



**THE COST OF SAYING “NO” TO
OPPORTUNITY:
LESSONS FROM THE REJECTION OF THE
WARMAN URANIUM REFINERY**

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Introduction

In July 1980, the people of Saskatchewan missed a significant opportunity when the decision was made to not proceed with the construction of the world's largest uranium refinery in Saskatchewan. The project, now called the Blind River Refinery, did in fact proceed and is located in Blind River, Ontario. On Wednesday January 9, 1980, the Saskatoon Board of Trade (subsequently renamed the Saskatoon and District Chamber of Commerce) officially endorsed the construction of a uranium refinery near Warman¹. In view of the Government of Canada's review panel decision to not support the construction of the facility, through the Federal Environmental Assessment Review Office, this paper was developed to evaluate the economic impact of that decision on Saskatchewan today.

Nuclear energy is a safe form of energy and the cleanest non-solar source of energy production available.

In addition to the examination of the Warman discussion, this paper will also explore in a preliminary fashion the potential for the uranium and nuclear industries and their expansion in Saskatchewan. Nuclear energy is a safe² form of energy. It is the cleanest non-solar source of energy production available. With new technology being continuously developed and applied to nuclear power generation and storage, these attributes are further enhanced. Over 16% of the world's population has their energy needs met through nuclear power. This percentage jumps to 24% in OECD countries and to 35%

¹ "Positive Assessment of Warman Refinery" Saskatoon Commentator, January 9, 1980, article reproduced and included as Appendix G

² Energy production accident and death information is included as Appendix H

in the European Union³. The use of nuclear energy is expected to increase into the future. With an increase in global use of nuclear energy, and a corresponding increase in the demand for processed uranium, Saskatchewan continues to possess many opportunities to stimulate a value-added industry that results from our natural resource base, for a resource that has gone largely untapped in terms of value-added processing relative to competing jurisdictions.

Cameco Corporation, created out of a merger between Eldorado Nuclear and the Saskatchewan Mining Development Corporation, is the world leader in uranium mining, and it is based in Saskatchewan. Cameco uses the leading Saskatchewan natural resource base to create billions of dollars of economic activity and, consequently, thousands of jobs. This backgrounder serves as an important source of information and comparison regarding the basis for the Warman decision and the foregone economic activity in Saskatchewan.

While this investigation focuses on the Eldorado project it must be noted that other mining companies in Saskatchewan, such as Areva (formerly known as Cogema), also play a critical role in uranium production and provide large contributions to the economy of Saskatchewan.

³ “World Energy Needs and Nuclear Power” *World Nuclear Association*, July 2002.

Blind River: The Cost of an Opportunity Lost

The decision not to invest in the refinery, to be built by Eldorado Nuclear (the predecessor to Cameco) in Saskatchewan, was made in July 1980.

Saskatchewan's
loss was
Ontario's gain

Subsequently the federal government approved the company's plan to build the world's largest uranium refinery in Blind River, Ontario as an alternative to the Saskatchewan proposal. The Blind River decision was made subsequent to the release of the findings of the Federal Environmental

Assessment Review Office. Saskatchewan's loss has turned into Ontario's gain. The decision regarding this opportunity has had a real cost in terms of employment and economic activity within Saskatchewan. Gross Provincial Product (GPP), and provincial government revenues for Saskatchewan have been significantly reduced as a result of the refusal to approve this project.

Saskatchewan
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Saskatchewan has not yet embraced value added activity, despite ongoing rhetoric about adding value and building on the basis of our strong natural resource reserves.

Over its life to date, the Blind River, Ontario project has had over \$100 million invested in capital assets and improvements⁴. This investment alone would have been subject to capital taxes in Saskatchewan and property taxes. The *Corporation Capital Tax Act* was implemented in Saskatchewan on April 1, 1980. Had the uranium refinery investment project been built in Warman in 1983 (the Blind River facility was built in 1983) it would have been subject to capital taxes over 21 years. The Government of Saskatchewan capital tax

⁴ June 26, 2002 letter from Cameco Corporation

Over the 30-year life, the corporation capital tax loss reaches over \$21 million for the Government of Saskatchewan

Saskatchewan has experienced a capitalized loss of over \$280 million in employee wages

revenue would have been approximately \$450,000 per year over the 21 years that the facility would have been in operation, resulting in a total capitalized loss of over \$17.9 million for the Government of Saskatchewan. Projecting that the facility will have a 30-year future life, this amount jumps to over \$21 million (Appendix E).

The refinery at Blind River also has an average annual payroll of \$6 million and employs between 80 and 160 people at any given time. This implies that personal income tax revenue was lower in Saskatchewan by more than \$372 million in 2004 (Appendix C). If we assume that salaries have increased at a real rate of 3% per year from the date the facility opened, implying a starting total payroll of \$3.47 million and will continue to grow by a real rate of 3% per year through to the end of the 30 year estimated life, reaching \$8.31million we have a total capitalized loss of approximately \$297 million in employment wages in Saskatchewan when using a 6% rate. (Appendix C). 6% was chosen for the entire analysis based on the assumptions of 2% inflation and a 4% real rate of return on investment.

The corporate income tax rate of 10% for manufacturing and processing firms would likely have been paid on this project. As it is not specifically stated as to how much profit was generated by the Blind River facility, we can use an estimated rate of return on investment to approximate the profit generated. It is estimated that Cameco's return on investment is 4.75% (see Appendix A), therefore, since there has been \$100 million invested, the facility would be

returning \$4.75 million per year in pre-tax profit. At 10%, this results in lost corporate income taxes of \$475,000 per year over 21 years, with an additional 9 years remaining in the initially projected life of the facility. This results in a capitalized total of over \$18.9 million to date and over \$22 million given a 30-year life on the facility (Appendix E).

