



REGULATORY IMPACTS ON THE CANADIAN URANIUM INDUSTRY

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Abstract

The development of environmental and safety regulation in Canada is described and the impacts of these developments on various phases of the uranium industry are examined. In the past 25 years, seven new uranium mining projects, major expansions to four projects, and five uranium refining/conversion projects have undergone environmental assessment in Canada. As regulations and the processes for applying them have developed, the size, complexity and cost of obtaining operating approvals for uranium projects have increased exponentially. Uranium projects are subject to a level of scrutiny that goes far beyond what can be justified by their potential for environmental damage, based primarily on a perceived degree of public concern, rather than any objective measure of environmental risk. The author believes that it is time to re-examine our priorities, to establish some balance between the risks of a project and the assessment effort required. Otherwise, we shall soon find ourselves in the position where smaller projects will never be developed because they cannot cover the regulatory costs.

1. INTRODUCTION

The Canadian uranium industry moved from rapid expansion in the 1950s into a ten-year slump in the early 1960s. The rising demand for uranium and the resultant increase in price in the early 1970s sparked a new wave of exploration which bore fruit in an unprecedented expansion of the industry. The Rabbit Lake mine started production in 1975. Rio Algom and Denison started major expansions at Elliot Lake in the late 1970s. New mines at Cluff Lake and Key Lake started up in the early 1980s. The 1990s have seen new mines at McClean Lake, the Midwest Project at South McMahan Lake, Cigar Lake and McArthur River, together with new developments at the existing Cluff Lake and Rabbit Lake mines. In uranium refining and conversion, five new projects were subjected to environmental assessment between 1975 and 1980, resulting in two new plants being built. At the same time that these projects were under development, the regulations which control them were undergoing major changes.

2. CANADIAN REGULATORY REGIME

Canada has a federal government and ten provincial and two territorial governments. Resource development has always been a provincial matter and is normally conducted under provincial laws. However, the development of atomic energy was made a federal matter by passage of the Atomic Energy Control Act in 1946, and all matters related to the development of atomic energy, including all facets of the uranium industry are regulated by the Atomic Energy Control Board (AECB), a federal agency. The involvement of provincial governments in the uranium industry has been largely a matter of choice by the provincial governments. Saskatchewan, which is the source of all uranium now being mined in Canada, has chosen to exert control over uranium mining and does so by surface lease agreements. Since all the mining is taking place on provincial lands, the mining company must sign a lease with the province. The province inserts clauses into the lease agreement, which commit the company to abiding by provincial law and any additional provisions that the province may see fit to add. In Ontario, the other (former) uranium producing province, the provincial government has varied in its direct interest in the uranium industry, but has applied provincial law to uranium mining operations.

The net effect of this approach to regulation has been a duplication of effort to a varying degree in a number of areas that directly affect the uranium operations. The provinces have generally been stronger in conventional mine safety and they have usually been the leaders in inspection and enforcement in this area at the uranium mines. In some cases agreements have been signed with the federal agency formally giving the province authority in the conventional health and safety area. In the environmental area, the provinces, particularly Saskatchewan, have also taken a lead, but the federal Departments of Environment and Fisheries and Oceans exert influence as advisors to the Atomic Energy Control Board. The AECB has concentrated more on the radiation protection requirements, but Saskatchewan also has a well-developed radiation protection act and regulations and enforces these through the surface lease agreements.

During the period of this review, the regulations have been evolving. The current federal radiation protection requirements are based on the pre-1977 recommendations of the International Commission on Radiological Protection (ICRP), but new regulations, based on the 1990 recommendations of the ICRP [1] are in draft and are expected to come into force in 1999. These regulations have been written under the new Nuclear Safety and Control Act, which will replace the Atomic Energy Control Act, and replace the AECB with a new agency, the Nuclear Safety Commission. The Province of Saskatchewan introduced new regulations based on ICRP Publication 60 several years ago.

