

Regulatory Oversight of the Legacy Gunnar Uranium Mine and Mill Site in Northern Saskatchewan, Canada – 13434

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ABSTRACT

As Canada's nuclear regulator, the Canadian Nuclear Safety Commission (CNSC) is responsible for licensing all aspects of uranium mining, including remediation activities at legacy sites. Since these sites already existed when the current legislation came into force in 2000, and the previous legislation did not apply, they present a special case. The *Nuclear Safety and Control Act* (NSCA), was written with cradle-to-grave oversight in mind. Applying the NSCA at the end of a 'facilities' life-cycle poses some challenges to both the regulator and the proponent. When the proponent is the public sector, even more challenges can present themselves. Although the licensing process for legacy sites is no different than for any other CNSC license, assuring regulatory compliance can be more complicated. To demonstrate how the CNSC has approached the oversight of legacy sites the history of the Commission's involvement with the Gunnar uranium mine and mill site provides a good case study. The lessons learned from the CNSC's experience regulating the Gunnar site will benefit those in the future who will need to regulate legacy sites under existing or new legislation.

INTRODUCTION

The legacy Gunnar Uranium Mine Mill Site in northern Saskatchewan has presented a challenge to the Federal regulator since it fell under the jurisdiction of the NSCA in 2000. Challenges included the remoteness of the site, the public sector ownership, the interpretation of new legislation, developing new relationships with small communities and first nations, and coordinating the regulation of this site within a large program regulating many sites across Canada. The regulatory history at this site is representative of the approach used at all of the legacy sites managed under this program.

REGULATING URANIUM MINING IN CANADA

The Atomic Energy Control Act (1946)

The regulation of mining in Canada is primarily the responsibility of the Provincial Crown. Each Province has a Mining Act and regulates exploration and all aspects of mining within their land area. The main exception to this began during World War II and the mining of metals of strategic importance to national interests, including uranium. This national interest in uranium production and use remained a high priority for the Federal government for many decades after World War

II. In order to regulate the emerging technology and potential of atomic energy the Canadian Government established the Atomic Energy Control Board (AECB) under the *Atomic Energy Control Act* (AECA) in 1946. At that time the Board's mandate was to only regulate the nuclear industry's research activities. It wasn't until 1960 that the regulations were amended to empower the AECB to regulate the health and safety of atomic energy workers.

In the early years of the AECA, the AECB's only influence on uranium mining was that it permitted the sale of uranium through the crown corporation Eldorado Mining and Refining Limited. The regulation of mining operations and any safety standards were deferred to the Provinces who were already performing this function.

This remained relatively unchanged during the "boom years" described below with the AECB providing health and safety guidance to the provinces regulating the mines, but not actually regulating the operations themselves.

During the late 1960s and throughout the 1970s Canada was part of the global environmental "awakening". Attitudes toward the health and safety of humans and the environment were changing. At the same time Canada was part of the growing nuclear power industry. Not only was Canada building nuclear power plants to produce electricity, Canada was also positioned to supply the uranium for the growing global market. During this time of change the AECB's focus shifted to developing regulations to address health and safety, including the re-emerging uranium mining industry.

How did the AECA apply to the Gunnar site? Technically it didn't. During operations the Gunnar mine was permitted to extract uranium and sell through Eldorado to meet the Canada-Great Britain-US contracts. And after 'closure' the mine was abandoned. As in most jurisdictions, abandoned properties revert to the Crown (in this case the Province of Saskatchewan). The AECA was not binding on the Crown.

The Nuclear Safety And Control Act (2000)

On May 31, 2000 the *Nuclear Safety and Control Act* (NSCA) replaced the *Atomic Energy Control Act* (AECA). This was modern legislation that better reflected the evolving role of the national regulator.

