Uranium rush leaves wake of toxic debris

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A uranium exploration and mining boom centered in Northern Saskatchewan, is currently taking place in Canada. A first boom came in the early 1950's as a result of the nuclear arms race, and the second began in the early 1970's when uranium prices were inflated by a price-fixing cartel.

At present, six new mines are under construction, and the whole of Northern Saskatchewan is experiencing intensive exploration.

Uranium mining in Northern Saskatchewan takes the form of open pit and underground mines. Once the uranium ore (or rock containing uranium) is taken out of the ground the uranium is extracted by processing the ore in a mill, where it is crushed, ground down to a fine sand, and reacted with chemicals.

Uranium ore in Northern Saskatchewan generally contains only a few tenths of a percent uranium. All the rest of the rock is unwanted, and therefore considered to be waste. In addition, huge quantities of unusable liquid by-products are produced in the milling process. Up to 2000 pounds of waste water for example are created to produce 1 pound of "yellowcake"—the final product from an uranium mill.

In recent years there has been increasing concern over the health and environment effects of these wastes.

It is now realized that while milling removes about 90% of the uranium, few of the other radioactive materials are removed. In fact, 85% of the total radioactivity remains in the wastes, including almost all the radium and thorium.

Concern has arisen because radiation, even in low doses, may well be harmful to life forms. Critics of uranium mining argue that our actions today are creating environmental dangers that will last "forever".

Radionuclides are not the only hazardous component of mill wastes, however. Also of concern are heavy metals such as iron, copper and arsenic, which do not decay but are always toxic.

To date, precautions taken with solid mill wastes have been so minimal that these wastes have even been used as construction fill material, while liquid wastes have been directly dumped into lakes and streams.

At Uranium City, in Northern Saskatchewan, city streets, homes, and the local High School, Candu High, have been built on radioactive mill wastes.

In April, 1977, radiation levels in the school were 60 times higher than the "acceptable" limit set by the Atomic Energy Control Board (AECB). In an attempt to solve the problem, a venting system was installed in the building. Ironically, the vents designed to decontaminate the school now release contaminants into a school used by the students.

To deal with the problem of radiation in buildings constructed on mill wastes, the AECB established a clean up and decontamination program late in 1976. The program, according to a *Globe and Mail* article of March 19, 1980, has a budget of $4 million per year, and total costs are estimated to be in the range of $20 million.

Of yet more concern than solid contaminants are the liquid wastes which have a greater impact on the surrounding environment. The reason for this is that liquid wastes are easily carried to locations far from the mine site.

In Northern Saskatchewan, contaminated water from the Beaverlodge mines flows into Lake Athabasca. From there, contaminants are able to flow down the Slave River, and into the MacKenzie river which flows into the Arctic Ocean. (In the late 1950's and early 1960's Eldorado Nuclear reports that wastes from the Gunner Beaverlodge mill were dumped directly into Lake Athabasca.)

Streams and lakes have long been used to absorb pollutants. However, experience with pollution of the Great Lakes has taught us that a water system is not infinite and can only deal with a finite quantity of pollutants. The risk of overloading a natural system is always present.

To avoid this overload, surface water quality standards and regulations for radioactive and non-radioactive substances have been established. As with many industries, research by the B.C. Survival Alliance has shown that it is a tradition within the uranium industry to grossly exceed water quality standards. In addition, the fact that the recent Dubyna Lake, and Key Lake mine proposals in Saskatchewan have included effluent releases which exceed water quality regulations for a variety of radioactive and non-radioactive substances further indicates that compliance with regulations is not taken seriously.

Government data show that levels of uranium, radium, iron, and copper in lakes and streams downstream from the Beaverlodge mines all excess concentrations for either, or both, suitability for human drinking water and aquatic life. As well, it is stated by Menely Consultants of Saskatchewan that at the Key Lake mine, levels of arsenic are high enough to present a serious hazard.