The federal government first introduced environmental assessment requirements by cabinet memorandum in the early 1970s. These were initially applied only to federal government works. The requirements were formalized by a cabinet order in 1984 and applied not only to federal works but to any activities regulated by federal laws or agencies. In 1994 the federal government passed the Canadian Environmental Assessment Act, creating a federal government agency with the responsibility for environmental assessment. The regulations under the act are very detailed and broadly applicable. They cover screening of projects for potential impacts, various levels of environmental assessment, and include provisions for public hearings.

The Province of Saskatchewan passed an Environmental Assessment Act in 1979, but the government had the authority to conduct public inquiries under earlier, more general legislation that was not specific to environmental assessment. Ontario also had legislation in place in the 1970s, which permitted the conduct of public hearings into environmental matters.

3. ENVIRONMENTAL ASSESSMENT OF URANIUM PROJECTS

An environmental impact statement was developed in 1973 for the Rabbit Lake mine. It was reviewed by the Saskatchewan Environment Department, but there were no formal hearings and little public attention. Mining started in 1974 with the first uranium production in 1975.

The Cluff Lake project had identified a number of ore bodies, but the first, the D ore body, was the highest-grade uranium ore body yet to be developed in Canada. The Saskatchewan government appointed a commission in 1977 to conduct an inquiry into the project. This inquiry was very broad-ranging, dealing with nuclear power, waste management, weapons proliferation, radiation risk and the adequacy of radiation protection requirements, and moral and ethical issues, in addition to environmental, safety and socio-economic matters. Despite

the broad range of material, the commission completed its work and reported to the government in 16 months [2]. Mining started in 1980 and the first uranium concentrate was produced late that year.

At the same time in Ontario, the Environmental Assessment Board was conducting hearings into the proposed expansion of the Elliot Lake uranium mines operated by Rio Algom and Denison. This hearing was more limited in scope, dealing primarily with environmental matters and with impacts on the Town of Elliot Lake, although there was consideration of the adequacy of standards. The board was appointed in September, 1976, and reported [3] in May, 1979 (32 months); however, it should be noted that the environmental impact statement (EIS) was developed after appointment of the board, whereas the Cluff Lake EIS had been prepared before the appointment of the commission. Production from the various expanded facilities started between 1980 and 1983, because construction work was started during the assessment process.

The Key Lake Board of Inquiry was appointed in December, 1979, after the EIS had been issued. This Board also made a more limited examination of the project, dealing with environmental and safety issues and regional socio-economic matters. The Board reported in January, 1981, after 13 months [4]. Production started in 1983.

Recognizing the growing need for uranium refining and UF₆ conversion capacity in the mid 1970s, Eldorado Nuclear developed proposals for new plants in Ontario and Saskatchewan. These projects were referred to the federal assessment process and a panel was appointed in 1976. Until that time the federal process had only required public meetings, to explain the project and answer questions, but this panel held public hearings. Prior to the appointment of the panel, a steering committee had developed guidelines for the two EISs. The Ontario hearings started in the fall of 1977 and the panel report refusing the project was issued in May, 1978 [5]. Subsequently, EISs were developed for the project on three alternative sites in Ontario, hearings were held in late 1978, and the panel issued its report in February, 1979, approving all three sites [6]. The refinery component of the expansion was eventually constructed at Blind River, Ontario, and commenced production in 1983. The EIS for the Saskatchewan plant was issued in July, 1979, the hearings were held in January, 1980, and the panel report was issued in July, 1980 [7]. Although the panel found that the environmental impact of the proposal was acceptable, they recommended a further examination of the social impacts before they could reach a conclusion on the overall acceptability of the project. The Saskatchewan project was not pursued further. However, to meet expanding UF₆ requirements, Eldorado built a new conversion plant on its existing operating site at Port Hope, Ontario. Since one of the alternative sites which had been approved by hearing was only a few miles from this site, no additional hearing was required, but public information meetings to deal with site-specific issues were held as part of the AECB licensing process.