A quick review of the Sections of the NSCA of direct importance to this paper includes:

3. The purpose of this Act is to provide for
 - (a) the limitation, to a reasonable level and in a manner that is consistent with Canada's international obligations, of the risks to national security, the health and safety of persons and the environment that are associated with the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information;

One can see from the wording of Section 3 that the NSCA was constructed to regulate the complete life-cycle of nuclear activities. Furthermore, under the numerous transitional provisions of the NSCA it is presumed that at no time would sites that required regulation ever fall outside of the jurisdiction of the Commission. For example, Section 80 states that:

- 80.** A licence that is issued pursuant to regulations made under paragraph 9(b) of the *Atomic Energy Control Act* and that is in force immediately before the commencement day is deemed to have been issued under section 24 of this Act and to be in force for the remainder of the period for which it was issued under the *Atomic Energy Control Act* and any fees paid or payable under the *AECB Cost Recovery Fees Regulations, 1994* in respect of such a licence are deemed to be paid or payable, as the case may be, under this Act.

However, nowhere in the NSCA or its regulation is there a recognition that sites might already exist outside of the jurisdiction of the AECA, that might come under the jurisdiction of the NSCA. One specific change, which broadened the jurisdiction of the NSCA, is found in Section 4 of the NSCA:

- 4.** Subject to any order made pursuant to section 5, this Act is binding on Her Majesty in right of Canada or a province.

Prior to the coming into force of the NSCA in 2000, uranium mine and/or mill sites, uranium or radium contaminated land, or other lands contaminated with nuclear substances were generally subject to the AECA. The exception being those that were owned by the Federal or Provincial government which were outside of the jurisdiction of that Act. On May 31, 2001 these sites became subject to the NSCA.

Section 26 of the NSCA states:

- 26.** Subject to the regulations, no person shall, except in accordance with a license,
- (a) possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information;
 - (b) mine, produce, refine, convert, enrich, process, reprocess, package, transport, manage, store or dispose of a nuclear substance;

Therefore in the absence of a license to possess, manage and store nuclear substances, all of these Crown owned sites were technically out of compliance with the laws of Canada. Of course the coming into force of a new Act did not change the risk at any of these sites, nor did it imply any explicit danger related to these sites. However, there was now a requirement for the sites to be assessed against the requirements of the legislation, and there was the administrative matter of

the non-compliances.

The Gunnar mine and mill site was one of these sites.

HISTORICAL CONTEXT

The Canadian Uranium Boom Of The 1950s

In 1930 prospector Gilbert Labine discovered pitchblende, on the shores of the Canada's Great Bear Lake. This led to the development the Eldorado (radium) Mine at Port Radium, Northwest Territories in 1932. The ore was shipped south to Port Hope, Ontario for refining. The legacy of the impacts of the radium industry in Ontario is the topic of another paper.

World War II and the Manhattan Project introduced a need for uranium. The Port Radium mine was reopened as part of Canada's contribution to the project. At the time, and until 1947 the prospecting for and mining of uranium was restricted to Eldorado Mining and Refining Limited, a crown corporation (wholly owned by the Government of Canada).

To meet the needs of Canada's strategic partners, The United States and Great Britain, the restrictions on prospecting were removed in 1947. At the same time the Canadian government entered into contracts to supply uranium to Great Britain and the United States. To deliver on these contracts the price of uranium was fixed at a high level. The resulting exploration boom led to many new mines being developed in the Northwest Territories, northern Saskatchewan and central Ontario. Many of these mines shipped their ore off-site to a local mill. One of these sites which had a mill associated with it was the Gunnar Uranium Mine in northern Saskatchewan.

The Crash Of The 1960s

In the early 1960s the strategic partners had less need of a guaranteed supply of uranium and chose not to renew the Canadian contracts. The Canadian government removed the fixed price and many uranium mining operations became too expensive to run. Of the 20 uranium mills operating in 1960 across Canada, only 3 continued operations after 1965. Figure 1 shows the historic uranium mills that have operated in Canada prior to the 1990s.

