Minister, New Brunswick Department of Health, from R.O. Read, Director, Bureau of Chemical Safety, Health and Welfare Canada, to dated August 7, 1981. Obtained from Health Canada under the federal *Access to Information Act.*

[182] Inter-Office Memo from B.B. Barnes, Environment Department to C. Morris, Health Department dated June 11, 1984. Subject: Request Update of 1981 Health Study in Belledune Area. PANB Environmental Planning and Science Branch Records RS 839.

[183] Inter-Office Memo from C.M. Morris, Health Department to B.B. Barnes, Environment Department dated July 10, 1984. Subject: Update of 1981 Health Study, Belledune Area. PANB Environmental Planning and Science Branch Records RS 839.

[184] Inter-Office Memo from C.M. Morris, Health Department to B.B. Barnes, Environment Department dated August 14, 1985. Subject: Belledune Environmental Health Study. PANB Environmental Planning and Science Branch Records RS 839

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[187] Final Minutes, Belledune Environmental Monitoring Committee. June 19, 1986 Meeting. PANB Environmental Planning and Sciences Branch Records, RS 839.

[188] Letter to K.G. Hamilton, A/Director, Air & Water Branch, Environment Canada (Dartmouth) from D.C. Kirkpatrick, Director, Bureau of Chemical Safety, Health and Welfare Canada (Ottawa), dated November 9, 1986. PANB Environmental Planning and Sciences Branch Records, RS 839.

[189] Letter to C. MacLaggan, Chairman, Belledune Environmental Monitoring Committee, from J. De Gonzague, Director, Environmental Protection Services, Environment Canada (Dartmouth), dated December 12, 1986. PANB Environmental Planning and Sciences Branch Records, RS 839.

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[191] Ibid.

9. Eyes wide shut: the monitoring years

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[195] Memorandum from G.F. Westlake, Water Pollution Control, Environment Canada to M.P. Guilcher, Chief, Water Pollution Control, Environment Canada (Dartmouth) dated June 6, 1980. Subject: Belledune Smelter; Memorandum from W.R. Parker, Head, Laboratory Division, Environment Canada (Dartmouth) to G.F. Westlake, Water Pollution Control, Environment Canada (Dartmouth) dated December 18, 1981. Subject: Bioassay results - Brunswick Mining & Smelting; Memorandum from P. Hennebury, Laboratory Division, Environment Canada (Dartmouth) to G.F. Westlake, Water Pollution Control, Environment Canada dated January 6, 1982. Subject: Brunswick Smelter - Belledune, N.B.; Memorandum from G.F. Westlake, Water Pollution Control, Environment Canada to G. Lindsay, District Director, Environment Canada (Fredericton) dated June 11, 1982. Subject: Belledune Monitoring Committee; Memorandum from W.R. Parker, Head, Laboratory Division, Environment Canada (Dartmouth) to G.F. Westlake, Water Pollution Control, Environment Canada (Dartmouth) dated November 22, 1983, Subject: Bioassay results - Brunswick Mining & Smelting; Memorandum from W.R. Parker, Head, Laboratory Division, Environment Canada (Dartmouth) to Andre Gauthier, Water Pollution Control, Environment Canada (Moncton) dated June 29, 1984. Subject: Bioassay results - Brunswick Mining & Smelting; Memorandum from W.R. Parker, Head, Laboratory Division, Environment Canada (Dartmouth) to A. Gauthier, Water Pollution Control, Environment Canada (Moncton) dated January 24, 1985. Subject: Bioassay results - Brunswick Smelting, Belledune, N.B.; Memorandum from R. Gaudet, Water Pollution Control, Environment Canada (Moncton) to W. R. Parker, Water Pollution Control, Environment Canada (Dartmouth) dated June 26, 1985. Subject: Monitoring - Brunswick Smelter; Memorandum from J.D. A. Vaughan, Water Pollution Control, Environment Canada (Moncton) to W. R. Parker, Head, Metal Mining and Milling Section,Water Pollution Control, Environment Canada (Dartmouth) dated December 11, 1985. Subject: Bioassay results - Brunswick Smelting, Belledune, N.B.; Memorandum from R. Gaudet, Water Pollution Control, Environment Canada (Dartmouth) to W. R. Parker, Water Pollution Control, Environment Canada (Dartmouth) dated January 17, 1986. Subject: Monitoring Brunswick Smelter - Belledune, N.B.; Memorandum from J.D. A. Vaughan, Water Pollution Control, Environment Canada (Moncton) to W. R. Parker, Head, Metal Mining and Milling Section, Water Pollution Control, Environment Canada (Dartmouth) dated November 18, 1986. Subject: Bioassay results - Brunswick Smelting; Memorandum from J.D. A. Vaughan, Water Pollution Control, Environment Canada (Moncton) to W. R. Parker, Head, Metal Mining and Milling Section, Water Pollution Control, Environment Canada (Dartmouth) dated December 10, 1987. Subject: Bioassay results - Brunswick Smelting; Obtained from Environment Canada under the federal *Access to Information Act.*