The Rabbit Lake project presented an EIS for development of the Collins Bay B-zone mine in 1980 and went through the Saskatchewan environmental assessment process without a public hearing, although there were public information meetings. This is a ministerial option under the Environmental Assessment Act. Production from the new open pit started in 1985.

In 1987, the EIS for the next phase of development at Rabbit Lake was issued. This comprised the Collins Bay A-zone and D-zone open pits and the Eagle Point underground mine. Again the provincial process was followed, with public meetings but no hearing. In this case the Atomic Energy Control Board specifically agreed that the provincial process would satisfy

federal requirements. The process took less than one year, although the EIS had taken about 18 months to develop before being issued publicly. However, the project was delayed due to the weakening uranium market and, when the proponent decided to proceed in 1991, the AECB announced that there was sufficient public concern that a federal environmental hearing would be required. The province chose not to participate, because it saw no reason to withdraw its previous approval. It took six months to appoint a panel for this assessment, the EIS was updated, hearings were held and the panel reported [8] in November, 1993, 24 months after being appointed. This hearing was also narrower in scope, dealing with environmental and safety matters and local socio-economic issues. Production from the first of the new ore bodies started in 1994.

By 1991, Cluff Lake was proposing to develop a new ore body, and new projects were proposed by the Midwest Joint Venture at South McMahon Lake, Minatco at McClean Lake, the Cigar Lake Mining Corporation, and Cameco at McArthur River. Since it had been ten years since the last provincial inquiry into uranium mining, Saskatchewan was interested in conducting a formal assessment. The Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan was appointed in August, 1991, to review all five projects. The first three had already submitted environmental impact statements, but requests for additional information were issued by the panel.

The panel held scoping meetings in nine northern and three southern communities in Saskatchewan in early 1992 to garner public input into the assessment process, resulting in one of the most comprehensive sets of guidelines yet developed for an environmental impact statement [9]. Because the McArthur River deposit is between 500 and 600 m deep, it was necessary to sink a shaft and do detailed drilling from underground in order to design a mining method and develop other information required for the EIS. Although underground exploration did not require a full environmental assessment under either the Uranium and Thorium Mining Regulations or the various regulations under the Canadian Environmental Assessment Act, the panel felt that allowing the underground exploration to proceed without a detailed examination would harm the credibility of the main hearings. Consequently, the underground exploration was referred to the panel for review in 1992 and approved in early 1993 [10]. The shaft was sunk in late 1993 and early 1994, with underground development on one of the two approved levels.

Hearings for the first three projects proceeded in the first half of 1993. Although the panel mandate was more narrowly defined than that of the Cluff Lake Board of Inquiry, the discussion was fairly free-ranging and covered such issues as non-proliferation and nuclear power in general. The panel reported in October, 1993, approving the Cluff Lake project, refusing the Midwest proposal, and approving the McClean Lake project, but recommending a five-year delay to accumulate more information on the tailings management proposal, to improve the environmental baseline data, and to do further work on socio-economic issues [11]. EISs for a new Midwest proposal, Cigar Lake and McArthur River were issued in 1995. Hearings proceeded for Midwest in May and June, 1996, and for the latter two projects in the fall of 1996. The panel approved the McArthur River project in February, 1997 [12]. However, the Midwest and Cigar Lake proposals included milling the ore at McClean Lake and disposing of tailings in the Jeb pit, and the panel requested a further document on tailings management for all three projects. Additional information was submitted in late 1996 and early 1997. The panel held further public hearings dealing only with tailings issues in August, 1997, and approved the Midwest and Cigar Lake projects in November, 1997, together with a

final report on cumulative observations on the five projects [13], nearly seven years after the process was initiated.