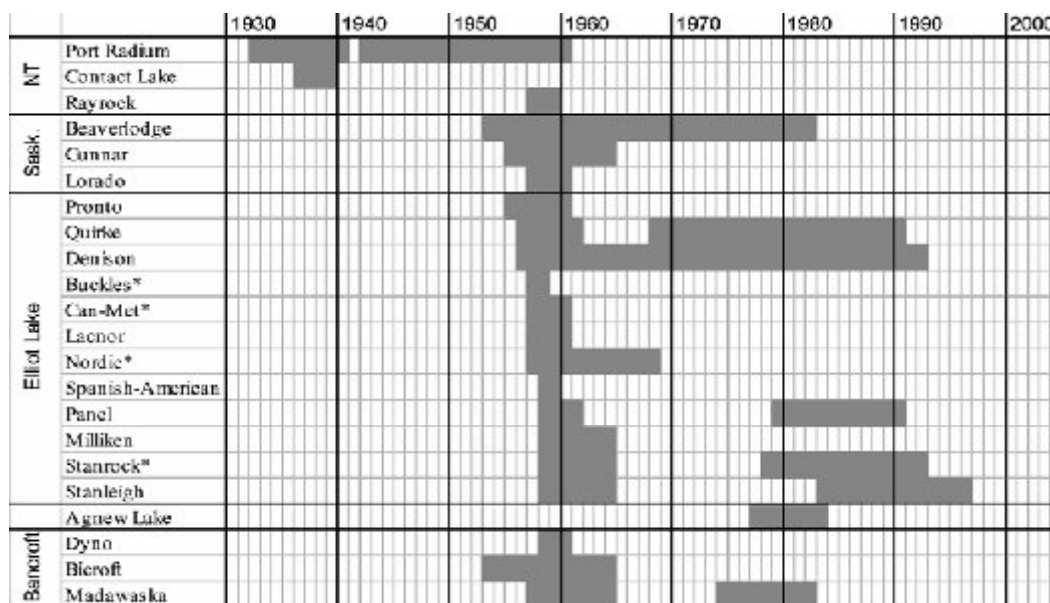


Figure 1: Operating Years for Historic Uranium Mills in Canada Prior to 1990.

One of the uranium mine/mill sites affected by this boom and bust was the Gunnar Uranium Mine in northern Saskatchewan. In its eight years (1955-1963) of both open-pit and underground mining, the Gunnar mine produced over 5 million tonnes of uranium ore, grading at 0.15% uranium. Like many of its sister mines, with the collapse of the uranium market in 1963 the Gunnar mine workings, and the associated infrastructure, was abandoned with no decommissioning.

The Gunnar Mine And Mill Site

The Gunnar uranium deposit was discovered by Walter Blair in 1952. By 1955 the Gunnar open-pit mine was producing ore. By 1961 the pit was approximately 250 by 300 meters and over 100 meters deep. The underground workings began in 1957 and reached the 600 meter level. The mine operated until 1963. It was officially ‘closed’ in 1964. No decommissioning was performed and the site was abandoned.

The site included the open pit, the underground workings, the mill, two acid plants, numerous support buildings, large waste-rock piles (2.7 million tonnes), three large areas of exposed tailings (4.4 million tonnes) and a town site that had housed 600 people.

When the CNSC first visited the site in 2000 all of the structures were still standing (See Figure 2), although some had been scavenged for useful parts. Equipment that had been shipped in by barge during operations still sat in crates near the docks. There was still yellowcake in barrels and hoppers in the barreling area of the mill. Sulfur piles were obvious around the acid plants and the unconfined uranium mill tailings had begun to migrate with the wind into the adjacent

forest.



Figure 2. The Gunnar Mine Site Before Demolition of the Buildings in 2011.

REGULATION OF THE GUNNAR SITE

The C.L.E.A.N. Program

In order to approach the regulation of the numerous historic sites now subject to the NSCA, including the Gunnar mine site, CNSC staff created a program under the name “The Contaminated Lands Evaluation and Assessment Network” (CLEAN). The CLEAN Program was intended to identify all of the existing sites which didn’t require regulatory control under the AECA but which do now. The sites would then be systematically evaluated for safety under the CLEAN Program and recommendations would be made for the regulatory approach to each site. It was envisioned that based on a combination of legislative requirements and relative risk a site might be subject to a range of approaches:

- i. no regulatory requirements
- ii. an Order to immediately remediate the site
- iii. a requirement for an application for a licence to:

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- a. possess, manage and store nuclear substances
- b. complete remediation to a standard, and then possess, manage and store
- c. operate a facility (although none of the sites was currently operating)

While this assessment was going on a number of activities were taking place.

