"Exploring" the arguments made by MANS in favour of ending Nova Scotia's ban on uranium exploration and mining. Gillian Thomas

The Mining Association of Nova Scotia (MANS)—formerly the Chamber of Mineral Resources-- relies on two major assumptions in its lobbying to allow uranium exploration and mining in this province.
First: that Nova Scotia uranium would be supplying an urgent need, and second: that uranium mining in Northern Saskatchewan offers a model for Nova Scotia to follow.

> The World Nuclear Association provides useful information on both these assumptions.
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> WNA is emphatic that there is no shortage of uranium and explicitly states: "There is therefore no reason to anticipate any shortage of uranium that would prevent conventional nuclear power from playing an expanding role in providing the world's energy needs for decades or even centuries [my emphasis]to come."
> https://world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview
> May 2024
>
> Canada is the world's third largest uranium supplier from the mines in Northern Saskatchewan.
> The Cigar Lake mine is currently ranked as the world's largest uranium mine. The Saskatchewan mines have access to a massive ore body with an exceptionally high grade ore. By contrast the uranium in Nova Scotia is low grade.
> The province of Saskatchewan covers over a quarter of a million square miles compared with Nova Scotia's 21,000. In other words, nearly 12 Nova Scotias would fit into Saskatchewan's land mass.
> The Saskatchewan mines are all located over 600kms away from the nearest town or city, while the area in Nova Scotia which has been targeted for possible mining is less that 60kms from HRM and closer to small towns like Windsor and Wolfville.
> The notion that a uranium mine in Nova Scotia could be compared to (and could compete with!) Saskatchewan mines seems too preposterous to even merit discussion.

The MANS “End the Uranium Ban Report” of 2025 relies on the following arguments also reiterated in many recent MANS Facebook posts

1) That uranium is a “critical mineral” and therefore “essential”
2) That uranium mining is “safe” for both humans and the environment
3) That uranium mining generates many jobs and contributes to prosperity
4) That restrictions on uranium exploration hampers the search for other minerals
5) That Nova Scotia uranium would contribute to public health and safety
6) That most Nova Scotians would support uranium mining
7) That new mining technologies have eliminated environmental risks
8) That uranium mined in Nova Scotia would “save lives.”

“Critical minerals”

The MANS “End the Uranium Ban” document makes no less than 17 references to “critical minerals” in its 14 pages of text, implying that uranium is universally agreed to fall in this category.

While it is true that uranium is listed in Canada's extensive list of "critical minerals" [1](mainly because the exports from Saskatchewan (about which more later) are significant to the national economy, uranium is notably absent from the critical minerals list of many other countries. Neither the UK or France—both heavily dependent on nuclear power, have uranium on their lists. It does not appear on the International Energy Agency (IEA) 2024 list of minerals needed for clean energy transition. It is still absent from the US list of critical minerals despite Donald Trump's attempt to add it by executive order on January 20, 2025. For a better understanding of the term "critical minerals" read the primer provided by the IGF Intergovernmental Forum on Mining, Minerals and Sustainable Development (2022) https://www.iisd.org/system/files/2023-09/critical-minerals-primer-en.pdf

> There is no universally agreed upon definition of what "criticality" means, and **criticality changes over time**, depending on the needs of society and the availability of supply.
>
> Criticality is also very country- and context-specific, particularly with respect to mineral endowment, the relative importance of the minerals to industrial and economic development, and a strategic assessment of supply risks and volatility. These considerations would then determine the mineral strategy of each country and/or region.
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> IGF Intergovernmental Forum on Mining, Minerals and Sustainable Development (2022)

MANS use of the term also implies that uranium is scarce and urgently needed so that every source, however low grade or scanty, should be exploited. The World Nuclear Association's Uranium Mining Overview (May 16, 2024) has a detailed account of global uranium resources and concludes, "There is therefore no reason to anticipate any shortage of uranium that would prevent conventional nuclear power from playing an expanding role in providing the world's energy needs for decades or even centuries to come." https://world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview

That uranium mining is "safe" for both humans and the environment

MANS assertions on this is in the form of 12 separate quotations from the website of the Canadian Nuclear Safety Commission (CNSC) as the sole source.
While CNSC can be a useful source of information, it has some important limitations. First, like its precursor AECB (Atomic Energy of Canada Board) it has the conflicted double role of being both the promoter and the regulator of the nuclear industry. The Canadian Environmental Law Association (CELA) has frequently gone on record condemning the implied conflict of CNSC's reporting to the federal minister for Natural Resources rather than the Minister of Environment and Climate Change. A detailed article outlining how this conflict plays out in relation to several aspects of the nuclear industry can be found here:

[1] Interestingly, uranium is not on Canada's list of "priority" minerals but Is listed as "other."

https://www.sciencedirect.com/science/article/pii/S0301421524002489?ref=pdf_download&fr=RR-2&rr=9179b0360d830f7d

Secondly, given the MANS focus on Saskatchewan uranium mines, it should be noted that CNSC relies on the monitoring done by CAMECO, the principal mining company for health and safety information and does not have its own on-site inspectors based in the region.