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[197] Ibid.

[198] Memorandum from W.R. Parker, Head, Mineral Industries and Toxic Studies Section, Environment Canada (Dartmouth) to J. de Gonzague, New Brunswick District Director, Environment Canada dated May 26, 1988, Subject: Effluent Survey Results - Brunswick Smelting and Fertilizer, Belledune; Memorandum from J.D. A. Vaughan, Water Pollution Control, Environment Canada (Moncton) to W. R. Parker, Environment Canada (Dartmouth) dated December 14, 1988, Subject: Bioassay results - Brunswick Smelting. Letter from W.R. Parker, Head, Metal Mining and Milling Section, Water Pollution Control, Environment Canada (Dartmouth) to V. Kresta, New Brunswick Department of Municipal Affairs & Environment dated March 30, 1989, Re: Brunswick Mining & Smelting - Belledune Lead Smelter. Memorandum from D. Vaughan, Water Pollution Control, Environment Canada (Moncton) to R. Parker, Environment Canada (Dartmouth) dated July 24. 1989, Subject: Bioassay results - Brunswick Smelting; Memorandum from D. Vaughan, Water Pollution Control,

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[199] Letter from A. Gauthier, Mining Industries & Toxic Studies Section, Environment Canada (Dartmouth) to M. Murphy, New Brunswick Department of Environment, dated December 09, 1991. Re: Belledune Lead Smelter, Brunswick Mining and Smelting Corporation Limited (BMS).Obtained from Environment Canada under the federal *Access to Information Act.*

[200] Ibid.

[201] Presentation to B.E.M. [Belledune Environmental Monitoring] Committee Meeting by Brunswick Mining and Smelting Corporation Ltd, Smelting and Fertilizer Division, October 29, 1991, p. 6. PANB Environmental Planning and Sciences Branch Records RS839.

[202] Ibid., p. 6.