4. LICENSING PROCESS

The conclusions of the federal and provincial environmental assessment processes take the form of recommendations to the respective ministers of environment (and other ministers in the case of a joint referral to the assessment agency). The government or governments must then respond to the panel reports. In the cases described here, this response has generally taken two to three months and has generally accepted the panel recommendations, although the governments may add some conditions to the approval. On rare occasions they have decided not to accept a panel recommendation, but this decision must be fully explained in the government response. In the case of Saskatchewan, the provincial legislation requires that public opinion be solicited on the contents of the panel report before the Minister of Environment issues the government decision on the project. This entails a further 30-day public review period.

Having received a favourable report from the panel and a favourable response from the government, the proponent may then apply to the AECB and the provincial agencies for a construction licence for the project. The application must include the full engineering design package, including design criteria, detailed design, a hazards and operability study, and ALARA analysis (a demonstration that the design meets the objective that radiation exposures will be kept as low as reasonably achievable, economic and social considerations being taken into account). In the case of the tailings disposal system, detailed environmental pathways analysis is required with modelling extrapolated 10,000 years into the future. It must also be demonstrated that the recommendations of the environmental assessment panel have been taken into account in developing the detailed design. Because the level of detail in this package is so much greater than that required for the EIS, the assembly of the package can be very time consuming. Work on this package is generally started before the panel report is issued, to minimize the delay in licensing. Even so, the assessment of the design package by the province and AECB staff is likely to take several months. In the federal process, when all questions have been answered, the project is put before the Board. Board policy demands that all licensing issues be brought before two Board meetings with at least one meeting in between. The intent of this policy is to allow public input into the licensing decision. Because the Board does not meet every month, this can add a further two to three and one-half months to the approval schedule. As construction is nearing completion, the application for the operating licence is assembled and forwarded to the AECB. This must include general organizational structure, detailed operating procedures, methods of dealing with upset conditions, possibly some additional ALARA analysis, and a description of how the panel recommendations have been addressed in developing the operating procedures. Again, the license application must be heard at two Board meetings, which with the Board staff appraisal time is likely to take a total of six months after submission. The provincial process is more straightforward, but both licenses are necessary before construction can commence.

5. TRENDS IN CANADIAN ENVIRONMENTAL IMPACT ASSESSMENT

It becomes apparent in reviewing the history of environmental assessment in the uranium industry, that the assessment process is becoming progressively more arduous. The level of

public participation has increased dramatically, from the initial public information meetings to direct public involvement at several stages of the assessment. Intervenor funding is now made available to individuals and to organizations to enable them to conduct independent studies and compile presentations for the hearings.

The guidelines for EISs have become increasingly complex. For example, the guidelines for Cigar Lake and McArthur River were drafted after input from public meetings in 12 communities, then given a 30-day public comment period before finally being issued in September, 1992. They comprised 78 single-spaced pages of issues to be dealt with by the proponents plus an additional 22 pages of information requests to government agencies. With guidelines this complex, the EISs themselves have grown by an order of magnitude and the level of effort required has grown similarly. Field work to develop the necessary information for McArthur River had actually started before the project was referred to the Federal Environmental Assessment Review Office (FEARO) and continued through the assessment process. Before these studies were complete, 17 different consulting firms were used with specialties ranging from hydrogeology, through aquatic biology, air dispersion analysis, environmental pathways analysis and radiation protection, to socio-economic impact assessment. In the 1970s, an EIS would consist of two or three volumes, numbering less than 500 pages. The McArthur River EIS occupied 15 volumes totaling 12,000 pages. After two days of information sessions for the panel, the panel issued a request for further information, which was supplied in an addendum of two volumes totaling an additional 800 pages. The topics covered in the EIS included the expected ones, such as the baseline aquatic and terrestrial environment, rare and endangered species, regional geology and mineralogy of the ore body. Because this is an extremely high-grade ore body, mining methods, radiation protection and waste management were also of prime importance. An economic assessment was required to demonstrate that there would be a net public benefit from the development. However, in addition to these topics, impacts on community health and community vitality, and cumulative impacts also had to be assessed, despite the fact that the nearest community is well over 100 km away and the nearest other development is some 50 km away. The assessment of the operation included a regional ecological risk assessment to identify those factors of greatest significance, and environmental pathways analysis to predict the impacts during operations and on potential future occupants of the area long after the operations are decommissioned.