Thirdly: CNSC's role as public educator on radioactivity. MANS is fond of referring readers to the CNSC's ten-year old "Mythbusters" site (https://www.cnsc-ccsn.gc.ca/eng/resources/mythbusters/) which lists some 38 "myths" about radioactivity and various aspects of the nuclear industry. Apart from a couple of exceptions, in sitting through dozens of public meetings raising concerns about the nuclear industry, I've never heard people voice any of these "myths". This seems to be a classic "straw man" type of argument where an opponent is attacked for positions they've never actually held. Equally worrying is the absence of cited sources to support CNSC's own assertions.

Medical doctors E.R.Young and R. F. Woolard undertook a massive survey of the available studies on the health dangers of uranium mining which was submitted to the British Columbia Royal Commission of Inquiry in 1980 which led to BC's moratorium. Clearly much more has now been published on the subject—far too much to begin listing here.

However, the following more recent items are of interest for the Nova Scotia context

Potential Human Health Effects of Uranium Mining, Processing and Reclamation
https://www.ncbi.nlm.nih.gov/books/NBK201047/
This article is part of a larger study: **"**Uranium Mining in Virginia: Scientific, Technical, Environmental, Human Health and Safety, and Regulatory Aspects of Uranium Mining and Processing in Virginia.**"** Committee on Uranium Mining in Virginia; Committee on Earth Resources; National Research Council.
Washington (DC): National Academies Press (US); 2011 Dec 19.It's worth noting that the State of Virginia, which has the largest known uranium deposit in the US, has banned uranium mining since 1982—a ban that was upheld by the US Supreme Court in 2019.

Dewar, Harvey and Vakil: Uranium mining and Health in *Canadian Family Physician*, May 2013
https://pmc.ncbi.nlm.nih.gov/articles/PMC3653646/

While the studies examined by Woolard and Young focused mainly on the radiological hazard and drew heavily on data about workers' health in the (now closed) Ontario uranium mines there has been considerable work done recently on the toxicological aspects of the uranium decay chain. The following is frequently cited: Ma et al: Emerging health risks and underlying toxicological mechanisms of uranium contamination: Lessons from the past two decades *Environment International*, 2020.
https://www.sciencedirect.com/science/article/pii/S0160412020320626

That uranium mining generates many jobs and contributes to prosperity

Mining is notorious for its boom and bust cycles and uranium mining mirrors this. Even the companies exploiting the vast high grade ore body in Northern Saskatchewan step down production in response to falling uranium prices. For example, the Rabbit Lake mine has been put on hold since 2016 because of low prices.
As a Province, Saskatchewan also incurs significant costs to support the industry. Saskatchewan tax payers have already paid $220 million to clean up "unconfined tailings" from older mines. Currently, the Saskatchewan Energy and Resources Department are only asking the Orano company to leave about $390,000 total as (1) financial assurance and (2) for dealing with "future unforeseen events" associated with the tailings from the 1980-2002 operation at Cluff Lake. Since the tailings contain Radium -226 with a half-life of 1600 years it seems that Orano's pledged money will be nowhere near sufficient for long term waste containment.
MANS recent PR lauds the current Nova Scotia government "for acknowledging the industry's "potential to create more jobs and opportunity for Nova Scotians" but provides no details about patterns of employment in mining. It's worth noting that the specialized nature of uranium mining and its particular hazards would need to rely on people with experience in that industry. It's notable that few, if any, of Nova Scotia's DNR employees have direct experience of uranium mining which, in itself, raises concerns about the capacity for responsible oversight. The only Nova Scotian I've come across who worked in a uranium mine is an older man who worked as a labourer for a few years, carrying bags of yellowcake, at the mine in Uranium city –the mine closed in 1982. Uranium "City" has now been reclassified as a "settlement" and lists its population number as 73.
MANS favorite and endlessly reposted picture of a Saskatchewan mine is of the underground mine at Cigar Lake, displaying the shiny clean conditions—a necessity for safety reasons in a mine with such a phenomenally high grade ore. MANS does not mention that 50% of the ore from Cigar Lake is extracted by automation, controlled by artificial intelligence. For light relief check this Youtube example of clueless business reporting where the reporter is giddy about being able to use wifi in Cigar Lake's deep underground mine in its remote Northern location. : https://www.youtube.com/watch?v=ztNMW1Qlsds
"Safe" uranium mining will increasingly rely on automation in order to protect workers which will also limit the number of jobs on offer.