At Fookes Lake, downstream from the Beaverlodge mines, iron levels are more than 7 times the level safe for fish (stated by the federal Environmental Protection Service to be .5 parts per million), and almost 15 times the level suitable for human drinking water (.3 parts per million—according to Health and Welfare Canada.)

Copper levels in Fokes Lake are 6 times the level necessary to kill trout and salmon (.03 parts per million—as determined by the Canadian Department of the Environment).

At several points surrounding Fookes Lake, uranium concentrations are more than 100 times the "maximum concentration" for drinking water established by Health and Welfare Canada (set at 20 parts per billion).

A further water quality problem is high acidity of waste water and mine drainage. Nero Lake for example, downstream from Eldorado Nuclear's Beaverlodge operation, has been found by the Environmental Protection Service to have a pH of 3.4, which is in the pH range of vinegar. The low pH is due to the production of sulfuric acid from oxidization of pyrite contained in mill wastes, combined with the addition of large quantities of sulfuric acid in the milling process. A particular problem with acidic wastes is that high acidity increases the solubility of radium, uranium, thorium, and other heavy metals.

Groundwater contamination is also a problem, though until recently it has not been recognized by regulatory authorities. Water quality is often judged by surface water monitoring alone. This ignores the ground water seepage problem. Contamination of groundwater has been taking place for almost 30 years, as common practice since the beginning of mining in the early 1950's according to the Atomic Energy Control Board has been to simply dump wastes directly on the surface and into lakes and streams.

Uranium mine and mill wastes degrade water quality to such a degree that aquatic communities are completely eradicated in the immediate vicinity of a mine.

As distance increases from the source of contamination, the effect on plants is no longer so obvious. However, radioactivity and heavy metals can travel through a complexity of biological pathways and build up to high concentrations.

Radioactivity in the environment eventually finds its way up the food chain to animals, and this, one must remember, includes people.

This area of study is almost completely unexplored in the Canadian context.

Nevertheless, an example of a biological pathway to people that has been confirmed through scientific study is one involving the lichen-to-reindeer-to-human chain.

Finnish scientists from the University of Helsinki found that people consuming reindeer that ate contaminated lichen ended up with 8 times the normal level of radioactivity in their blood. Lichens accumulate greater amounts of trace elements than other plants because their slow growth increases their exposure time to environmental contaminants.

Research in Russia by A. Il'enko found the effect on small mammals living in areas with high uranium and radium concentrations is greater incidence of sterility. It was also found that gamma radiation reduced bird populations, by reducing the number of hatching eggs. Generally though, research is limited to bioaccumulation of radioactivity in the aquatic environment, and does not examine the impact of that bioaccumulation.

A study on the accumulation of radioisotopes in plants and fish was recently conducted by Eldorado Nuclear at their Dubyna mine, situated 12 km. NE of Uranium City. Results of this work clearly showed that levels of radioactivity in plants and fish were thousands of times greater than levels in the surrounding water, and that the degree of uptake is element and species specific.

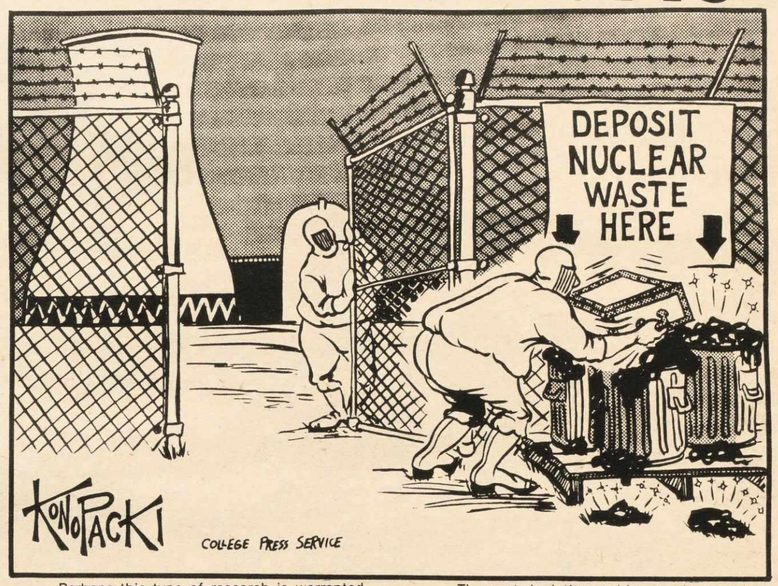
For example, of the three aquatic plants studied, millfoil concentrated uranium the greatest (at 14,000 times) while waterlily concentrated greater amounts of radium (at 11,000 times), and sedge the greatest amount of lead—210 (at 13,000 times).