The RM of Corman Park has lost a conservatively estimated \$14 million in property taxes

The above calculations also do not include municipal taxes paid which help fund local infrastructure, libraries, and schools. During the review of the proposal made by Eldorado to build the refinery, it was stated that the company would make annual payments as grants in lieu of taxes of approximately \$300,000 per year. Capitalized at 6% over 30 years, that represents a loss to the Rural Municipality of Corman Park of more than \$14 million today. (Appendix E)

The estimated total tax loss to the province exceeds \$70 million

It is estimated by this report that the project being located in Blind River rather than Saskatchewan has cost the governments in Saskatchewan approximately \$1.5 million per year in tax revenues, including personal income tax, corporate income tax, corporate capital tax, and property tax over each of the past 21 years. This loss will also continue for as long as the Blind River facility is producing. Capitalized over the 30-year life of the facility, this would be approximately \$70 million today, or enough revenue to eliminate small business income tax on income up to \$400,000.

There is more than simply a tax-revenue loss. There is also a Gross Provincial Product (GPP) loss. Assuming that GPP would increase at the rate of GPP per capita, as reported by the Saskatchewan Bureau of Statistics, Saskatchewan would have endured a GPP loss of between \$38 and \$78 million dollars.

These figures are not capitalized, nor do they take into account that GPP per capita would likely have been higher had the refinery been built in

The GPP loss to the province could be over \$12.8 billion

Saskatchewan. (Appendix B)

Had the facility been located in Saskatchewan, employment opportunities, tax base broadening, and increased GPP would have all occurred in

Saskatchewan. If the Blind River facility accounted for only 50% of conversion revenues, or \$68.5 million, it would result in a capitalized value in excess of \$3.2 billion (Appendix E). This does not take into consideration any economic multipliers, which can be estimated to be between 1 and 4. If a multiplier of 4 is applied, the loss to the GPP of Saskatchewan reaches over \$12.8 billion at the end of the 30 -year life of the facility. (Appendix E)

Any additional year, beyond the 30-year mark, that the facility operates results in an incremental loss to the province of Saskatchewan

While it has been assumed that the Blind River refinery would have a 30 year operating life, this life can be easily extended with moderate capital expenditures. Any additional year, beyond the 30 year mark, that the facility operates results in an incremental loss to the province of Saskatchewan due to a decision made in 1980.

Discussions and Process for the 1980 Decision

After reviewing numerous newspaper articles, letters to the editor, and public hearing documents, a number of reoccurring themes appear surrounding the debate that occurred in the early 1980s: environmental impact, health and safety, “social” impact, and nuclear arms proliferation, just to name a few. Of course, when examining past events, it is easy to draw conclusions regarding a project or decision, but it is still important to evaluate whether or not the concerns communicated during the public hearing process were justified.

Employee Safety Concerns

One frequently stated concern in the early 1980s was over employee health and safety.

One frequently stated concern in the early 1980s was over employee health and safety. At the time, a number of unions involved in the construction industry, the United Steelworkers of America, and the Saskatchewan Federation of Labour all supported the project, stating that the plan presented by Eldorado had adequate safety measures. In order to ensure the safety of their employees, plant personnel would be supplied with clean clothing daily, would be required to shower prior to leaving the site, would undergo pre-employment and annual medical examinations, would wear radiation dosimeters, and would have respirators provided under “upset” conditions, in addition to the safety requirements for any other industrial process.

“The Panel is satisfied that, with the proposed precautions, low-level radiation from the plant would not represent a significant risk over background levels to the workers...”

- Eldorado Uranium Refinery – Report of the Environmental Assessment
Panel, July 1980

The year 2001 marked the 11th consecutive year of operations at the Blind River Refinery without a lost-time accident to an employee

In a January 26, 2001 press release provided by Cameco Corporation, the Blind River Refinery announced it had operated for 11 years without a lost-time accident. These eleven years, put in other terms, is equivalent to more than 1.8 million work hours or 4,000 days. The last lost-time injury occurred on January 25, 1990⁵.

When the Canadian Nuclear Safety Commission considered an application to have the license of the Blind River Refinery extended, which it granted in 2002, one of the reasons for its decision was "...Cameco's radiation protection program for workers is adequate, that it incorporates Action Levels, and that it effectively applies the principles of ALARA (As Low As Reasonably Achievable, social and economic factors taken into account)."⁶

The 2002 Commission review continued by stating, "Based on the safety record and evidence of effective safety programs and safety culture at the Blind River Facility, the Commission is satisfied that Cameco is making, and will continue to make, adequate provisions to protect workers from non-radiological hazards at the facility."

⁵ A "Lost Time Accident" is one in which the time lost from an injury extends beyond the day of the injury, preventing an employee from returning to work.

⁶ "Record of Proceedings, Including Reasons for Decision" in the matter of Cameco Corporation's Application for a License to Operate the Blind River Nuclear Fuel Facility, February 18, 2002.

Environmental Impact Concerns

Environmental impact was noted in a large number of intervention documents.

The second significant concern raised in 1980 that was noted in a large number of intervention documents is that of environmental impact.

“...Available information was sufficient to permit the Panel to conclude that the impact on the physical environment would be minimal...”

-Eldorado Uranium Refinery – Report of the Environmental Assessment Panel, July 1980

“We are satisfied that if the refinery is designed and operated according to the environmental protection concepts proposed in the Environmental Impact Statement, the degradation in the quality of the receiving environment would be minimal.”

...Cameco Corporation announced that the Blind River Refinery officially received certification under the ISO14001 program.

- John Mar, Environment Canada, 1980

On March 13, 2002, Cameco Corporation announced that the Blind River Refinery officially received certification under the ISO 14001 program. This program is the most internationally recognized standard for environmental management systems.

The certification is not received simply by submitting an application. In fact, it is received through years of planning, preparation, and review. Not only does this certification indicate a current and historical commitment to

One other concern was the evaluation of safeguards and security at the facility, as well as the role of the refinery in the nuclear arms cycle.

environmental stewardship, it also represents a commitment to continual improvement.

The ISO 14001 certification at the Blind River refinery also calls for annual independent audits as well as a re-certification process every three years. This ensures objective measurement and independent protocol review.

Eldorado representatives noted that there are far more efficient and inexpensive ways to produce plutonium than reprocessing spent fuel from power reactors.

Cameco, at the time of the license renewal application, had 16 wells in place to monitor groundwater quality, with plans to add 5 new wells.