[203] Memorandum from S.J. Wade, Aquatic Toxicology, Environment Canada (Moncton) to W. Roy Parker, Environment Canada (Dartmouth) dated June 22, 1992, Subject: Toxicity Results - Brunswick Smelter, Belledune, N.B.; Memorandum from J. David A. Vaughan, Aquatic Toxicology, Environment Canada (Moncton) to R. Parker, Environment Canada (Dartmouth) dated October 21. 1992, Subject: Toxicity Results - Brunswick #12 and Brunswick Smelter; Memorandum from Kenneth G. Doe, Aquatic Toxicology Section, Environment Canada (Moncton) to W. Roy Parker, Environment Canada (Dartmouth) dated July 13, 1993, Subject: Toxicity Test Results, Brunswick Smelter, Belledune, N.B., Memorandum from Kenneth G. Doe, Aquatic Toxicology Section, Environment Canada (Moncton) to W. Roy Parker, Environment Canada (Dartmouth) dated November 10, 1993, Subject: Toxicity Results, Brunswick Smelter, NB, and Brunswick #12 Mine, NB; Memorandum from J. David A. Vaughan, Toxicology Section, Environment Canada (Moncton) to Andre Gauthier, Environment Canada (Dartmouth) dated October 20, 1994, Subject: Toxicity Results - Brunswick Smelter, N.B.; Memorandum from Suzanne Wade, Toxicology Section, Environment Canada (Moncton) to Andre Gauthier, Environment Canada (Dartmouth) dated July 4, 1995, Subject: Toxicity Results - Brunswick # 12 and Brunswick Smelter, N.B.; Memorandum from Suzanne J. Wade, Toxicology Section, Environment Canada (Moncton) to Andre Gauthier, Environment Canada (Dartmouth) dated November 20, 1995, Subject: Toxicity Results - Brunswick # 12 and Brunswick Smelter, N.B.; Memorandum from Amanda L. Huybers, Toxicology Section, Environment Canada (Moncton) to Andre Gauthier, Environment Canada (Dartmouth) dated June 20, 1996, Subject: Toxicity Results - Brunswick # 12 & Brunswick Smelter; and Memorandum from Gary Wohlgeschaffen, Toxicology Section, Environment Canada (Moncton) to André Gauthier, Environment Canada (Dartmouth) dated December 9, 1996, Subject: Toxicity Results - Brunswick # 12 and Brunswick Smelter. Obtained from Environment Canada under the federal *Access to Information Act.*

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[205] Ibid. , p. S-1.

[206] Hatch Consultants. 2000. Review of Environmental Management Practices for The Base Metals Smelting Sector. Prepared for Environment Canada. November 3, 200. 25 pp. + Glossary of Terms, Bibliography and Appendix.; Hatch Consultants. 2000. Environmental Management Plan Guidance Document for the Base Metals Smelting Sector. Prepared for Environment Canada. November 3, 2000.17 sections + Glossary of Terms, References, Bibliography and Appendices.; Hatch Consultants. 2000. Review of Environmental Releases for The Base Metals Smelting Sector. Prepared for Environment Canada. November 3, 2000. 4 sections + Glossary of Terms, References, Bibliography and Appendices; Haussmann Consulting. 2001. National Consultation Workshop on the Development of Environmental Performance Standards for the Base Metals Smelting Sector Held in Hull, Quebec. January 24-26, 2001. Proceedings. Prepared for Environment Canada. April 30, 2001. 4 sections + Appendices.

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[208] Enforcement Action Briefing Note. January 31, 2001. Warning Letter Belledune Smelter (Noranda Inc.) Fisheries Act Section 36(3). Inspection date August 20, 2000.Obtained from Environment Canada under the federal *Access to Information Act.*

[209] Memorandum from Carole Pomeroy, Toxicology Lab, Environment Canada (Moncton) to Joyce Dagnall, Office of Enforcement, Environment Canada (Dartmouth) dated June 14, 2001, Subject: Results of toxicity Test for a sample from Brunswick Mining & Smelting, N.B.; Memorandum from Werner Van Thielen, Toxicology Laboratory, Environment Canada (Moncton) to Joyce Dagnall, Office of Enforcement, Environment Canada (Dartmouth) dated October 3, 2002, Subject: Results of Toxicity Tests on Brunswick Noranda BMS Smelter; Memorandum from Troy Steeves, Toxicology Laboratory, Environment Canada (Moncton) to Joyce Dagnall, Office of Enforcement, Environment Canada (Dartmouth) dated November 27, 2003, Subject: Results of Toxicity Tests on BMS Smelter Final Effluent, Belledune, NB. Obtained from Environment Canada under the federal *Access to Information Act.*

[210] Hildebrand (1984), p. 54. See note 194.

[211] Ibid., p. 55.

[212] Ibid., p.53.

[213] Letter from R.E.S. Homans, Regional Director Maritimes Region, Department of Fisheries to C.W. Hills, Manager of Process and Chemical Division, Tectonics, Ltd. Saint John, N.B. dated August 17, 1966. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[214] Hildebrand (1984), p. 57-58. see Note 194.