Radioactivity accumulated by both Northern Pike and Lake Trout is concentrated more in the bone (up to 11,000 times) than in the flesh (up to 6,500 times) and therefore several parts of such fish must be examined to determine such accumulations.

The degree of concentration though is species specific. Lake Trout were found to have greater levels of uranium, thorium, and lead—210 for example, but Northern Pike had the greatest level of radium.

The effects of radioactivity on some species of fish are known, though a great deal of research has not been done. In a sample of fish taken by Eldorado Nuclear Ltd., downstream from the Beaverlodge mines, examination showed 25% of the Lake Chub caught to have eye deformities. Some of the fish had one or both pupils deformed.

Eldorado Nuclear's studies did not examine the effects of radioactivity at higher points in the food chain.



Perhaps this type of research is warranted since a number of cow moose have been found carrying a two-headed fetus near Northern Saskatchewan uranium mines. Some may say this is merely coincidence, but it is not coincidence that the main food of moose, aquatic plants, are highly contaminated with radioactivity—as confirmed by the Dubyna Lake samples noted above.

NO SOLUTION IN SIGHT TO WASTE PROBLEM

If present expansion plants take place, the annual production of solid wastes will more than double by 1990. In their current search for a longterm solution to contamination by wastes, government and industry are considering "encapsulation" on the surface or underground, both of which have serious drawbacks.

Surface isolation schemes hold the risk of being exposed to erosion and weathering. Underground isolation has the advantage of avoiding catastrophic pollution on the surface though there is no guarantee that such pollution will not occur underground.

Even barring the possibility of a catastrophe, due to the difficulty in eliminating seepage, the underground site itself still has to be isolated from human use forever.

The waste isolation problem can be regarded as "solved", only when longterm contamination of an area is accepted.

Seepage-proof, waste isolation proposals are based on the theory that seepage in and out of a waste area can be eliminated by covering the top and bottom with an extremely low permeability material, thus preventing contamination of surface and groundwater.

Even though waste "encapsulation" designs do exist, in the Canadian context there is a significant barrier to their implementation. In both the Ontario and Saskatchewan uranium mining areas, large volumes of low permeability material simply do not exist.

What is more, seepage-proof designs remain in the realm of unproven theory. It is well accepted among hydro-geologists that seepage cannot be eliminated over the short term, let alone the long term. Needless to say, there is a high degree of uncertainty with regard to the future of uranium mine wastes.

In short, it can be stated that the current form of uranium—dependent, northern development in Saskatchewan is based on the "distant cow principle"—"the southerners get the milk and the northerners get the shit."

In the case of uranium mining, the shit will be around for a long time, and there's more to come.

Native people—refugees in own land

Uranium mining in Northern Saskatchewan is a controversial issue. While the government is actively supporting the rapid expansion of existing mines and the construction of several new mines, native land claims have not been settled and a group of people known as "uranium refugees" emerged.

To further express their concerns, community and environmental groups throughout Saskatchewan have boycotted the recent environmental inquiry into the Key Lake mine.

The Saskatchewan government strongly influences the uranium industry in its province: as of March 1, 1975 a revision in the Saskatchewan Mineral Resources Act requires all new exploration and mining projects to offer up to 50 per cent participation to the provincial government-owned corporation, Saskatchewan Mining Development Corporation [SMAC].