To accommodate this increased effort in production of EISs and the increased level of public involvement, the time to complete the assessment has greatly expanded. The most efficient assessment process was probably the second assessment of the Ontario uranium refinery/conversion plant, which took just nine months from the initiation of the project to the issuance of the panel report. This included the writing of three EISs for the three alternative sites under consideration; however, these sites had been considered in a previous assessment, so most of the information was readily available in a useful format. In contrast, the McArthur River environmental assessment took six years from the initial referral to issuance of the panel report. The Phase 1 construction license took an additional six months for approval and the Phase 2 construction license was approved a further nine months later. In total, the process from initial notification of the regulatory agencies to the final construction approval took seven years and four months. Production is expected to start one year and four months later.

6. DISCUSSION

After the five projects were referred to FEARO for environmental assessment, FEARO and the province of Saskatchewan developed terms of reference and applicants were considered

for the panel to conduct the hearings and assess the projects. The objective was to form a panel with the necessary expertise to assess the many different aspects of the projects, including mining engineering, occupational health and safety, the physical and biological environment, mill chemistry and northern native issues. Assembling the panel took about six months, because the panelists not only required the necessary expertise but also should have had no past connection with the uranium industry nor have expressed any views about the uranium industry.

Although in the end the various joint ventures achieved approval of the projects examined by the Joint Federal-Provincial Panel, one must question the need for such a microscopic examination of what are really relatively small mining projects. It appears that the environmental assessment process has become so detailed and so all-encompassing that only extremely rich ore bodies could afford to support the costs that this work entails.

Northern Saskatchewan is an area of some 250,000 km² with a population of only 35,000. There are three producing uranium mines and four others either planned or under construction. The nearest community to any of these mines is Wollaston Lake, which is 35 km from the Rabbit Lake mine. In many cases there is no road access between the mine sites and the communities. The uranium is generally found at the contact between the Archaean basement rock and the overlying Athabasca Sandstone. The earlier mines have been on the edges of the Athabasca Sandstone basin, where the contact is close to the surface. Later discoveries have been farther into the Basin, as evolving geophysical techniques allowed the discovery of deeper deposits. The Basin itself is not particularly productive, being sandy with low rainfall and low nutrient levels in the soil. Hence, the Basin does not produce abundant food and there are no permanent settlements in the middle of the Basin. Despite this situation, great concern has been expressed about the impacts of mines on communities and the cumulative impacts of the mines. The EIS guidelines required detailed examination of these issues.

In the past, the feasibility study and financial analysis that a company would do to satisfy its board of directors was considered sufficient justification for the economic basis of a project. A company was unlikely to invest money in a project that was not going to be profitable, and directors' due diligence would not permit this to happen. However, for McArthur River and Cigar Lake an extensive economic analysis was required to publicly demonstrate that a market existed for the uranium, that the projects were going to profitably recover that uranium and that all interested parties would get their share of that profit. It was pointed out by more than one intervenor that the panel was asking these questions but had no one with business credentials in its membership to provide the necessary financial assessment. Fortunately, these projects had such clear economic benefits that it did not take a high level of business acumen to reach a proper conclusion. The problem that this type of analysis presents for the proponents is that much of their business is opened to public scrutiny, which can be very detrimental in a highly competitive market.