From the Record of Proceedings of the license application, the Commission stated, “Based on the information presented, the Commission is satisfied that Cameco is making, and will continue to make, adequate provisions for the protection of the environment.”

Safeguards and Nuclear Arms Proliferation

One other concern raised as an objection was the evaluation of safeguards and security at the facility, as well as the role the refinery plays in the nuclear arms cycle.

The Panel does not accept the notion that Eldorado is warmongering by producing UF₆.

Spent fuel from nuclear reactors can be chemically processed to separate plutonium from other products. Plutonium can then be used in electrical generation or for nuclear weapons. While many participants in public discussions demanded that Canadian uranium never be used for weapons,

Eldorado representatives noted that there are far more efficient and inexpensive ways to produce plutonium than reprocessing spent fuel from power reactors. The Panel recognized that, while the product being produced by the refinery could, at some later date and after other use, be used in nuclear weapons, that it was the responsibility of the federal government and other international organizations to place more stringent restrictions on nuclear arms production.

“...Eldorado strongly resented the accusation by some participants that producing UF₆ is promoting nuclear war.”

- Eldorado Uranium Refinery – Report of the Environmental Assessment Panel, July 1980

“The Panel does not accept the notion that Eldorado is warmongering by producing UF₆. The panel recognizes, however, the concerns about proliferation of nuclear weapons. Because of the extent of public concern, it believes that the federal government should continue to pursue institutional means to strengthen international safeguards.”

- Eldorado Uranium Refinery – Report of the Environmental Assessment Panel, July 1980

The Commission stated, in its review of the operating license for the Blind River refinery, “CNSC staff reported that Cameco has met all safeguards license conditions and provided all of the information for, and made all of the

preparations necessary in support of, Canada’s safeguard agreement with the International Atomic Energy Agency.”

... Cameco has made all of the preparations necessary in support of Canada’s safeguard agreement with the IAEA.

In addition, Canadian Nuclear Safety Commission staff reported that, “...Cameco continues to implement adequate security measures at the facility and has responded appropriately to the recent CNSC Order for enhanced security at nuclear facilities following the terrorist events in the United States...”

Radiation

Cameco continues to implement adequate security measures... and has responded appropriately to the recent CNSC Order for enhanced security at nuclear facilities...

Radiation levels were another point of concern for objecting individuals during discussions about the refinery in 1980. As was expected by the company but unexpected by many protestors, radiation caused by the process at the refinery are far below acceptable levels, not only for workers, but also for the public in general. The record of proceedings states, “With respect to the protection of the public from radiation, Cameco estimated that the highest dose to an individual in a theoretical critical group is approximately 0.7% of the public dose limit.”

Radiation levels were another point of concern for objecting individuals...

The Commission continues by saying, “Based on the information provided, the Commission concludes that Cameco has made, and will continue to make, adequate provision for the protection of workers and the public from radiation.”

Use of Land

Some argued that the proposed site would be better used if it were left for agricultural applications

Some of those who were involved in opposing interventions in 1980 argued that the proposed site would be better used if it was left for agricultural applications.

“Why must the nuclear refinery be located on prime agricultural land?”

While some believed that the province should focus only on primary agricultural production, others, like the provincial Department of Agriculture, recognized the need to diversify and develop value-added activity

16 hectares of the land that was to be used for the refinery was considered to be “Class 5” land under the Canada Land Inventory. This class represents low capability for agricultural production. The remaining 564 hectares, the “buffer zone” between the refinery itself and other groups, had a higher agricultural production potential, being listed as a Class 3 parcel of land. The Panel stated that they believed that the impact on agriculture would be negligible. In addition, should farmers wish to farm the land in the buffer zone, Eldorado proposed to lease the land back to farmers for agricultural purposes.

The Saskatchewan Department of Agriculture also presented their opinions to the Review Panel. They noted that the refinery met the goals and requirements for rural development and land use and that the refinery “...would enhance opportunities for non-farm employment in an area characterized by small farms with low incomes.”⁷

⁷ Eldorado Uranium Refinery – Report of the Environmental Assessment Panel, page 45

“Will your genes be fit for your great-grandchildren to wear?”

- Opponent

“If a refinery were built here, it would stand as a symbol of destruction for our people for generations to come”

- Opponent

This area of argument demonstrates that there was some significant difference in opinion as to the economic direction of the province. While some believed that the province should focus only on primary agricultural production, others, like the provincial Department of Agricultural, recognized the need to diversify and develop value-added activity.

Public Sentiment

Attached as Appendix D are a number of posters that were hung around Saskatoon during the refinery discussions in the late 1970s. These posters indicate the views expressed by opponents of the idea of this investment developing in Saskatchewan. As can be seen from the 2002 environmental review, the risks stated in 1978 were not proven to be justified by the last 20 years of experience at the Blind River facility.

“Will your genes be fit for your great-grandchildren to wear?”

Below are some of the comments made by individuals, opposed to the project, who made presentations or provided written submissions to the Panel in 1980:

“I am hoping our farm will be handed on to the third generation in good condition, where pure milk and uncontaminated grain will continue to be produced.”

“In my view, it is unethical to place uranium hexafluoride onto the export market, when one knows there is a very high risk that some of it will be

“We feel that government policies on nuclear energy... are playing fast and loose with our lives, our health, and our safety.”

- Opponent

The safety and environmental findings over more than a decade of experience at the Blind River facility proves that the environmental and safety objections were unfounded

diverted for use in nuclear weapons. There can surely be no doubt that this risk is very real.”

“If a refinery were built here, it would stand as a symbol of destruction to our people for generations to come.”

“We feel that government policies on nuclear energy, both in Saskatchewan and other geographical and political settings, are playing fast and loose with our lives, our health, and our safety.”

Unfortunately, future generations of Saskatchewan citizens missed out on a significant opportunity for employment, value-added activity, and growth in the province. The safety and environmental findings over more than a decade of experience at the Blind River facility proves that the environmental and safety objections were unfounded to the extent that the project proceeded in another part of Canada. The consequence of public concerns voiced in Saskatchewan had a practical effect of shifting economic opportunity outside Saskatchewan but did not stop the project from occurring elsewhere.

