BRIEF TO

THE CLUFF LAKE BOARD OF INQUIRY

Presented by

THE ATOMIC ENERGY CONTROL BOARD

APRIL 1977
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I  INTRODUCTION

The purpose of this brief is to describe the structure and modus operandi of the Atomic Energy Control Board, and to indicate how these relate to current activities and to possible future developments with respect to the nuclear fuel cycle.

The nuclear fuel cycle includes the steps of mining and milling of uranium ores, refining of uranium and its fabrication into reactor fuel, production of electricity in nuclear reactors, and management of wastes arising at all stages. Outside the nuclear fuel cycle there exist numerous applications of radioisotopes in a variety of medical, industrial and research applications. Particle accelerators are "nuclear facilities" and are subject to Board licensing procedures.

The problem areas from the regulatory viewpoint may be identified as follows: protection of the health of workers and the public; protection of the environment; the safe use of nuclear materials, equipment and technology for peaceful and lawful purposes.

The attention of regulatory authorities has been focused on all these areas, perhaps without much public awareness, but today the increasing public concern necessitates a parallel increase in public information and participation.

II  THE ATOMIC ENERGY CONTROL BOARD

The Board was established and vested with its powers by the Atomic Energy Control Act promulgated on October 12, 1946. While originally its role was mainly to control strategically important materials in the field of atomic energy, its present role includes the following:

(1) to ensure regulatory control over nuclear substances and facilities in matters of health, safety and security,

(2) to furnish technical advice and administrative support with regard to Canadian policy and international commitments which include guarantees of peaceful use,

(3) to furnish advice on the policy making and administration of certain aspects of Canadian policy on the management of uranium resources,

(4) to ensure the security and protection of certain information on atomic energy,

(5) to administer a mission-oriented research program in the broad field of nuclear, industrial and public safety.

The current organization of the Atomic Energy Control Board, which became effective 15 October, 1975, is shown in Figure I. Not shown on this figure is the reporting link to Parliament which is at present through the Minister of Energy, Mines and Resources.
BOARD

PRESIDENT
A.T. Prince**

LEGAL ADVISER
J.F.D. MacIsaac**

SECRETARY TO
THE BOARD
R.W. Blackburn**

MEDICAL ADVISER
* **

OFFICIAL LANGUAGES
PROGRAM
P.E. Hamel

DIRECTORATE OF
LICENSEING
DIRECTOR: J.H. Jennekens

REACTOR LICENSING
DIVISION
CHIEF: J.W. Beare

MINE, CHEMICAL &
WASTE MANAGEMENT
FACILITY
LICENSELING DIVISION
CHIEF: R.M. Duncan

ADMINISTRATION
DIVISION
CHIEF: E.M. Nolan**

NUCLEAR SAFETY
RESEARCH DIVISION
CHIEF: W.D. Smythe

INDUSTRIAL & PUBLIC
SAFETY RESEARCH
CHIEF: P.E. Hamel
(Acting)

SAFEGUARDS AND
NUCLEAR MATERIAL
LICENSELING DIVISION
CHIEF: J.G. McManus

RADIOISOTOPE
LICENSELING DIVISION
CHIEF: G.C. Jack

COORDINATION AND
PLANNING DIVISION
CHIEF: W.K. Guummer

TECHNICAL
INFORMATION
DIVISION
CHIEF: R.W. Blackburn

* Position subsequently filled by Dr. D.H. Niblett, seconded from Department of National Health and Welfare

** Member of AECB Management Committee
The Atomic Energy Control Act provides for a five-member Board - one ex officio member being the President of the National Research Council, and four other members, including a President, being appointed by Governor-in-Council.

The current membership of the Board is as follows:

Dr. A.T. Prince,
President, Atomic Energy Control Board.
Appointed as full-time Member and President on 20 February, 1975.

Dr. W.G. Schneider,
President, National Research Council.
Ex officio member.

Professor L. Amyot,
Director, Institute of Nuclear Energy,
Ecole Polytechnique,
Montreal, Quebec. First appointed 1 July, 1971, reappointed for second 3-year term 1 July, 1974.

Miss S.O. Fedoruk,
Professor of Therapeutic Radiology, University of Saskatchewan, and Director of Physics, Saskatchewan Cancer Commission, Saskatoon, Saskatchewan.

Mr. J.L. Olsen,
President and Chief Executive Officer, Phillips Cables Limited, Brockville, Ontario.
Appointed 20 February, 1975, for 3-year term.