By 1978, SMAC was one of ten corporations accounting for 60 per cent of total Canadian exploration.

In 1979, according to their most recent annual report, SMAC was involved in about 240 exploration and development projects, only seven of which they own 100 per cent. SMAC owns a percentage of five of the six mines under construction in Saskatchewan and one of the producing mines.

People questioning the present form of northern development in Saskatchewan, and the uranium industry in particular, have been given no meaningful way to voice their concerns, and often learn of mine developments after they are well into the construction phase. For example, the Saskatchewan government, in the late 1970's granted AMOK, a large French Uranium Company, exploration leases in the Cliff Lake area. The first time the Indians became aware of this was when trees were being cut, trap lines being burnt, and in some cases, drilling taking place beside camps already in use.

When they complained, the Save the North Committee of Northern Saskatchewan reports that the Native people were told they were trespassing. The Indians were forced to move from their ancestral homes without any compensation or prior warning. These are the people who have become known as uranium refugees.

In an attempt to improve public input, the government convened a board of inquiry to examine the most recently proposed mine—Key Lake. The board's terms of reference did not allow it to consider aboriginal rights or land claims however, nor did the terms of reference give authority to stop the mine.

More than a year before public environmental hearings began, the federal crown corporation Eldorado Nuclear Ltd., had made the last payment on $95 million interest in the Key Lake mine. In addition, at least eight lakes were drained, a 200 kilometer road built into the site, and employee accommodations constructed, all under the name of "exploration".

For these reasons the inquiry was boycotted by community and environmental groups throughout Saskatchewan.

When the Key Lake Inquiry opened in La Ronge, a group of more than 50 people marched down Main Street demanding recognition of native rights and an end to uranium mining. The group of protesters was part of a "Caravan for Survival" that travelled from Regina to Saskatoon and Prince Albert, to publicize their concern over human rights violations by the government and uranium companies. To "record" the event, in Prince Albert, "camera men" equipped with long telephoto lenses were stationed on the roofs of buildings as was a video crew on the street.

La Ronge, situated about half way up the province is the gateway point for northern uranium developments. Due to the uranium boom, the population of the town has doubled to about 3,500.

Not everyone is happy in La Ronge, however.

Early this spring a molotov cocktail was thrown through the front office window of Uranerz Canada Ltd., a West German owned uranium exploration and mining company. The cocktail did not ignite but Uranerz reacted by spending over $10,000 on installing bullet proof glass.

Uranerz owns 50 per cent of the Rabbit Lake mine and one-third of the Key Lake mine.

Uranium exported to Soviet Union

The uranium industry, or the "front-end" of the nuclear fuel chain, is of key importance in the debate over the pros and cons of nuclear power. The reason for this is that uranium is the raw material used to fuel the nuclear industry.

Almost all uranium mined is used for either production of nuclear weapons or fuel for nuclear reactors, and negligible amounts are used for medical and industrial purposes. The exact proportions of these different uses is unknown because military consumption is not made public.

However, it is known that Canadian uranium from the Port Radium, NWT mine, was used, in part, to fuel the Hiroshima and the Nagasaki bombs, and that Canadian uranium is being used by the French to fuel their regular nuclear weapons' tests in the South Pacific.

Over 90 per cent of Canadian uranium is exported. This means that less than 10 per cent is used for the production of Canadian-consumed electricity.

Most of the uranium is mined by American, British, French and West German companies. Canadian uranium is sold to the following countries: Belgium, Finland, Switzerland, Italy, Japan, South Korea, Spain, Sweden, the United Kingdom, the United States and West Germany.

Further, according to J.W. Beare, Director of the Safeguards and Nuclear Materials Branch of the AECB, uranium has been sent to the Soviet Union for enrichment (a further step in the processing for consumption by nuclear reactors). For example, in 1979 about 1000 tons of uranium owned by the Canadian crown corporation Eldorado Nuclear Ltd. and the West German government-owned corporation Uranertz Canada Ltd. was exported to the Soviet Union.