Socio-economic issues are getting much more attention. The examination of these issues has gone far beyond what has traditionally been required. Because of the remoteness of the mine sites and the lack of roads, all the northern mines operate fly-in camps. Workers are picked up from small communities all over the north and flown into the mine sites, where they work for one week before returning home for a week off. These communities have grown beyond the capabilities of the local environment to support them by a traditional hunter-gatherer lifestyle, but because of their remoteness, there is little opportunity for wage-earning. The mines are one of the few sources of employment and (quite rightly) the provincial government through

its surface lease agreements with the mines encourages the preferential hiring of northern residents. However, in assessing the McArthur River and Cigar Lake projects, the panel asked that extensive information be gathered on the impact of hiring northerners for mine jobs. Naturally it was known and expected that fly-in camps were disruptive to family life and do not work well for everyone. However, when one considers that the traditional lifestyle required a trapper to be away from home for days, even weeks, at a time, there is little difference, except that the transportation is more reliable and the camp accommodation more comfortable than a trap line affords. Nevertheless, the impacts of this type of employment had to be examined, with questions even being raised as to whether or not it is a good idea to create economic divisions within the community by giving people the well-paid mining jobs.

Questions such as the advisability of building roads were debated. Without exception the northern communities want roads to improve communication with the south and reduce the cost of bringing in supplies. But others, frequently not from the north, complained that building roads would open the north more and result in increased hunting and fishing pressure on limited resources. They also questioned the impact that easier communication would have on northern lifestyles. This debate did point out the generation gap, with many elderly people preferring the old ways (although recognizing that these would no longer support the larger community), while the youth clearly wanted the modern lifestyle that they see on television.

The net effect of all this social policy examination has been a number of panel recommendations for monitoring socio-economic impacts, community health and community vitality. This has resulted in the formation of several committees to examine these issues and develop monitoring protocols for matters that the committees themselves do not fully understand.

For all its value to the uranium business, McArthur River is a very small mine. At full production, it will produce only 125 tons of ore per day, compared with 1,000 to 2,000 t/d at earlier Saskatchewan mines such as Rabbit Lake and Beaverlodge and up to 8,000 t/d at some of the Elliot Lake mines. Unless the material being mined has some particularly nasty properties, the environmental impact of a mine is primarily a function of the mine production, both ore and waste rock. Ore transport impacts are also in proportion to production. An underground mine produces proportionately much less waste rock than does an open pit mine. In the case of McArthur River, much of the waste rock will be used as back-fill underground, further reducing the amount of waste rock to be left on surface at the end of the operation.

In situations where a mineral zone spawns several mines on adjacent properties, cumulative impacts are a serious consideration, e.g., the Sudbury nickel-mining area in Ontario. The impacts of several operations discharging effluent into a single stream can be significant and should be considered in the environmental assessment. However, in the northern Saskatchewan context, where mines range from 40 to 300 km apart and are generally discharging effluents into different water bodies, although possibly part of the same drainage basin, the concept of cumulative impacts is overworked. Yet, this has become another buzz word in modern environmental assessment; companies are asked to assess the cumulative impacts of operations that are hundreds of kilometers apart with no reasonable expectation of having anything other than a very localized impact. Cumulative air emissions had to be examined, despite the fact that no changes can be measured in airborne radionuclides at more than a couple of kilometers from any operating site. The cumulative impacts to air and water then had to be translated into dose and risk estimates for the distant northern communities.

The additional employment will be small. Because Key Lake is running out of ore, McArthur River ore will be processed there, meaning no new mill is required. The cessation of mining at Key Lake reduces the work force there. McArthur River will supply new jobs to replace those lost, but the net additional employment will only be about 125 jobs.

Certainly McArthur River will have an economic impact which is far out of proportion to its physical size and environmental impact. It will generate large amounts of revenue for the federal and provincial governments in the form of taxes, royalties, and lease and license fees. But these are positive impacts, which were more than adequately dealt with in the economic analysis.

Not only was the process long, but the requirements changed over the period with the net result that the hurdles continually got higher. Some of this change was as a result of the panel process itself (through recommendations in the earlier reports of the panel) and some was from normal regulatory/political evolution. We started the McArthur River process believing that we were providing more information than was required by any regulation: "going the extra mile". This was a conscious decision to produce the best EIS possible in order to minimize negative regulatory impact. Because of the changes in regulatory and panel perception, in the end we had done just enough work to meet regulatory and panel expectations.