Active Participation May Have Landed The Project

Throughout the process, some question was raised as to the true desire of some stakeholders to see the project progress. The most glaring example of complacency was from the Meewasin Valley Authority (MVA), the body that oversees the development of a portion of the South Saskatchewan River.

Even after repeated requests from the panel, the MVA refused to make a presentation to the review panel. No communications were returned and the MVA remained as far away from the process, even though the proposed refinery was to be located on land that was listed as a “buffer zone” for the river.

In addition to the MVA, proceedings show that support from the provincial government of the time, under Premier Blakney, did not put a strong push in favor of the refinery. Considering that it was largely due to Premier Blakney’s insistence that further facilities be located in Saskatchewan, it is disappointing that the government was relatively silent on the subject and was virtually invisible at the public hearings.

The Panel and Process

The review panel was composed of seven members. John Klenavic, Chairman of the panel and hailing from Ontario, was serving on behalf of the Federal Environmental Assessment Review Office for the Department of the Environment.

Reg Lang, a member of the Faculty of Environmental Studies at York University, was born in Saskatchewan and was teaching urban-regional and environmental planning at York while the review was being conducted.

Allan Olmsted, a professor in the Department of Sociology at the University of Calgary, was also born in Saskatchewan where he also received his B.A. and M.A. in sociology. Dr. Olmsted taught courses including human ecology, social psychology, and human community.

David Scott, from the Freshwater Institute of the department of Fisheries and Oceans Canada, was residing in Winnipeg at the time of the hearings. Dr. Scott grew up in British Columbia, but had worked numerous years for the Provincial Government of Ontario.

Kim Shikaze, representing the Environmental Protection Service branch of Environment Canada, was born in British Columbia, but grew up and was residing in Ontario. He held a Masters Degree in Sanitary Engineering from

the University of Toronto and had worked for Federal and Provincial governments throughout his entire career.

The only two panel members who were residing in Saskatchewan at the time of the review were Professor Glen Beck from the Department of Economics at the University of Saskatchewan and Professor Donald Rennie from the Department of Soil Science at the University of Saskatchewan.

Prior to the completion of the review, Dr. Rennie suffered a heart attack and asked that Dr. Beck cast his vote on all issues facing the review panel. In essence, Dr. Rennie and Dr. Beck attempted to ensure that current Saskatchewan residents were still being represented, even if it was an under-representation.

Under-representation is being claimed since it should likely have been those who would have the refinery in their back yard who made the ultimate decision. While not everyone has the technical expertise to evaluate the science on which the refinery was based, it was determined quite early in the process that the potential impact on the environment would be minimal. As such, the review turned to the social implications.

In evaluating the social impact of such a project, no one should have a better sense of what the impact might be than residents of the region. Panel members who are from other regions may not have an appropriate sense of

what the region is prepared to accept. External panel members may have over-weighted the religious aspect of the debate, in which it was argued that the refinery would degrade the Mennonite community's religious beliefs, which should not have played any role in the decision because of the separation of church and state.

The review panel itself made critical comments regarding the review process and procedures in an appendix to the panel's Appendix II, "Discussion of Procedures", panel members raised nine points of concern that they felt needed to be communicated to the Environmental Assessment and Review Office. Below are some of the comments included in that appendix:

"...the more contentious the issue the greater the need for firm ground rules. The Warman public meetings provided many instances for appeal to procedural irregularity, often for what appeared to be strategic reasons."

"There may be a need to establish firm rules regarding the roster for presentations to avoid the situation where they become rebuttals of previous speakers. In addition, submissions must be filed with the Panel prior to their oral presentation."

"It would seem necessary to clear up a present confusion in the Federal Environmental Assessment Review Office guidelines concerning the nature and amount of public information which is sought. There is some confusion

now about whether ‘representative’ opinion is sought or whether the public meetings are an occasion where one and all may express their views.”

“Some thought should be given to rules of order at public meetings.”

Perhaps the most important recommendation made by the panel, and one which would have helped guide Eldorado Nuclear when preparing the environmental impact statement, is the following:

“It may be necessary to address early in the review the identification of major issues by means of public involvement in the preparation of guidelines for an Environmental Impact Statement in order that it may contain a sound data base for public dialogue during the Panel public meetings to review the final project. The Panel notes that public input to guidelines is now the normal practice but that the 1976 guidelines for this project were not subjected to public review.”

Had the above been necessary, Eldorado would have had a better sense of what elements of the project were of concern to the public. The company could then have responded appropriately to those concerns in the Environmental Impact Statement, rather than having to resubmit a portion of the Statement after the bulk of the review had been completed. Some companies undoubtedly see the requirement to resubmit information, when the ground rules were not initially clear, as an overburden and a significant barrier to investment.

Health Applications of Nuclear Technology

Saskatchewan could have capitalized on the development of its uranium industry and captured a portion of the market for nuclear medicine

The potential value-added activity that exists for our resource base extends beyond the refinery discussion in this paper. Other opportunities have been missed. One example is that of “nuclear medicine”.

Nuclear medicine is a cost-effective, safe, and painless technique used to treat disease and “image” the body. Often there is no other treatment recourse available. With patients being exposed to only as much radiation as a standard medical X-ray, nuclear imaging provides a more detailed view of organs. The technology also allows for earlier detection of disease, which leads to earlier treatment and increased survival rates.

The nuclear medicine industry employs 2,700 full time equivalent nuclear medicine physicians as well as 14,000 nuclear medicine technologists in the U.S. alone

Saskatchewan could have capitalized on the development of its uranium industry and captured a portion of the market for nuclear medicine. Annually, there are between 10 million and 12 million nuclear medicine procedures performed in the United States, with one to two million being performed in Canada, and an estimated 50 million such treatments worldwide. In addition, the nuclear medicine industry employs 2,700 full time equivalent nuclear medicine physicians as well as 14,000 nuclear medicine technologists in the U.S. alone.