At the present time, the Board has a staff of 120 persons including 80 Professionals.

III LEGISLATION AND REGULATIONS

Under the Atomic Energy Control Act (R.S.C. 1970, Ch. A-19)(Annex A) the Board may, with the approval of the Governor-in-Council, make regulations in certain fields, notably:

(a) for developing, controlling, supervising and licensing the production, application and use of atomic energy;

(b) respecting mining and exploration for prescribed substances;

(c) regulating the production, import, export, transportation, refining, possession, ownership, use or sale of prescribed substances;

(d) for the purpose of keeping secret information respecting the production, use and application of, and research and investigations with respect to atomic energy.
The Atomic Energy Control Regulations (Annex B) were last revised in 1974. The Board also administers the Nuclear Liability Act (R.S.C. 1970, ch. 29)(Annex C), under which the operators of nuclear facilities are held absolutely liable for nuclear accidents. If the damage resulting from a nuclear accident exceeds the statutory limit of seventy-five million dollars, the Act provides for special compensation measures, as well as the creation of a Nuclear Damage Claims Commission.

IV LICENSING PROCEDURES

The Board controls nuclear substances and facilities through a comprehensive licensing system which includes the steps of receipt of application, evaluation of application, issuance of licence, and compliance inspection.

The evaluation of applications for various types of licences, and also the assessment of compliance with licence conditions are major functions of the Board and its staff. To assist in these functions, the Board appoints both standing and ad hoc advisory committees composed of technical experts from appropriate disciplines, including experts drawn from other federal, provincial and municipal government agencies and universities, with emphasis on safety, health and environment. In addition to providing technical support, Board staff normally participate in meetings of these committees by providing secretariat services.

Requirements for applications for prescribed substances and nuclear facilities are outlined in general terms in the Atomic Energy Control Regulations and in more specific terms in appropriate application forms and/or licensing guides. General requirements for prescribed substances applications include nature and quantity of substance, purpose for which required, description of premises on which substance will be used, proposed radiation protection and physical security measures; qualifications, training and experience of proposed users; and proposed method of disposal. General requirements for nuclear facility licence applications include radiation protection measures, evidence that all health, safety, environment and security criteria will be met; radiation monitoring methods, information on types and quantities of effluents from the facility, proposed methods of disposal, physical security measures; and qualifications, training and experience of facility operators.

Applications for nuclear facility licences are normally made in three stages - site approval, construction approval and operating licence. Site approval is further sub-divided into conditional site approval and final site approval. Conditional site approval may be given on the submission and acceptance of preliminary site evaluation report and is normally transmitted by letter which indicates that the Board sees no major reason, on the basis of the information submitted, why final site approval may not be given. Before a final site approval is given, the applicant must have conducted a public information program (including public meetings to outline proposed plans and resultant environmental, social and economic impacts and to collect feedback from the interested public), satisfied environmental assessment and related requirements and submitted the final site evaluation report to the Board. Construction approval may be granted on submission of an application and the preliminary safety report, which includes design
information and postulated accident analyses. The preliminary safety report is further developed and updated through the construction period and forms the basis for the operating licence submission. The operating licence may be granted on application and submission of complete documentation including final safety report, operating policies and procedures, radiation protection manuals, etc., and assurances that design, construction and commissioning have been completed in accordance with all regulatory requirements. The operating licence is normally first issued as a provisional licence with subsequent approvals given to proceed with the various phases of commissioning. On satisfactory completion of commissioning, submission of outstanding documentation, and finalization of commissioning and operating assurances, the final operating licence may be issued.

In the case of nuclear facilities such as radioactive waste management sites, the AECB specifies that the decision to establish such facilities carries with it the obligation for long-term surveillance of the site, both inside and outside, and of the environs some distance from the site. The length of time for which surveillance may be required, upon abandonment of the site, will be determined by the specific radionuclides buried at the site.

Licences are normally issued for a fixed term and are renewable on application and on demonstration of satisfactory compliance with their terms and conditions. Licences may be cancelled or revoked at any time because of non-compliance, or in order to amend them.

V OCCUPATIONAL AND ENVIRONMENTAL HEALTH AND SAFETY CRITERIA

The "maximum permissible doses" of ionizing radiation specified in the Atomic Energy Control Regulations (Schedule B) are based on the recommendations of the International Commission on Radiation Protection. Limits for occupationally exposed persons were first set in 1934, and subsequently revised as new information became available. First dose limits for the public were recommended in 1953, and were one-tenth of those recommended for occupational exposure; this 10:1 relationship has been maintained. The last changes were made in 1958 (whole-body dose limit of 5 rem per year for occupational exposure, and 0.5 rem for general public). In 1965, and again in 1972, the ICRP reviewed available dose-effect information, and concluded that there was no biological evidence to justify reduction in dose limits.