[215] Ibid., p. 50-51.

[216] Crippen, R.W. 1980. Biological Survey of Baie de Chaleurs in the vicinity of Belledune, New Brunswick. Beak Consultants Ltd. A report for Belledune Fertilizer, a Division of Canada Wire and Cable Limited, Belledune, N.B. 16 p. cited in Parker, W.R. 1986. A review of the effect of fluoride in the marine environment in relation to the Belledune fertilizer plant, N.B.. Water Pollution Control Division, Air & Water Branch, EPS, Atlantic Region, Dartmouth, Nova Scotia. February 1986, 11 p.. PANB Environmental Planning and Sciences Branch Records RS 839.

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[219] Parker, W.R. 1986. A review of the effect of fluoride in the marine environment in relation to the Belledune fertilizer plant, N.B.. Water Pollution Control Division, Air & Water Branch, EPS, Atlantic Region, Dartmouth, Nova Scotia. February 1986 PANB Environmental Planning and Sciences Branch Records RS839.

[220] "No significant impact foreseen from added fluoride dumping", *Telegraph-Journal*, June 19, 1986.

[221] Ibid.

[222] Wood, C.S., Duncan, J. and K. Wheeland. 1985. Marine bioassays with lobster larvae and gammarids. *Canadian Technical Report of Fisheries and Aquatic Sciences* No. 1368: 351-372.

[223] Presentation to the Belledune Environmental Monitoring Committee by Brunswick Smelting and Fertilizer Environment Department Representatives, June 14, 1989. 17 p. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[224] Letter from John A. Legault, Head, Habitat Planning and Inventory, Gulf Region (Moncton), Fisheries and Oceans Canada to Insoon Lee, General Manager,

Brunswick Mining and Smelting Corporation Ltd., dated September 27, 1989. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[225] Notes from a meeting held at DFO's Gulf Fisheries Center (Moncton) between staff from DFO Moncton and Tracadie-Sheila and representatives of Brunswick Mining and Smelting. Dated January 16, 1998. 4 p. Obtained from Fisheries and Oceans Canada under the federal Access to Information Act.

[226] Ibid., p. 2.

[227] Ibid., p. 2.

10. More smoke on the horizon

[228] "Belledune picked as site for development: Power plants could cost $1.4 -B" *Times & Transcript*, January 25, 1989, p. 10.

[229] Ibid., p.10.

[230] Ibid., p. 1, 10.

[231] Ibid., p. 1.

[232] General Review Statement of an Environmental Impact Assessment of a Coal-fired Generating Station in New Brunswick. New Brunswick Department of Environment, June 19, 1989. Draft #2. 10 pp. Obtained from Environment Canada under the federal *Access to Information Act.*

[233] Washburn & Gillis Associates Ltd. 1989. Belledune Thermal Generating Station, Environmental Impact Statement. January 18, 1989. Submitted to: NB Power.

[234] Belledune Thermal Generating Station, Belledune Environmental Impact Statement, Draft Working Document, Addendum March 17, 1989. 51 pages, p. 3-13. Obtained from Environment Canada under the federal *Access to Information Act.*

[235] Environment Canada's Technical Review of the Belledune Thermal Generating Station. Environmental Impact Statement (9 pages) attached to a letter sent to Paul Monti, Environmental Planner, New Brunswick Department of Municipal Affairs and Environment from George Lindsay, Director, New Brunswick Office of Environment Canada, May 9, 1989.Obtained from Environment Canada under the federal *Access to Information Act.*

[236] Memorandum from Billie Beattie, Atmospheric Environment Service, Environment Canada, Atlantic Region, to Roger Albright, Head , Assessment Section, Environment Canada, Atlantic Region dated August 09, 1989. Subject: Comments on Belledune EIS (Draft Working Document). Obtained from Environment Canada under the federal *Access to Information Act.*

[237] Memorandum from Billie Beattie, Atmospheric Environment Service, Environment Canada, Atlantic Region, to Roger Albright, Head, Assessment Section, Environment Canada, Atlantic Region dated September 27, 1988. Subject: Comments on Belledune EIS (Draft Working Document). Obtained from Environment Canada under the federal *Access to Information Act.*

[238] Environment Canada. May 9, 1989, p. 3. See note 235.