People of the world are benefiting from nuclear medicine. The Ottawa Heart Institute performs more than 8,000 procedures annually to evaluate damage and blockages in the heart. The Institute has shown that “...the accuracy of

The technology being used in the Ottawa region reaches over half a million people worldwide through the use of “cobalt-60” imaging machines

The U of S was the birthplace of the Cobalt-60 unit. Professor Harold Johns installed the first Cobalt-60 unit at the Royal University Hospital on August 17, 1951

Nuclear medical procedures have helped hundreds of millions of people worldwide over the past 40 years through a procedure that has clear Saskatchewan roots

diagnosing heart disease has increased 30 – 40 percent. This means avoiding unnecessary invasive surgery...”⁸

Canadian nuclear science technology has been recognized with two Nobel prizes. The technology being used in the Ottawa region reaches over half a million people worldwide through the use of “cobalt-60” imaging machines. Similarly, approximately 50,000 people per day undergo procedures that detect cancer and heart disease using “molybdenum-99” from the Ottawa valley. This contribution to world health, one of the largest and fastest growing industries in the world, could have come from within Saskatchewan as another value-added industry that would have provided a significant contribution to the economy.

In fact, the University of Saskatchewan was the birthplace of the Cobalt-60 unit, also called the “Cobalt Bomb”. Professor Harold Johns, head physicist at the University of Saskatchewan, installed the first Cobalt-60 unit in Room 167 of the Royal University Hospital Cancer Wing on August 17, 1951.

In many cases there is no real alternative treatment, to that of nuclear medical treatment, available to individuals suffering from certain illnesses. Nuclear medical procedures have helped hundreds of millions of people worldwide over the past 40 years through a procedure that has clear Saskatchewan roots.

⁸ “Nuclear Medicine: Better disease diagnosis and detection” Canadian Nuclear Association

Had Saskatchewan seized the refinery opportunity, it is possible that continued advancements in the field of nuclear medicine would have occurred in Saskatchewan.

Had Saskatchewan seized the refinery opportunity, it is possible that continued advancements in the field of nuclear medicine would have occurred in Saskatchewan, building on the expertise that already existed at the University of Saskatchewan and other research centers throughout the province.

Consequences of Rejecting Opportunity

...The message that was sent when the refinery was rejected signaled to AECL that research and development was not wanted in this province.

The opponents' objections in Saskatchewan in 1980 have been proven to be unjustified by the last 20 years of the Blind River Facility.

The success of the opponents was not to eliminate the risk of nuclear war, nor did cows quit producing milk in Blind River.

When the public outcry prevented the Federal Environmental Assessment Review Panel, ironically with the acronym "FEAR", from giving an outright approval of the project, the province did not just lose a uranium refinery with a capital cost of over \$100 million. Other projects and businesses chose not to expand, or ceased operations, in Saskatchewan after that decision was made.

Atomic Energy Canada Ltd. (AECL), a federal organization that develops the technology to be used in the production of electricity through uranium usage, as well as other related technology, had one of its most productive offices in Saskatoon in the 1970s and early 80s. After the refinery was not approved, AECL closed its Saskatoon office. The closure of some offices was needed due to budgetary constraints, however, the message that was sent when the refinery was rejected signaled to AECL that research and development of nuclear-related technology was not wanted in Saskatchewan based on objections that were factually incorrect. As can be seen from the subsequent development of the Blind River facility, the opponents objections in Saskatchewan in 1980 have been proven to be ineffectual by the last 20 years other than to limit opportunities in Saskatchewan while still experiencing refinery developments elsewhere.

The success of the opponents was not to eliminate the risk of nuclear war, nor did cows quit producing milk in Blind River. The success of the opponents

was to push needed value-added investment away from Saskatchewan and into another jurisdiction for its benefit.

Historical Impact of Uranium Conversion

The cost to convert uranium from its mined form to a useable product in power plants is approximately US\$930, or around CAD\$1,450 per kilogram of U_3O_8 ⁹. Canada's annual production of uranium has risen from 10,768,000kg of U_3O_8 in 1993 to 14,742,000 kg in 2001. Had the entire conversion process occurred within Canada, approximately \$2.5 billion in economic activity would have been generated each year without applying economic activity multipliers. This activity, using a capitalization rate of 6%, had a cumulative value of over \$24 billion from 1993 to 2001. (Appendix E)

The \$6,000,000 payroll at Blind River has cost over \$297 million to the economy of Saskatchewan when a capitalization rate of 6% is used over the period from 1983 to 2004. (Appendix C)

The value of the \$100,000,000 investment in 1983 is in excess of \$335 million in 2004, again using a capitalization rate of 6%. Over the 30 years life of the plant, the value of the foregone investment jumps to over \$574 million in today's dollars using a rate of 6%. (Appendix E)

These are all substantial losses to the economy of Saskatchewan and provide only a glimpse of the foregone for economic growth that occurred as a result of the 1980 decision. The construction of the Blind River upgrader in Ontario

⁹ Conversion rate of CAD\$1.56 = US\$1.00

Of those employed at mine sites in 2001, 45% were of aboriginal ancestry.

resulted in all of the benefits that could have been experienced in Saskatchewan now being experienced in Ontario.

In the future, other provinces and countries will continue to compete to attract the investment dollars of companies like Cameco and Areva as the demand for processed uranium increases with the demand for cleaner energy sources. For Saskatchewan to again be considered for this kind of investment, a clear public policy change to direct nuclear potential development in Saskatchewan would have to be presented.

Saskatchewan, however, has not been at a total loss when examining the uranium industry. The uranium mining industry spent in excess of \$102 million in salaries and benefits to employees in Saskatchewan, with over \$35 million of this total going to residents of Northern Saskatchewan¹⁰. Personal income tax, Canada pension plan contributions, and employment insurance premiums totaled \$30 million. \$130.5 million in goods and services were purchased by the industry from companies in Saskatchewan. With over \$44 million in taxes and royalties being paid by the industry to the Government of Saskatchewan, the impact of the industry is substantial.

In addition to the pure financial benefit derived from the industry, 1,300 people were directly employed in the uranium industry. Of those employed at mine sites in 2001, 45% were of aboriginal ancestry. It is fair to say that without the current level of uranium development in Saskatchewan, these

¹⁰ Cameco Corporation website

Without the current level of uranium development in Saskatchewan, these 1,300 people and their families would either have left the province or be unemployed on social assistance.