That a ban on uranium hampers the search for other minerals

This was the repeated claim of many industry advocates in 2009 when the original moratorium was being formalized into a legislative ban. Frequently the language used was highly emotional and alarmist, for example suggesting that it "will shut down mining in this province." Or, more specifically, "A company will not explore for any non-uranium base metal or gold targets as long as their project is subject to closure due to inadvertent discovery of uranium." John O'Sullivan, November 2, 2009. Clearly exploration for and

mining development of “gold targets” has been unhindered by the uranium ban as the existence of subsequent gold mines shows.
It is striking that only one of the many assertions to Law Amendments that mineral exploration was impeded by the uranium ban cited an actual case where work was stopped because of the amount of uranium found in samples. Tellingly, this sole example came from Capella Uranium—a company that repeatedly assured the public that, despite its name, it was really “looking for other minerals.” Aside from the company’s name, some skepticism might have been triggered by the fact that Capella had staked claims to 60,000 hectares adjacent to Millet Brook in Hants County—the proposed site in the 1980s of the uranium mine planned by Aquitaine (later Kidd Creek). An examination of Capella’s company reports suggests that the company estimated that the moratorium was sufficiently porous to merit going ahead with uranium exploration.[2]
It is also of interest that mining proponents were prepared to argue that mineral extraction should replace traditionally established rural industries. For example, John Wightman suggested that, “Agriculture, forestry and the fishery are in decline,” and should be replaced by, “A rural based mineral industry.” November2, 2009.

That “The Uranium Ban Makes Us Less Safe”

This claim comes perilously close to the misleading assurance promoted by Kidd Creek in the 1980s that mining uranium in Hants County would “take the uranium away.” Aside from the fact that probably no mine in human history has ever removed 100% of the target mineral, the promoters were relying on the general public not having a grasp of the uranium decay chain. The MANS claim is a slightly more sophisticated advance on the Kidd Creek version. It focuses on the health risk from radon gas and suggests that only extensive uranium exploration will reveal which areas are at greatest risk. The general public in Nova Scotia has become well aware that radon poses a significant health risk. But MANS’ assurance depend on people having a weaker grasp of the uranium decay chain and the problems posed by the radon “daughters” or progeny.[3] Detailed mapping of uranium occurences in the province is undeniably important, but depending on mining companies to document a public health risk seems to be the least reliable way of developing the necessary database.

“Most Nova Scotians support mining uranium”
MANS claims that “ a 2024 poll shows that 54% of Nova Scotians support exploration and mining and only 22% oppose it.” Unfortunately MANS does not provide information about

[2] Cappella considers the holdings in **Nova Scotia** to host the most significant mineralized occurrences and, coupled with Nova Scotia's excellent infrastructure, reducing the cost of mineral exploration; it is poised to invest there into the brunt of exploration activities. Most held properties are large enough to support mining activities, but because of the light, but generally pervasive cultural influence, discretion would have to be exercised in the location of any processing facility. CAPELLA RESOURCES LTD. MANAGEMENT DISCUSSION & ANALYSIS FORM 51102F1 For the Period Ended JULY 31, 2007 September 25, 2007

[3] Dr. David Maxwell’s brief to Nova Scotia’s Voluntary Planning Board provides a clear, well-sourced, account of the health risks posed by radon daughters

the actual questions asked in the poll that they funded. It seems likely that this is an example of "push polling" where desired answers are achieved by the way questions are framed.
Of the 244 briefs and presentations to the McCleave Inquiry in the 1980 211 were opposed to uranium mining. 32 presentations were either from mining interests supporting mining or from regulatory agencies outlining their role. Only one brief from a private citizen spoke in support of mining.