[239] Fax from Paul Monti, Environmental Planner, Department of Municipal Affairs and Environment, to R. Albright, Head , Assessment Section, Environment Canada, Atlantic Region dated June 23, 1989. 11 pages. Obtained from Environment Canada under the federal *Access to Information Act.*

[240] Belledune Thermal Generating Station, Belledune Environmental Impact Statement, Draft Working Document, Addendum March 17, 1989. 51 pages, p. 2-7. Obtained from Environment Canada under the federal *Access to Information Act.*

[241] "Que. group enlivens thermal plant hearing", *Telegraph-Journal*, October 12, 1989, p.3; "Chaleur mayor want pollution monitored", *Telegraph-Journal*, October 13, 1989, p.3.; Final Report to Canada Ports Corporation by Le Groupe Ecotone Inc., Montreal. Construction of a Coal-fired Thermal Generating Station in Belledune, New Brunswick. Review of the Environmental Report. November 1989. 105 pp., p. 28. Obtained from Environment Canada under the federal *Access to Information Act.*

[242] "Call for scrubbers at thermal plant is overwhelming", *Northern Light,* October 18, 1989, p. 5A.

[243] "No scrubbers needed at plant – NB Power", *Telegraph-Journal*, October 13, 1989, p.3

[244] Ibid.

[245] "Power plant will get scrubbers", *Telegraph-Journal*, November 17, 1989, p.1

[246] The New Brunswick Department of Environment publishes annual reports on air quality in the province. In 1997, Belledune coal-fired power plant violated the provincial 1-hour SO2 standard 29 times and, in 1998, the standard was violated 46 times. In 2001, the 1-hour standard was violated 3 times and in 2002 it was violated 5 times. In 2003, the most recent year reported by the province, there were 4 violations of the1-hour standard, however, the air quality monitors were not operating for six months. Air Quality Monitoring Reports

can be found on the provincial Environment Department website at: http://www.gnb.ca/0009/0355/0015/index-e.asp

11. Inconvenient truth

[247] Pilgrim, W. 1991. Monitoring Heavy Metals Near Belledune Lead Smelter 1980-1991. 62 pp + Table of Contents, Forward and Summary. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[248] Ibid. Summary

[249] Ibid., p.45.

[250] Inter-Office Memo from Paul Monti, Policy Branch, NB Environment Department to Jim Knight, Operations Branch, NB Environment Department, dated September 12, 1991. Subject: Belledune Biomonitoring Report. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[251] Ibid.

[252] Ibid.

[253] Pilgrim, W. 1992. Monitoring Heavy Metals Near the Belledune Lead Smelter and the Bathurst-Dalhousie Railway, 1980-192. Draft, October 1992. 63 p. + Table of Contents, Summary, Description of Studies, Acknowledgments, List of Figures, List of Tables. Obtained from Fisheries and Oceans Canada under the federal *Access to Information Act.*

[254] Inter-Office Memo to Mark Allen, Director, NB Community & Environmental Health Unit, from D.J. Ecobichon, NB Community & Environmental Health Unit, dated May 26, 1993. Subject: Belledune Report. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[255] Ibid.

[256] Inter-Office Memo to Jim Knight, Operations Branch, NB Environment Department, from M.C. Allen, Director, NB Community & Environmental Health Unit, dated June 2, 1993. Subject: Belledune Report. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[257] Belledune Environmental Monitoring Committee, Minutes of Meeting Held October 26, 1993. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[258] Pilgrim, W. 1995. Lead, Cadmium, Arsenic, and Zinc in the Ecosystem Surrounding the Belledune Lead Smelter. Department of Environment. February 1995. 40 p. + Table of Contents, List of Tables, List of Figures, Summary. PANB, Environment Protection, Formerly Pollution Control Branch, RS 314.