1,300 people and their families, plus the employees of suppliers to the industry, would either have left the province or be unemployed on social assistance.

The people of Saskatchewan should be encouraged, but not satisfied, with the current level of activity and the benefits derived from the uranium industry because future opportunities are even greater than those experienced to date.

Potential Future Impact of Uranium Based Electrical Generation

Nuclear power is proven to be a safer form of energy than all others, even when the side effects of greenhouse gas emissions are not included in the calculation.

Demand for finished uranium is only expected to rise as the need to convert from coal and gas plants to greener technologies occurs. As this transition happens, there will be increasing reliance on the nuclear industry to provide power to the world. Nuclear power is proven to be a safer form of energy than all others, even when the side-effects of greenhouse gas emissions are not included in the calculation. When greenhouse gas emissions are included, the impact coal and gas plants have on health and safety is severely worsened.

When greenhouse gas emissions are included, the impact coal and gas plants have on our health and safety is severely worsened.

Other forms of electricity production can cause environmental damage. Coal produces large levels of greenhouse gas and can be a major contributor to acid rain. Dams producing hydroelectricity are much cleaner from a sulfur and direct CO₂ emissions perspective, however, this approach destroys wildlife habitat, much of which acts as a natural method of carbon sequestration. In addition, the potential locations for new hydro electricity plants are limited. Wind power is not predictable enough upon which to build an industrial base and, though clean, is thought by some to be an eyesore. Solar power has a fundamental downfall: there are fewer hours of available daylight in the winter when power needs are highest and an excess of daylight hours in the summer when power needs are lower. As technology improves for generating storing energy from solar panels, it may become a more reliable energy source. An additional challenge relative to solar power technology today is that, at present, the amount of energy produced relative to the amount of space

occupied by solar panels is impractical for the immediate employment of this technology on a broad scale in the near term.

By capturing a large portion of this emerging industry, Saskatchewan could stand to experience enormous gains in employment, investment attraction, and acceleration in tax base growth.

The global nuclear power industry is growing steadily. With today's improvements our technology allows for more energy to be produced using less processed uranium at a lower capital cost over shorter construction periods. By capturing a large portion of this emerging industry, Saskatchewan could stand to experience enormous gains in employment, investment attraction, and acceleration in tax base growth.

Influences on the Mobility of Investment Capital

While there are a number of factors that are involved in every investment decision, it may help to identify just some of those factors. While some are very clear and easily identifiable, others are of an intangible nature but may be the most critical components to an investment decision.

Taxation policy, at all levels of government, can play a very important role, especially considering that many levels of taxation vary a great deal between jurisdictions. For example, region A may have no sales tax but may have very high corporate tax levels. This could result in an outflow, or a barrier, to investment in that region.

The supply of labour, the skill level of labour, and the legislative environment concerning labour are all important considerations. Look simply to Idaho, a U.S. state that implemented Right to Work legislation and experienced a subsequent boom in investment. Other regions, with more stringent and demanding labour requirements, could face decreasing levels of investment.

A region that has extremely high prices, a cumbersome regulatory environment, or high costs of production will experience significantly lower inflows of investment as investors seek higher returns in other low-cost areas.

If it is far too difficult to receive regulatory approval, or to apply for appropriate licenses, investment will divert its attention elsewhere

Regulatory requirements often act as the primary barrier to investment. If it is far too difficult to receive regulatory approval, or to apply for appropriate licenses, investment will divert its attention elsewhere.

The above have all been, in some way, government policy decisions.

However, regardless of the economic benefits of a project to the proposer, a negative attitude from the citizens of a community can kill a proposal. Of course many examples can be provided in Saskatchewan including intensive livestock operations, expanded forestry, expanded mining, and the proposed Warman uranium refinery. Investment will flow to where it is profitable and wanted. A public environment that does not encourage investment will not receive investment.

Conclusions

The pursuit of some of these opportunities by communities beyond our borders have occurred while Saskatchewan's pursuit of these same opportunities has lagged sometimes based on objections similar to those voiced during the uranium refinery decision

Saskatchewan has, to date, not pursued opportunities for many resource base value added economic development opportunities. The pursuit of opportunities, such as the uranium refinery, by communities beyond our provincial borders has occurred while Saskatchewan's pursuit of these same opportunities has lagged often based on objections similar to those voiced during the uranium refinery decision. For example, the oil industry in Saskatchewan is not fully developed, value-added food processing has been only minimally explored, and intensive livestock operations such as hog production have been aggressively challenged at the community level based on concerns that have similar themes. Consequently, other value-added activities, like uranium processing, have developed in other regions and the economic benefits derived there from have been largely experienced elsewhere. Other activities like egg and poultry operations as well as cattle and hog projects have not grown to reflect the reality of the post-crow freight rate era from a Saskatchewan perspective.

Saskatchewan's population remains the same as it was in the 1930's, when it was Canada's third largest province but when an older demographic profile and an eroding tax base are added, the challenges compound. Now, rather than growing, Saskatchewan is struggling to maintain infrastructure through a tax base that is eroding. These trends, in conjunction with a dismissive

attitude towards investment projects expressed by too many residents, are diminishing the province's economic activity and job base. Our ability to excite a sufficient number of young people currently resident in Saskatchewan to pursue their future lives in Saskatchewan is essential if the erosion of our tax base is to be arrested and reversed.

Saskatchewan must identify, pursue, and secure many new opportunities to maximize the value added activity of natural resources for the future citizens of the province...

Saskatchewan must identify, pursue, and secure many new opportunities to maximize the value added activity of natural resources for the future citizens of the province in order to arrest and reverse youth out-migration. As long as the attitudes of those who expressed objections to the uranium refinery are unchallenged, and these attitudes continue to be reflected in aggressively stated and often unfounded objections to other economic development and job creation opportunities, the youth exodus and tax erosion will continue to restrict the ability of Saskatchewan to provide needed services and provide support for the social fabric of the province. Through the uranium industry, and the development of technologies to complement this industry,

We must create opportunities within our borders so the youth of the province can be proud of their home and enjoy successful careers in the province that educated them.