From the perspective of nearly 25 years of participation in environmental assessments and public hearings, it becomes apparent that the "public" involved is a very small group indeed. The same individuals appeared as intervenors in the 1996-97 hearings as appeared in the 1977 Cluff Lake Board of Inquiry and all the hearings in between. This represents a small but vocal group of dedicated environmentalists who are philosophically opposed to industrial development generally and to the nuclear industry in particular. One of their strategies would appear to be to make the assessment process so onerous as to discourage proponents from proceeding. One must question the wisdom of catering the entire environmental assessment process to this small group.

Interested members of the public do attend sessions of the hearings but generally not for more than one evening or afternoon. Certainly there are people in the north of the province, closer to the mine sites, with genuine concerns and questions that should be answered. However, it is questionable whether a formal process conducted at the level of detail of these hearings is really necessary. Most of the questions could be answered in meetings without the formality and cost of the hearings.

The role of the regulatory agencies seems to have been forgotten in the zeal to promote public participation. Government agencies such as the AECB and the Saskatchewan Department of Environment and Resource Management (SERM) exist to protect the public interest. If the public had no interest in the matters being regulated by these agencies, there would be no need for these agencies to exist (nor would there be any need for hearings). If the agencies are performing their assigned tasks, then there is no need for others to act on behalf of the public.

In cases where there is a government agency which regulates the matter under review, we question the justification for intervenor funding. The argument put forward in support of intervenor funding is that the public, which is not expert in technical matters, needs the funds to hire consultants, etc., to assist it in examining the issues under review by the panel. Yet the government agencies exist for the sole purpose of protecting the public interest. By handing

money to the public to independently analyze the issues, the assessment agency is suggesting that the government agencies are doing their job very badly. That being the case, the first issue to be addressed by any panel should be an assessment of the relevant government agencies. If these agencies are doing their jobs effectively, then there should be no intervenor funding. Taxpayers and proponents should not have to pay for both intervenor funding and an agency looking after the public interest.

The proponent faces a constant struggle over the level of detail required in describing the project and its impacts. Recent experience with the licensing of the McArthur River and McClean Lake projects has shown that the regulatory agencies are demanding more detailed analysis than they have ever demanded before. It is apparent that the agencies regard much of the information presented at hearings as superficial. The panel members are attempting to make an honest assessment of the project but they cannot be expected to bring the level of expertise of someone whose full-time occupation is studying the details of these projects. On the other hand the proponent is criticized for not making his documentation understandable to the public present in the hearings.

Environmental panels should not be turned into instruments of research. Many of the questions which proponents are being asked to address go far beyond what is reasonable and necessary to assess the projects. We estimate that the responses to this type of question from the current federal-provincial panel will cost the proponents approximately US\$1,300,000. Public health studies in northern native communities may be worthwhile, but they should not be carried out under the guise of vital information required to assess a small mining project located over a hundred kilometers away from any community, and they should not be done at the expense of the proponent.

There is a fundamental difference between the federal and provincial processes. The provincial hearings are quasi-judicial, with sworn testimony and cross-examination. The federal process is informal, with no sworn testimony and very limited opportunity to question a witness. Such a process is designed to elicit opinion rather than scientific truth about a project. The proponent must submit an environmental impact statement, which is subjected to intense scrutiny by the panel and any experts it cares to employ. On the other hand, intervenors can make any sort of irrational statement about the supposed impacts of the project without the need to present proof. The more extreme cases are so transparent that even without cross-examination it is clear that the statements are wrong; however, a clever intervenor can sow the seeds of doubt in the panel's collective mind without going to extremes.