ICRP recommended that doses should be kept as far below the dose limits as is reasonably achievable, economic and social factors being taken into account. In establishing design and operating objectives and targets, the Board has been guided by this, with full cooperation from the nuclear industry. As a result, the objective and target for nuclear power stations are such that the dose to members of the public resulting from radioactive effluents should not exceed 1% of the statutory limits.

The above target refers specifically to nuclear power plants but the same ICRP dose limits are applied to all nuclear facilities.

Nuclear facilities may discharge both radioactive and non-radioactive products into the general environment. Both of these have potential for direct effect on the local ecology and subsequent effect on man. The primary objective of safety analyses and licensing reviews by the Board is to ensure that radioactive
VI PHYSICAL SECURITY

The Atomic Energy Control Regulations define the general requirements for the physical security of prescribed substances and nuclear facilities. Applications for prescribed substance licences must include "a description of the measures to be taken to prevent theft, loss or any unauthorized use of the prescribed substance". Applications for nuclear facility licences must include "a description of the measures to be taken to ensure the physical security of the nuclear facility". In addition, the Regulations define requirements for protection of classified information and for designation of "protected places".

In practice, applicants are required to submit a security plan with their application for a prescribed substance or nuclear facility licence. The security plan must specify policies and procedures to provide for:

1) The protection of the substance in use, storage and transit, or the protection of the nuclear facility as appropriate.

2) An appropriate security organization including duties, training and responsibilities. In this respect staff selection procedures relating to employee reliability must be defined.

3) The protection of information, the dissemination of which would compromise the security of the plant or material.

4) Special situations such as bomb threats, attempts to steal material, recovery of stolen material, attempts at sabotage, etc.

Such security plans are evaluated by a Security Adviser on the Board staff in cooperation with appropriate experts in the Royal Canadian Mounted Police. At the present time, International Atomic Energy Agency publications along with draft AECB licensing guides are used to define application requirements and evaluation criteria in this area. On approval of the security plan by the AECB, the appropriate prescribed substance or nuclear facility licence may be issued.

Part V of the Atomic Energy Control Regulations relates to the security of certain information and to the designation of "protected places". Although almost all of the information relating to the Canadian nuclear power program is unclassified (albeit some may be proprietary), there are certain types of information, including fissionable substance properties relating to weapons applications, fissionable substance production and separation, and military reactors, which are classified and protected under the Atomic Energy Control Regulations. The Board may designate certain areas as "protected places" for the purposes of keeping secret certain information and of protecting persons and property. To date only the Chalk River Nuclear Laboratories and the Whiteshell Nuclear Research Establishment have been so designated.
VII  SAFEGUARDS

Canada has continued its efforts to encourage a number of the major nuclear nations to commit themselves to more stringent control policies governing the export of nuclear materials and equipment. In this connection, a Board staff officer assisted the Canadian Delegation to the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons at Geneva in May 1975, in which Canada played an important role. This conference contributed to the ratification of the Treaty by Euratom countries, Japan, and other smaller countries, and focussed attention on the need for better defined and more stringent safeguards arrangements. Another Board staff officer serves as Chairman of the International Atomic Energy Agency Standing Advisory Group on Safeguards Implementation.

In accordance with the Canadian Government's safeguards policy statement of 24 December 1974, the negotiation of new safeguards treaties has continued with those countries with which Canada has nuclear cooperation agreements. Agreements have been signed with Argentina, Finland, South Korea and Spain.

Within Canada, 22 operating nuclear facilities are now safeguarded under the terms of the "Agreement Between Canada and the International Atomic Energy Agency for Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons", and subject to inspection by representatives of the International Atomic Energy Agency.

In cooperation with the International Atomic Energy Agency and the United States Arms Control and Disarmament Agency, the Board is working towards the development of instrumentation to facilitate safeguards inspection. This work has been carried out at the Pickering Generating Station. Also, the Board and Atomic Energy of Canada Limited have implemented a program at the Douglas Point reactor, for development of safeguards instrumentation and techniques for the CANDU reactor.