That new mining technology has transformed mining and eliminated environmental risks

The MANS "Not Your Grandfather's Mining Industry" site extolls new mining methods and repeats some of this in its uranium promotion. It would be astonishing if mining methods had NOT evolved over the decades. However, regardless of the specific mining technology adopted, uranium mining poses particular problems—summed up in this statement from a recent US Environmental Protection Agency Document:
"Regardless of how uranium is extracted from rock, [my emphasis] the processes leave behind radioactive waste. These processes separate uranium from its decay products which are also radioactive and actually contain most (80-90%) of the radioactivity in the rock (ore). The solid radioactive wastes that are left over from the milling processes are called tailings and the liquid wastes are called raffinates. Mill tailings and raffinates are stored in specially designed ponds called impoundments. The tailings remain radioactive and contain hazardous chemicals from the recovery process." US EPA January 29, 2025

https://www.epa.gov/radtown/radioactive-waste-uranium-mining-and-milling?fbclid=IwY2xjawIsWLVleHRuA2FlbQIxMAABHTtZ4Mf_oKp4tVJnKuRqN7D3Vt7naNLlQFWEu8WY8lObz6c7UWVMcTQdUA_aem_BfgOi93lA6kkGGMM6bVM-g

The Mining Association's PR publications and interviews with media make much of the intent to use in situ leaching to mine uranium deposits in Nova Scotia, giving the impression that this is a new mining technology. In fact, it has been used in mining uranium and various other minerals since the middle of the last century, initially in the Soviet Union and later in the 5 remaining uranium mines in the US—all of which are in comparatively arid zones. While it is an attractive option to the mining industry because it is significantly cheaper than either open pit or underground mining, it poses its own hazards. As the World Nuclear News noted in November 2023, "it requires suitable geology: the orebody needs to be permeable to the liquids used, and located so that groundwater away from the orebody cannot become contaminated." The potential for groundwater contamination is also noted in the Nuclear Regulatory Commission's study of in situ leaching uranium mining operations quoted below:

"ISL operations may affect the groundwater quality near the well fields when lixiviant [i.e. the leachate solution] moves from the production zone and beyond the boundaries of the well field. This unintended spread, either horizontally or vertically, of recovery solutions beyond the production zone is known as an 'excursion.' [i.e. a leak]" The NRC notes that leaks ("excursions") can be caused by a number of factors, among them, undetected high permeability strata or geologic faults, improperly abandoned exploration drill holes, poor

well integrity, such as a cracked well casing or leaking joints between casing sections, or hydrofracturing [fracking]of the ore zone.

Since ISL's impact on groundwater is regarded as more or less inevitable, US legislation requires that: "Before ISL operations can begin, the portion of the aquifer designated for uranium recovery must be exempted as an underground source of drinking water, in accordance with the Safe Drinking Water Act"[4]

This provision of exempting aquifers adjacent to in situ uranium mining operations speaks clearly to the expectation that the process will inevitably involve leakage or "excursions" of hazardous liquid. While the state-by-state licensing process restricts the ability to assemble a complete picture of the frequency of such leakages nationwide, it's worth noting that Wyoming recorded over a hundred "spills" over a 6 year period. One such spill in August, 2017 put over 200,000 gallons of contaminated water into the water table and was followed a few days later by a second spill that forced a temporary mine shutdown.[5]

That uranium mined in Nova Scotia would "save lives"

The MANS "End the Uranium Ban" document devotes 2 whole pages to the theme that "uranium saves lives," first of all with the Americium-241 used in smoke detectors. They omit to point out 1) that the amount of Americium in a smoke detector is vanishingly small—about .28 microgram, and 2) that now Americium is being extracted from stored nuclear waste from reactors –hardly something which is in short supply

Capitalizing on the fact that no-one is likely to quarrel with the medical use of isotopes for both diagnosis and treatment, MANS announces on its final page:"There are many misconceptions about uranium but here's a fact – it saves lives!" However they choose to ignore the amount of work that's been done to ensure that medical isotope production does not contribute to nuclear weapons proliferation or result in nuclear terrorism. A byproduct of this work has been the production of medical isotopes in accelerators rather than nuclear reactors—explained in this excerpt from a paper published by the American Association for the Advancement of Science: 'For a new source of supply of medical isotopes, accelerators offer several advantages over nuclear reactors. Accelerators present far less of a safety risk to operators or the public nearby. They generate minimal high-level nuclear waste and only modest quantities of low-level waste as a byproduct of medical isotope production. They also require substantially less capital investment than a typical reactor. Most pertinently for this report, accelerators that could be used for medical isotope production present minimal proliferation risk – they do not use any uranium, enriched or

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4 https://www.nrc.gov/docs/ML1509/ML15093A360.pdf