[259] Ibid., p. 32.

[260] Pilgrim, W. and R.N. Hughes. 1994. Lead, Cadmium, Arsenic and Zinc In The Ecosystem Surrounding A lead Smelter. *Environmental Monitoring and Assessment* 32:1-20.

[261] Ibid, p.18.

12. Digging up the dirt

[262] "Belledune pegs future on industrial waste", Canadian Broadcasting Corporation (CBC), New Brunswick. March 14, 2003.

[263] Renviro Park: Important to Chaleur's Future - Le parc Renviro: facteur déterminant dans l'avenir de la région. Undated 12-page promotional flyer distributed to households in Belledune.

[264] Ibid.

[265] Bennett Environmental has referred to the technology used to treat contaminated soil as a thermal oxidizer and an incinerator. In their 2003 annual report filed with the U.S. Securities and Exchange Commission, they use the term "thermal oxidizer" and "incinerator" interchangeably. (See: Bennett Environmental Inc., Annual Report Pursuant to Section 13(a) or 15(d) of the *Securities Exchange Act* of 1934, Securities and Exchange Commission, Washington D.C. Form 40-F, 2003.)

More recently, in their appearance (May 17, 2006) before the federal-provincial Joint Panel Review of the Remediation Project for the Sydney Tar Ponds and Coke Oven Site, representatives of Bennett Environmental Inc referred to the process and technology used to clean soil as "incineration" and an "incinerator". (See: Transcripts from the Public Hearing, Sydney Tar Ponds and Coke Oven Site, Remediation Project, Joint Panel Review, Volume 17: page 3246 line 16; page 3245 line 18, 25; page 3248 line 11; page 3250 line 17; page 3251 line 5; page 3252 line 11; page 3254 line 6, 9, 15; page 3255 line 2, etc).

[266] E-Mail to Terry Steeves, Business New Brunswick, and John Thompson, Business New Brunswick from Danny Ponn, Vice-President and CEO of Bennett Environmental dated January 14, 2003. Subject: Belledune Project. Obtained from NB Department of Environment under provincial *Right to Information Act.*

[267] Ibid.

[268] Bennett Environmental Inc., Minister's Determination. Conditions of Approval, Pursuant to Regulation 87-83 under the Clean Environment Act. January 17, 2003. File Number: 4561-3-897. Obtained from the New Brunswick Department of Environment and Local Government.

[269] Letter to I. Brophy, Project Manager, Office of the Chief Medical Officer of Health, NB Department of Health and Wellness, from D. Marquis, Project Manager, Jacques Whitford Environmental Ltd, dated July 9, 2003. 19 p. Obtained from NB Department of Health and Wellness under provincial *Right to Information Act*.

[270] Ibid., p. 7.

[271] Jacques Whitford Environmental Ltd. 2003. Report to Bennett Environmental Inc. Human Health Risk Assessment. Proposed High Temperature Thermal Oxidizer Facility. Belledune, New Brunswick. June 11, 2003., p. 8-3.

[272] Ibid., p. 8-3.

[273] Ecobichon's notes dated July 4, 2003. Obtained from the NB Department of Health and Wellness under provincial *Right to Information Act*.

[274] Letter to I. Brophy, Project Manager, Office of the Chief Medical Officer of Health, NB Department of Health and Wellness, from D. Marquis, Project Manager, Jacques Whitford Environmental Ltd, dated July 9, 2003. 19 p. Obtained from NB Department of Health and Wellness under provincial *Right to Information Act*.

[275] Letter to I. Brophy, Project Manager, Office of the Chief Medical Officer of Health, NB Department of Health and Wellness, from D. Marquis, Project Manager, Jacques Whitford Environmental Ltd, dated August 1, 2003. 32 p. Obtained from NB Department of Health and Wellness under provincial *Right to Information Act.*

[276] "Toxic soil report are 'scare tactics': Fear-mongering designed to stop planned construction of Belledune incinerator: Environment Minister". *Times & Transcript,* August 29, 2003.