The provincial process certainly discourages indefensible statements being made about the project. Over all it is a better process for eliciting scientific truth and controlling the more extreme statements that opponents of a project may be prone to make. The value of the federal process is that it is less intimidating for the participants. However, that lack of formality and the inability to elicit the truth make it less valuable as an assessment process. If the objectives are to familiarize the public with the project, listen to their concerns and answer their questions, this could be better and more economically accomplished in community meetings. As an educational process for the public, these hearings are, with few exceptions, an abject failure. Most opposition groups and opposed individuals appear only to present their briefs and to support each others presentations. Aside from panel and proponent staff, only a few individuals who could be termed public actually remain present to hear the majority of the presentations by the proponent. Those who wish to be recognized in the hearings, to present

written or oral briefs, should be required to attend some minimum amount of time, in particular listening to the presentations by the proponent and by any experts on those issues that the intervenor plans to address.

The increasing detail required in the assessment process is reducing flexibility for the proponent in subsequent dealings with the regulatory agencies. There is a growing tendency for panel recommendations to be treated as inviolate, rather than advisory. In Saskatchewan the ministerial approval is granted to carry out the project as described in the EIS with such modifications as may have been recommended by the panel. Any change in detail, even if it is an obvious improvement, must be formally reviewed and approved. This is a workable mechanism, but with the AECB, there is the added complication that a change from what was assessed must be screened for potential referral back to the assessment agency.

The AECB licensing process could also be made more efficient. The Canadian Environmental Assessment Act and regulations require that any project subject to a licensing decision by the AECB shall be screened for potential referral for environmental assessment. In the case of a project which has already undergone a public hearing, such a referral would be redundant. In fact the Canadian Environmental Assessment Agency is drafting protocols to ensure that a project only undergoes a single environmental assessment. For a project that has not undergone a formal environmental assessment, the AECB licensing process may be the only opportunity for public comment on the project. In this case the AECB policy of reviewing the license application at two meetings and soliciting public opinion in between is useful. However, in the case of a project such as McArthur River, which has undergone a six-year assessment process during which public opinion has been solicited nine times, including three public hearings, one must question the need for further delaying licensing with the AECB's formal process. Surely, anyone who had comments would have made them earlier in the proceedings.

7. CONCLUSIONS AND RECOMMENDATIONS

The major impacts of the environmental assessment process on Canadian uranium projects are delay of the project and added costs, both through the additional effort required in the assessment and through the delay of the project. The additional costs to the McArthur River project would probably be in the range of US\$1,300,000 for work above and beyond what would have been done to adequately examine impacts. A far more serious cost is the one- to two-year delay in the start of production. The cost of this delay has been estimated between US\$45,000,000 and US\$110,000,000.

Intensive environmental assessment is a phenomenon of the late twentieth century. Some factions of our society are demanding ever more stringent examinations of new developments. If major impacts are not identified, then the assessment effort is blamed and additional examinations are demanded. Canada is a wealthy country, blessed with mineral resources rich enough to support this level of effort, but how long can we afford to continue along this path? Under the present assessment approach, small ore bodies, which would have been economical to develop 20 years ago, are no longer viable, because they cannot support the level of effort required to go through environmental assessment and licensing.

We must temper our environmental ardour and make assessment effort commensurate with the size of the project and its ability to do damage. We must more severely limit the matters

which can be opened in an environmental assessment. Some consideration of socio-economic issues is justified, but a project which is going to create 125 new jobs in an area with 35,000 people, most of whom are unemployed, is not capable of an enormous impact and does not justify the depth of study which has been employed.

The principle of one assessment for one project must be upheld. The need for informing the public must be balanced against the efficient development of the project. For a project which has undergone extensive public review, there should be no need for further delays in the licensing to solicit additional public opinion.

Although these comments refer specifically to the Canadian regulatory regime, in general they would apply elsewhere. The case for public hearings is best made for completely new technology, for which there are no regulations and no industrial or regulatory experience. The uranium industry is a mature industry, regulated by agencies that have long experience and detailed knowledge of the industry. Recent developments have been in areas where there have already been uranium projects, which have been assessed in detail and are closely monitored. Under such circumstances it is difficult to justify a full-blown environmental assessment, as conducted for McArthur River and Cigar Lake. The licensing of such projects should be allowed to proceed through the normal regulatory process, without the need for extended studies and public hearings.

REFERENCES

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