5 https://apnews.com/general-news-c73ae2a2b2ca4abe942e30dd1f4d95bd

otherwise, and, except for very large and dedicated accelerator/reactor combinations called accelerator-driven systems, they are incapable of creating bomb-scale quantities of plutonium. The advantages of accelerator production have come to be recognized by isotope suppliers in the US and Canada. After the Mo-99 supply shortage in 2009, commercial operators in both countries have plans to grow capacity by building accelerators, not reactors." [6]

This paper, like several others, notes that isotopes produced in accelerators are both safer and more reliable[7] than those produced in reactors. They offer the additional advantage that their shorter half-lives result in reduced radiation exposure to the patient.

"The Saskatchewan Example"

MANS' "End the Uranium Ban" presentation relies heavily on photographs and other material to illustrate what it refers to as "The Saskatchewan Example."
Quite aside from the fact that Saskatchewan's mines are located hundreds of kilometers away from population centres or any agriculture, their high grade ores and access to well-established markets make them irrelevant to Nova Scotia.

A more relevant comparison to Nova Scotia's situation is one geographically much closer than Saskatchewan:

The State of Virginia has the largest unmined uranium deposit in the US. Like the deposits found in Nova Scotia, Virginia's are rated as "low grade." Despite its long history in mining, Virginia has had a ban on uranium mining dating back to 1982 and upheld by the US Supreme Court in 2019.

The main reason, summed up below, bears close comparison with Nova Scotia

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[6] Nuclear Medicine without Nuclear Reactors or Uranium Enrichment: Derek Updegraff and Seth A. Hoedl, Ph.D. Center for Science, Technology, and Security Policy. American Association for the Advancement of Science June 13, 2013

See also Wang et al. Production Review of Accelerator-Based Medical Isotopes, Molecules MDPI, August 2022,https://pmc.ncbi.nlm.nih.gov/articles/PMC9415084/

[7] It's worth noting that Canada shut down the National Research Universal Reactor dedicated to medical isotope production in 2018.

According to the Environmental Protection Agency's TENORM Report,[8] "Water is perhaps the most significant means of dispersal of uranium and related [radioactive materials] in the environment from mines and mine wastes…Uranium is very soluble in acidic and alkaline waters and can be transported easily from a mine site." This is of great concern. If Virginia allows uranium mining, it would be the first state to do so in the United States in a climate where rainfall exceeds evaporation.
The same concern was stated in Environment Canada's submission to the McCleave Inquiry in the 1980's. "In Nova Scotia, the wet climate, generally high water table, and generally acidic waters, may pose special problems to radioactive waste management."[9]
Virginia's Piedmont Environmental Council also states:
"Uranium has never been mined in the eastern United States. In Virginia severe risks posed by the state's high rainfall, intense storms, and natural events such as hurricanes and earthquakes, make it particularly unsuitable for mining and milling. In the United States, uranium has only been mined in arid areas, where the low rainfall makes it more feasible to contain the radioactive and toxic mine wastes and mill tailings." They add:
"Not only does the Virginia Piedmont have greater annual rainfall than other uranium mining communities, it also has greater acute rainfall events."
Like Virginia, Nova Scotia has an annual precipitation that exceeds evaporation. It also has a higher precipitation than Virginia (1300 mm a year as opposed to 1000) and has had extreme rainfall events (notably 860 mm in July 2023) far exceeding those recorded in Virginia. Nova Scotia government's own studies warn that extreme rainfall events are likely to become more common because of climate change.
.https://climatechange.novascotia.ca/sites/default/files/uploads/climate-change-risk-report.pdf Nova Scotia's annual precipitation also massively exceeds that of Northern Saskatchewan (1300mm as opposed to 400mm)

The vast differences geographically and climatically rule out the relevance of the Saskatchewan mines as an "example" for Nova Scotia, quite aside from the fact that the Athabasca Basin holds a vast reserve of exceptionally high grade uranium bearing no comparison to the low grade ores found here.

Remaining questions:

[8] https://www.epa.gov/radiation/tenorm-resources

[9] https://novascotia.ca/natr/meb/data/pubs/ofr/ofr_me_612.pdf

Given that most of the arguments put forward by MANS are spurious or unfounded, one is left wondering why so much effort is being put into promoting something with no convincing economic justification and with such clear disadvantages.

Equally mystifying is the enthusiasm with which Nova Scotia's current government is embracing a project which would burden its successors with the expense of endless environmental monitoring and risk management.

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