[277] Open Letter to Residents of Belledune from Thompson Hickey, General Manager, Noranda Inc. Brunswick Smelter. Dated September 8, 2003.

[278] Letter to I. Milewski, Science Advisor, Conservation Council of New Brunswick from B. Fowlie, Minister, Environment and Local Government. Dated October 16, 2003. File No. 6430- N2.

[279] Ibid., p.2.

[280] On September 19, 2003, Junia Culligan and other residents appealed the September 12, 2003 decision by the Belledune District Planning Commission to issue Bennett Environmental Inc a permit to construct. The appeal was made under section 86(2)(b)(ii) of the *New Brunswick Community Planning Act.*

[281] "Wake up - Bennett project is a good one," *Northern Light*, October 3, 2003.

[282] Ibid.

[283] "Power plant will get scrubbers", *Telegraph-Journal*, November 17, 1989, p.1

[284] "Health study to be conducted in Chaleur area." News Release, December 16, 2003. Communications New Brunswick (NB1195).

13. Health crisis exposed

[285] "Minister announces further study for the Belledune area", New Brunswick Department of Health and Wellness News Release, May 24, 2005

[286] The 98-page Summary Report of the Belledune Area Health Study is posted on the New Brunswick Department of Health and Wellness website. The complete study, comprised of five Appendices and several sub-Appendices, can be obtained by request from the Department of Health and Wellness.

[287] "Belledune cancer, mortality rates high", *Telegraph-Journal*, May 25, 2005, p.1.

[288] Belledune Area Health Study. 2005. Appendix E - Pilot survey of blood lead levels in Belledune Area children.

[289] Decou, M.L. Blood Lead in Niagara County. Regional Niagara Health Department, 2001. Ellis, E. Blood Lead in Ottawa Carleton, Ottawa-Carleton Regional Health Department, 2001 cited in Belledune Area Health Study. 2005. Appendix E - Pilot survey of blood lead levels in Belledune Area children.

[290] *Telegraph Journal*, May 25, 2005. See note 287

[291] "Minister slammed for waiting to issue mussel alert", *Telegraph-Journal*, May 26, 2005

[292] Ibid.

[293] "Doctor has no qualms about Mussels", *Telegraph-Journal*, May 27, 2005

[294] *Telegraph-Journal*, May 25, 2005. See note 287.

[295] "Belledune cleanup needed, Coon says", *Telegraph-Journal*, May 26, 2005

[296] "Minister announces further study for the Belledune area", New Brunswick Department of Health and Wellness News Release, May 24, 2005.

[297] "Peer reviewer hired for health study in Chaleur area", New Brunswick Department of Health and Wellness News Release, April 24, 2004.

[298] Ibid.

[299] Dillon Consulting Ltd., Health Study for the Greater Belledune Area: Draft Summary Report Peer Review Comments, January 24, 2005, page 28.

[300] Ibid., page 26.

[301] Review of Belledune Area Health Study (BAHS) Documents. A report prepared by D.L. Pengelly for Conservation Council of New Brunswick. November 15, 2005. 15 p.

[302] Milewski, I, and I. Aubé. 2006. Belledune Children's Health Survey. Conservation Council of New Brunswick. unpublished results.

[303] Goss Gilroy Inc. 2005. Belledune Area Health Study. Appendix AC - Toxicity Profiles. February 2005. 83 p.

[304] Jacques Whitford. 2006. Final Report: The Belledune Area Environmental Sampling Study. Project No. 10001701.

[305] Ibid., Appendix D.

[306] "Belledune fish, plants safe: study", *Telegraph-Journal,* June 2, 2006, p. A2.

[307] "Belledune health study sheds little light on cancer rates: minister", *Times & Transcript*, June 2, 2006.

[308] Telegraph-Journal, June 2, 2006, p. A2.