Regulatory Compliance

As alluded to above, with the coming into force of the NSCA, the Gunnar Mine Site was immediately out of compliance with the laws of Canada. A substantial inventory of nuclear substances existed on site in the tailings, the remaining ore piles, and residual materials in the mill circuit. The site owners, the Provincial government, were only just becoming aware of their obligations under the new legislation. In order to bring the site into compliance with the legislation sooner rather than later, it was proposed that Section 7 of the NSCA be used to issue a temporary exemption from very specific requirements of the NSCA.

Section 7 of the NSCA states:

7. The Commission may, in accordance with the regulations, exempt any activity, person, class of person or quantity of a nuclear substance, temporarily or permanently, from the application of this Act or the regulations or any provision thereof.

The *General Nuclear Safety and Control Regulations* require that in order for the Commission to exempt from the requirement for a license the following conditions must be met:

11. For the purpose of section 7 of the Act, the Commission may grant an exemption if doing so will not
- (a) pose an unreasonable risk to the environment or the health and safety of persons;
 - (b) pose an unreasonable risk to national security; or
 - (c) result in a failure to achieve conformity with measures of control and international obligations to which Canada has agreed.

The argument was made that the only activities (as specified in Section 26 of the NSCA) currently at the site were the possession, management and storage of nuclear substances. Therefore the exemption would only be to exempt the requirement for a license to do those three things. Any other prescribed activity at the site would still require a license. CNSC staff was confident that conditions 11(b) and (c) would not be compromised by the issuance of an exemption from the specific requirement for a license. However, without detailed information it would be impossible to make a definitive statement that the site did not pose an unreasonable

risk to the environment.

So staff presented the position that given that the site had existed virtually unchanged for almost 40 years, that the site was isolated relative to human populations, and was nominally under the control of the Provincial government, the act of issuing the exemption in and of itself did not change the risk of the site, and therefore did pose an unreasonable risk. This was an important step in the regulation of legacy uranium sites. If staff was not able to consider the historical context and current institutional management of existing sites then the immediate licensing of many sites would demand an unrealistic amount of resources from both the regulator and the potential licensee. The Commission accepted staff's recommendations and issued a time-limited exemption from the requirement to hold a license to possess, manage and store nuclear substances at the Gunnar site.

The issuance of an exemption created a more positive environment for discussions with the Provincial owner of the site, and officially brought the site under the direct scrutiny of the Commission. In other words the site was now officially on the CNSC's "books".

Once CNSC staff verified that the Province of Saskatchewan was the owner, Saskatchewan Environment and Resource Ministry (SE) was approached and informed of the requirements under the NSCA. CNSC staff was generally familiar with SE from their role in regulating certain aspects of the operating uranium mines also in northern Saskatchewan.

Verification Of Available Information

The next step under the CLEAN Program was the verification of the information that existed in the files. The Gunnar site had been previously known to the AECB (and other Federal departments) and on a few occasions guidance and advice had been provided on the safe management of potential radiological hazards. Without any authority over the site, the advice could not be 'imposed'.

There was no information available that indicated that the Gunnar site posed an immediate radiological risk to humans or the environment. There was certainly some concern over conventional hazards at the site. The site was also lacking any basic controls that might reduce the hazards at the site such as signage, fencing or other barriers to access the buildings or waste areas. SE was contacted and encouraged to put up signage, lock down building access and provide the local public (primarily fishing lodges on nearby islands) with information on the potential hazards at the site.

Of course no government agency appreciates another government agency interfering in their programs and priorities. That the CNSC is a Federal agency approaching a Provincial Ministry only magnified the reaction. And when a regulator tries to regulate another regulator, jurisdictions and responsibilities become unclear and lawyers get involved.

After many legal discussions it became evident to the Province that the new federal legislation applied and that the Gunnar site required remediation under a CNSC license. It took almost two years before the signs went up and access to the buildings was barred.

Many challenges were overcome while reaching this point. Most of these apply to almost every other site under the CLEAN Program.