Saskatchewan has the potential to surge onto the global economic stage and reverse the trends of out-migration and youth exodus.

We must aggressively pursue and create opportunities within our borders so the youth of the province can be proud of their home and enjoy successful careers in the province that educated them. The people of Saskatchewan have the potential to reverse the negative population and demographic trends by pursuing and securing opportunities rather than rejecting opportunities without

regard to the consequences of limiting Saskatchewan's economic potential.

Recommendations:

The Saskatoon and District Chamber of Commerce recommends:

- 1. That the Government of Saskatchewan adopts clear policies and incentives that encourage investment in the exploration and extraction and further development of our world-class uranium natural resource.*
- 2. That the Government of Saskatchewan adopts clear policies and incentives that encourage value-added processing of Saskatchewan's natural resource base.*
- 3. That the Government of Saskatchewan pursues and supports uranium-based electricity production as both a commodity available for export as well as a tool to help in meeting Canada's Kyoto Protocol targets.*
- 4. That the Government of Saskatchewan strives to position Saskatchewan as a world leader in all elements of the uranium use fuel cycle, from exploration and extraction to power generation, nuclear medicine technology and its application, and finally long-term storage of fuel to complete the cycle.*
- 5. For the Government of Saskatchewan to promote this uranium industry as a means to provide career opportunities for young people to stay in Saskatchewan.*
- 6. The citizens of Saskatchewan are encouraged to pursue opportunities in Saskatchewan aggressively. We must learn from our mistakes.*

APPENDIX A

PROXY RETURN ON INVESTMENT

	2001	2002
Calculation of Return on Investment		
Property, Plant, Equipment	\$ 1,994,424,000	\$ 2,044,820,000
Earnings (Note 1)	\$ 94,807,000	\$ 102,224,000
Approximated ROI	4.7536%	4.9992%
Property, Plant, Equipment	\$ 1,994,424,000	\$ 2,044,820,000
Interest in Bruce Power		-
	81,416,000	
Long Term Investments		
	17,564,000	17,564,000
	\$ 2,093,404,000	\$ 2,062,384,000
Earnings (Note 1)	\$ 94,807,000	\$ 102,224,000
Earnings from Bruce Power		-
	12,167,000	
Dividend from Long-term Investment	590,000	1,896,000
	\$ 107,564,000	\$ 104,120,000
Approximated ROI	5.1382%	5.0485%
Note 1 - Composition of Earnings		
Earnings before taxes, other income, earnings from Bruce Power, writedown of mineral properties, and provision for waste disposal		

APPENDIX B
GPP LOSS CALCULATION

Number of Employees	80		120		160	
YEAR	GPP/capita	Additional GPP	GPP/capita	Additional GPP	GPP/capita	Additional GPP
1983	\$16,278	\$1,302,240	\$16,278	\$1,953,360	\$16,278	\$2,604,480
1984	17165	1,373,200	17165	2,059,800	17165	2,746,400
1985	17,806	1,424,480	17,806	2,136,720	17,806	2,848,960
1986	17,279	1,382,320	17,279	2,073,480	17,279	2,764,640
1987	17,888	1,431,040	17,888	2,146,560	17,888	2,862,080
1988	18,433	1,474,640	18,433	2,211,960	18,433	2,949,280
1989	19,796	1,583,680	19,796	2,375,520	19,796	3,167,360
1990	21,339	1,707,120	21,339	2,560,680	21,339	3,414,240
1991	21,763	1,741,040	21,763	2,611,560	21,763	3,482,080
1992	21,121	1,689,680	21,121	2,534,520	21,121	3,379,360
1993	22,768	1,821,440	22,768	2,732,160	22,768	3,642,880
1994	24,530	1,962,400	24,530	2,943,600	24,530	3,924,800
1995	26,498	2,119,840	26,498	3,179,760	26,498	4,239,680
1996	28,793	2,303,440	28,793	3,455,160	28,793	4,606,880
1997	28,955	2,316,400	28,955	3,474,600	28,955	4,632,800
1998	29,013	2,321,040	29,013	3,481,560	29,013	4,642,080
1999	30,420	2,433,600	30,420	3,650,400	30,420	4,867,200
2000	33,372	2,669,760	33,372	4,004,640	33,372	5,339,520
2001	33,642	2,691,360	33,642	4,037,040	33,642	5,382,720
2002	34,730	2,778,400	34,730	4,167,600	34,730	5,556,800
		<u>\$38,527,120</u>		<u>\$57,790,680</u>		<u>\$77,054,240</u>

Source: Saskatchewan Bureau of Statistics, Economic Review 2003

APPENDIX C – Personal Income Tax Calculation

	80 Employees	120 Employees	160 Employees
Total Wages	\$6,365,400	\$6,365,400	\$6,365,400
Avg. Income Per Employee	\$75,000	\$50,000	\$37,500
Provincial Tax Credits (assumed single income, married, two children)			
Basic Personal Amount	\$8,000	\$8,000	\$8,000
Spousal Amount	8,800	8,800	8,800
Dependant Amount (2 x 2,500)	5,000	5,000	5,000
Subtotal	\$21,800	\$21,800	\$21,800
Taxable Income	\$53,200	\$28,200	\$15,700
Personal Income Taxes			
\$ 0 - 35,000	11.00%	\$5,852	\$3,102
\$ 35,001 - \$100,000	13.00%	2365.87	0
\$100,001+	15.00%	0	0
PIT per employee		\$8,218	\$3,102
Total PIT Paid by Employees		\$657,430	\$372,240

19 Years Before Base – Payroll \$3,467,707.58

Base Year – 2004 – Payroll \$6,365,400

11 Years After Base – Payroll \$8,305,403.22

Capitalized at 6% - Value of \$297,865,194.39

APPENDIX D
POSTERS FROM THE LATE 1970s

APPENDIX E - CALCULATIONS

Capital Tax Loss

Amount	450,000.00
Rate	6%
FVTime	21
PVTime	9
0-21	17,996,727.00
21-30	3,060,761.52
	<u>\$ 21,057,488.53</u>