14. Sacrifice Zone

[309] Hildebrand (1984), p. 75. See note 194.

[310] "City wants to relocate 2 lead plants", *Globe and Mail*, Toronto. November 1, 1973, p.1; "Second child enters hospital with high lead level in blood", *Globe and Mail*, November 1, 1973, p5. "Two mothers believe children were victims of lead from smelter", *Globe and Mail*, November 1, 1973, p.5.

[311] Letter to The Producer, "As it Happens" CBC, from A.E. Jarrett, Executive Assistant to the Minister, New Brunswick Department of Labour, dated November 1, 1973. PANB Survey of Lead Hazards RS 136.

[312] Dugdale and Hummel (1978),. p. 58. See note 112.; "Company Takes Blame For Cadmium Content," *Northern Light*, May 7, 1980, p. 9.

[313] New Brunswick Ministers of the Environment and Deputy Ministers 1971-2006

Ministers

G.W.N. Cockburn: Nov. 12, 1970 - Dec. 3, 1974
Fernand Dubé: Dec. 3, 1974 - Nov. 21, 1978
Eric Kippling: Nov 12, 1978 - Oct. 30, 1982
C.W. Harmer: Oct 30, 1982 - Oct.3 , 1985
Robert Jackson: Oct 30, 1985 - Oct. 27, 1989
Vaughn Blaney: Oct. 27, 1987 - Oct. 9, 1991
Jane Barry: Oct. 9, 1991 - Apr. 25, 1994
Marcelle Mersereau: Apr. 27, 1994 - Sept 26, 1995
Joan Kingston: Sep. 26, 1995 - July 23, 1997
Gene Devereux: May 14, 1998 - June 21, 1999
Kim Jardine: June 21, 1999 - June 27, 2003
Brenda Fowlie: June 27, 2003 - July 21, 2005
Dale Graham (Acting Minister) - July 21, 2005 - Nov. 21. 2005
Trevor Holder: Nov 21. 2005 -

Deptuy Ministers

Leonce Chenard: 1971- 1974
Brian B. Barnes: 1975-1985
Pierre C. Marquis: 1985/86 - 1988/89
Julian Walker: 1989 - 1991/92
Donald Dennison: 1992/93 - 1989/99
T. Byron James: 1999- 2002/30
Hermel Vienneau: Sept. 2003 -

[314] New Brunswick Ministers of Health and Deputy Ministers of Health (1968-2006)

Ministers

Norbert Theriault: Nov. 20, 1967 -
Paul Creaghan: Nov. 12, 1970 - July 18, 1972
Lawrence Garvie: July 18, 1972 - Dec. 3, 1974
G.W.N. Cockburn: Dec. 3, 1974 - Dec. 20, 1976
Brenda Roberston: Dec. 20, 1976 - Oct. 30, 1982
Charles Gallagher: Oct. 30, 1982 - Oct. 3, 1985
Nancy Clark Teed: Oct. 3, 1998 - Oct. 27, 1987
Raymond Frenette: Oct. 27, 1997 - Oct. 27, 1991
Russell King: Oct. 9, 1991 - May 14, 1998
Ann Breault: May 14, 1998 - June 21, 1999
Dennis Furlong: June 21, 1999 - Mar. 23, 2000
Elvy Robichaud: Oct. 9, 2001 - Feb. 14, 2006
Brad Green: Feb. 14, 2006 -

Deptuy Ministers

Nov. 12, 1970 J.G. LeBlanc: 1968
J. Graham Clarkson: 1969 - 1970
Ernest A. Watkinson: 1971 - 1975/76
W.K. Morrissey: 1976/77 - 1980/81
Claire M. Morris: 1982/83 - 1986/87
Jean-Guy Finn: 1987/88 - 1996/97
Paul M. LeBreton: 1997/98 - 1999/2000
Nora Kelly: 2000/01 -

Source: New Brunswick Legislative Library.
http://www.gnb.ca/legis/leglibbib/index.asp