- i. Under no circumstance could health and safety be compromised.
- ii. CNSC staff was still learning their own legislation while teaching others.
- iii. It was necessary to educate people on their responsibilities under the new legislation. Some of the people now subject to regulation under the NSCA had never had any dealings with the AECB and didn't understand the role of a federal regulator.
- iv. Responsibility / liability were often not clear, even when ownership was. This is relatively common when dealing with legacy issues. In many cases a government agency was responsible for the legacy management, but the site was privately owned.
- v. Site owners were from both the private and public sector. Both needed to be treated equally and all requirements had to be similar.
- vi. CNSC staff had no experience regulating the public sector.
- vii. Many of the sites were located on First Nations land claims or within areas of traditional land use. CNSC staff had little to no experience consulting with First Nations people.
- viii. Since the legislation was not written with legacy sites in mind, interpretation of the intent of the legislation was necessary and potentially "dangerous". All interpretations had to be written very precisely so that they clearly applied to very specific situations.
- ix. Access to many of these remote sites is very expensive. CNSC budgets were not used to accommodating these costs. CNSC staff had to rely on the future licensee for transportation and other logistics, complicating an already complex relationship.

Compliance By Motivation

In the absence of a license – an unfortunate necessity – only the spirit of the NSCA could be "enforced" at the site. This meant that the owner had to agree to the actions requested. Luckily many of the requirements, as they applied to the Gunnar site, are universally accepted in Canada. The Province shares the mandate for public and environmental safety. Therefore motivation was not difficult. Priorities differed between the two levels of government and were influenced by many factors, such as budgets, available resources and personnel, and historical and political complexities of working in remote areas with aboriginal interest in the lands in question. Add to

this that the site is remote and inaccessible except by small plane or boat in the summer or by extending the Provincial ice-road in the winter.

Uncertainties related to site ownership within the Government of Saskatchewan ministries also complicated the process of interim management of the site and bringing an application for a CNSC license forward. It took some time for the Province to place the site under Saskatchewan Industry and Resources Ministry with SE acting as a regulator for Provincial concerns.

CSNC staff continued to push for a more definitive and planned approach to the interim management of the site and, ultimately, the remediation of the site. The Province again was resistant as they believed that the liabilities at the site were shared with the Federal government who, through the guaranteed price for uranium to satisfy the Canada-Great Britain- US supply contracts, had encouraged the development of the Gunnar mine. The Province was hesitant to spend large sums of money on the Project until they had concluded their cost-sharing negotiations with the Federal government.

It was not until 2006 that the cost sharing agreement was signed. In the interim CNSC staff continued to press the Province to maintain the signage, public information program and restricted access to the buildings. With the signing of the agreement the Province assumed more active responsibility for the Gunnar Mine Site. A site manager was identified in the Saskatchewan Research Council (SRC), a Treasury Board Crown Corporation in the Province of Saskatchewan. The SRC would be the Provinces agent, would interim manage the site, manage the characterization and engineering studies necessary to remediate the site, apply for a CNSC license to perform the remediation and manage the site after closure.

The Environmental Assessment

In April 2007 the SRC submitted a letter of intent to remediate the Gunnar site under a license. This included a project proposal and description. This triggered an environmental assessment (EA) under the *Canadian Environmental Assessment Act* (CEAA). Under the CEAA two triggers existed, the CNSC regulatory trigger and the Natural Resources Canada funding trigger. Both of these agencies had to exercise their authority to allow the project to proceed. Since the Gunnar mine is located in Saskatchewan, a “joint-EA” commenced with Saskatchewan Environment (EA Branch) taking the lead for the Province.

Since a CNSC license cannot be issued until the EA is complete and accepted, the exemption from licensing was extended until 2013 to allow the EA process to conclude. As of the writing of this paper it is unlikely that the EA will be completed before the 2013 deadline.

The CNSC Demolition Order

Progress was relatively slow and as more information became available the understanding of the various hazards at the site changed. By 2010 it was clear that many of the buildings that had been

neglected for almost 50 years where structurally unsound and posed an immediate risk to people accessing the site. Although the number of people on site was small, the situation prompted the CNSC to issue an Order under Section 35 of the NSCA, which was subsequently modified under Section 37. The Order would result in the safe demolition of all structures on the site. The Order specified that this work must be completed by October 31, 2011. It was.