Personal Income Tax Loss

Amount	372,240.00
Rate	6%
FVTime	21
PVTime	9
0-21	14,886,892.58
21-30	2,531,861.93
	<u>\$ 17,418,754.51</u>

Worker Salary Income Loss

Amount	6,365,400.00
Rate	6%
FVTime	21
PVTime	9
0-21	254,569,702.38
21-30	43,295,492.00
	<u>\$ 297,865,194.39</u>

Corporate Income Tax Loss

Amount	475,000.00
Rate	6%
FVTime	21
PVTime	9
0-21	18,996,545.17
21-30	3,230,803.83
	<u>\$ 22,227,349.00</u>

Grants In Lieu of Property Taxes Loss

Amount	300,000.00
Rate	6%
FVTime	21
PVTime	9
0-21	11,997,818.00
21-30	2,040,507.68
	<u>\$ 14,038,325.69</u>

Total Tax Cost - \$1.5 million Annual Loss

Amount	1,500,000.00
Rate	6%
FVTime	21
PVTime	9
0-21	59,989,090.01
21-30	10,202,538.41
	<u>\$ 70,191,628.43</u>

GPP Loss - \$68,500,000 Annual Loss

Amount	68,500,000.00
Rate	6%
FVTime	21
PVTime	9
0-21	2,739,501,777.29
21-30	465,915,920.80
	\$ 3,205,417,698.09
	x Econ Multiplier of 4
	<u>\$ 12,821,670,792.37</u>

Uranium Conversion Impact

Initial Investment (1983)	\$ 100,000,000
Rate	6%
Time (Years)	21
Investment Today	<u>339,956,360</u>
Initial Investment (1983)	\$100,000,000
Rate	6%
\$ Value, 30 years	<u>\$574,349,117</u>

Uranium Conversion Impact

Economic Activity	\$ 2,500,000,000
Rate	6%
FVTime	8
Value	<u>\$24,743,669,772</u>

Appendix F

“Positive Assessment of Warman Refinery” Saskatoon Commentator, January 9, 1980

Overview – The Saskatoon Board of Trade supports the construction by Eldorado Nuclear Ltd. of the proposed Saskatchewan Uranium Refinery near Warman. This conclusion is based upon a seven month examination of the project as proposed by Eldorado, by members of the Board of Trade. The Board of Trade’s examination of the project included:

1. A tour of the Port Hope Refinery, operated by Eldorado, by representatives of the Board of Trade in April, 1979.
2. A seminar conducted by the Board of Trade involving guest experts and members of citizen’s groups, as well as members of the Warman Town Council and Council for the Rural Municipality of Corman Park. This seminar was conducted for the purposes of informing the membership of the Board of Trade regarding the pros and cons of the proposed refinery, in July of 1979.
3. An examination of the Environmental Impact Statement (EIS) prepared on the Warman site, by Beak Consultants Ltd., together with the public involvement supplement to the EIS.
4. A tour of the proposed refinery site by representatives of the Board of Trade in October of 1979.

Site – The EIS indicates that the site proposed for construction of the Saskatchewan Refinery has very low agricultural potential. The Refinery will occupy approximately forty (40) acres out of a total 1,440 acre site. The remaining 1,400 acres will be available to be leased back to farmers for agricultural use, or could be developed in other manners consistent with the requirements of the Meewasin Valley Authority, which has control

over a portion of the total site. The planned decommissioning of the site by Eldorado, upon the completion of the Refinery's productive life, will insure that the future use of the site will be unrestricted.

The Process – The Board of Trade perceives an ignorance of the details of the project by a portion of the general public with respect to the nature of the proposed facility.

Feedback from a small number of Board of Trade members during the Board's examination of the project, indicates a feeling by these members that a uranium refinery, as part of the nuclear fuel cycle, is a facility containing nuclear reactors, generating high-level radiation, and which involves a risk of nuclear explosion. It is considered that this misunderstanding is caused by a failure by the proponent, Eldorado Nuclear Ltd., to provide adequate information to the general public regarding the nature of the process of refining uranium and the nature of a uranium refinery. As the Board of Trade is now aware, a uranium refinery is not a nuclear facility as such, but is a chemical refinery for the refining of natural uranium, a substance that emits only low-level radiation. The EIS indicates that this low-level radiation represents no significant hazard to workers in the refinery, or to the general public, when the safeguards which are proposed by Eldorado are employed. The Board of Trade feels that the provision of basic information on the process of refining uranium, to the general public, is necessary in order for the proposed Saskatchewan Refinery to have a fair hearing on our community.

Monitoring and the Environment – The EIS indicates that there will be no long-term impacts on the Warman or Saskatoon areas' air quality as a result of the construction and operation of the proposed refinery. The overall impact on the terrestrial environment is expected to be minimal. The EIS further states that the natural geology and hydrology of the site, together with proposed safeguards such as paving the actual plant site, will insure

no environmental impact to ground or surface water on or near the site, and no measurable effect on water quality in the South Saskatchewan River at the plant's intake and outfall. The Board of Trade considers that the proposed plant will be a model industry in terms of environmental safeguards employed to prevent pollution, making the proposed uranium refinery a cleaner industry to welcome to our community than many others already operating in or near Saskatoon.

Appendix G – Energy Accident Statistics

Comparison of accident statistics in primary energy production.
 (Electricity generation accounts for about 40% of total primary energy).

Fuel	Immediate fatalities 1970-92	Who?	Normalized to deaths per TWy* electricity
Coal	6400	workers	342
Natural gas	1200	workers & public	85
Hydro	4000	public	883
Nuclear	31	workers	8

*Basis: per million MWe operating for one year, not including plant construction, based on historic data, which is unlikely to represent current safety levels in any of the industries concerned.

Source: Ball, Roberts & Simpson, Research Report #20, Centre for Environmental & Risk Management, University of East Anglia, 1994; Hirschberg et al, Paul Scherrer Institute, 1996; in: IAEA, *Sustainable Development and Nuclear Power*, 1997; *Severe Accidents in the Energy Sector*, Paul Scherrer Institute, 2001).