An Application For A CNSC License

In December of 2010 the SRC submitted a formal letter of application for a CNSC license to remediate the Gunnar site. The appropriate licensing documentation is being prepared in parallel with the EA documents. Together they will provide the basis for the assurances necessary for staff to recommend to the Commission that a license be issued for the remediation work.

Ongoing Regulatory Oversight

It should be noted that throughout the process noted above, and despite the challenges presented, CNSC staff visited the site at least once a year from 2000 to date. While in the area public consultation, both formal and impromptu was given a high priority. The promotion of safe use of the site and the use of strong risk communication techniques has helped to reinforce the expectations of the NSCA.

THE NEXT STEPS (10 YEARS)

Anticipated Licensing

CNSC Staff anticipates that by the end of 2013, the site will be licensed. Remedial work will begin as soon as possible afterwards. A number of logistical issues may delay the start of the project, in particular the difficulty mobilizing heavy equipment to this remote site. If the temperatures do not cooperate an ice road cannot be extended to the site and major work will be delayed until the following year (weather dependent).

Remediation

Once the work begins it will take a number of years to complete. The site is very complex with a large open pit, extensive waste rock piles and three separate (and characteristically unique) tailings areas. Both the CNSC and the Province will regulate the work and ensure that work proceeds as planned and with utmost consideration given to safety of humans and the environment.

Institutional Controls

It is the intention of the Saskatchewan Government to transfer the remediated site into their Institutional Control Program (ICP). In 2007, the province legislated *The Reclaimed Industrial Sites Act* and *The Reclaimed Industrial Sites Regulations* (RISR) to establish and enforce the

ICP. Under this legislation remediated industrial sites would follow a process for release to the Province for long-term care and monitoring. In the case of legacy sites, such as the Gunnar mine site, the process is fairly simple since the Province is already the owner. It is worth noting that Condition 3(f) of the RSIR states:

(f) if the closed site is required to be licensed pursuant to the *Nuclear Safety and Control Act* (Canada), the Canadian Nuclear Safety Commission has agreed, in writing, to grant the Government of Saskatchewan an exemption from the obligation to hold a licence under the *Nuclear Safety and Control Act* (Canada) for the closed site if the minister accepts the closed site into the Institutional Control Program;

Therefore the site must meet the requirements for exemption of the NSCA, as described above. This process has yet to be tested on a major site with large inventories of nuclear substances. It is likely that the Gunnar site will not be the first such site.

CONCLUSIONS AND LESSONS LEARNED

The legacy Gunnar Uranium Mine Mill Site in northern Saskatchewan has presented a challenge to the Federal regulator since it fell under the jurisdiction of the NSCA in 2000.

Of all the sites managed under the CLEAN Program Gunnar stands out as a complex case study of regulatory oversight. The Commission recognized very early that a temporary exemption from the requirement to hold a license was an important step in regulating legacy sites. Staff recognized that government policies didn't change as quickly as jurisdictions did in this case. Respect, motivation and coordination kept the Gunnar site out of the courts and promoted risk reduction at the site. While always promoting safety, allowing sufficient time for other government agencies to explore their options and opportunities brought the site under regulatory control with a minimum of effort on the CNSC.

When hazards were identified the regulatory reaction was risk-informed and appropriate. Specifically an Order was issued to ensure that the structures on the site were safely demolished, without the requirement for a license, and within a reasonable period of time.

Neither the NSCA nor CEAA were written with legacy sites in mind. However, they were written based on a modern safety principals and can be interpreted for legacy sites. Part of the mandate of the CLEAN Program was the interpretation of these pieces of legislation within a fairly well defined process for licensing and EA. All of the legacy mines under the program have been successfully remediated and brought under CNSC license, except Gunnar. Building on the experience gained from regulating the other sites, Gunnar will soon follow.

Based on 13 years of experience regulating historic and legacy sites a few suggestions can be made. Specifically, when writing new legislation, include some specific guidance for existing, previously unregulated sites. It would be useful if legislation specific to the management of low-

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energy, long-lived wastes such as tailings management facilities or decommissioned mine sites be developed.