VIII  URANIUM MINING AND MILLING

The substantial uranium mining industry of the early 1950's decreased sharply for various reasons by the 1960's, and at the end of that decade there were only three operating mines, feeding the government stockpile. Today, there are six operating mines, and an impressive number of potential new mines in various stages of development. There is widespread exploration activity in all the provinces and territories.

The initial emphasis on the part of the AECB in the mining and milling field was on the strategic material aspects of uranium. This emphasis changed with time, the 1960 Regulations bringing in health and safety requirements, and in 1974 further revised Regulations were published giving the AECB a new initiative in the licensing of uranium mines and their associated mills and waste management facilities.
As a result, a licensing procedure, similar to that for other nuclear facilities, has been laid down covering the stages of surface and underground exploration, construction and development, operation and abandonment. Each of these stages requires authorization by the Board, as outlined previously.

Licence compliance activities, which include the participation of provincial and other federal agencies, are directed towards ensuring that the mine and mill atmospheres are controlled so that the workers will not receive exposures to radon daughters in excess of an annual limit of 4 Working Level Months and that the releases to the environment, particularly from the mill tailings area, are within acceptable criteria.

Governments, trade unions and the public are currently bringing heavy pressure to bear on the uranium mining industry and the regulatory agencies because of the publicized incidence of lung cancer, that is thought to be related to exposure to radon daughters. In its brief to the Royal Commission on the Health and Safety of Workers in Mines in Ontario, the Board re-examined the problems of uranium mining and recommended certain measures to protect the health of uranium mine workers more effectively. These included establishment of health-safety standards in uranium mines, assistance in training of mine radiation and dust inspectors, establishment of a research program aimed at improving protection of miners underground and to conduct epidemiological studies, and clarification of federal-provincial requirements regarding licensing and compliance. Substantial progress has been made in achieving the aims of these recommendations.

IX MANAGEMENT OF URANIUM RESOURCES

The specific objectives of uranium policy are to guarantee:

(1) that a long-term reserve of nuclear fuel will be available for both existing and projected reactors and for reactors that are to go into operation within the next ten years;

(2) that sufficient uranium production capacity is available so that the nuclear program can achieve its full potential.

To attain these policy objectives, all draft uranium export contracts must be submitted to the Atomic Energy Control Board, which in turn forwards them to the Uranium Export Contract Study Group. This group must make sure that all contracts comply with uranium policy requirements, provide for the necessary safeguards, incorporate adequate protection, health and safety standards, and are in accordance with import and export regulations.

With respect to domestic contracts, public utilities must maintain an adequate contractual supply of nuclear fuel to ensure that each reactor now in service can operate at an annual rate of 80 per cent of capacity for at least fifteen years and that each projected reactor can operate for at least fifteen years after coming on stream.
FUEL PROCESSING AND FABRICATION FACILITIES

The Board's licensing program for controlling fissionable substances following mining and milling has undergone a change. Although prescribed substance licences will continue to be issued to those handling fissionable substances occasionally or only as an adjunct to other operations, those handling these substances routinely, such as uranium refineries and fuel fabrication plants will be licensed as nuclear facilities, as outlined in section IV. Where supplementary controls are required for specific materials or projects, they will be appended to the overall licence.

One uranium refinery (Port Hope) and six fuel fabrication plants are currently licensed. Sites for new refineries in Ontario and Saskatchewan are currently under study and the final choice must meet the Board's requirements as well as provincial and federal environmental goals.

NUCLEAR GENERATING STATIONS

Nuclear reactors, including sub-critical, research and power reactors, are nuclear facilities that must be licensed by the Board as described previously.

Three Reactor Safety Advisory Committees have been set up by the Board to examine applications for site approval, construction permits and operator licences, and other matters relating to reactor safety in general. The first of these committees was established in 1956 for Ontario projects, and similar committees have since been formed for Quebec and New Brunswick. Each committee consists of a group of scientists, engineers and technical experts who work hand in hand with federal, provincial and municipal representatives assigned to particular reactor projects. The Reactor Safety Advisory Committees are assisted as required by committees and subcommittees covering such fields as radiological environment monitoring, health physics and reactor control systems. Board officials, resident and delegated, make inspections after licences have been issued.

At present there are a total of seven power reactors in operation across Canada, capable of producing approximately 4,000 MW(e). The seven reactors are spread among five different plants at four separate sites. Twelve other reactors are being built on sites that have already been approved, and one new site is under study. In addition, there are approximately ten research reactors located in Atomic Energy of Canada Limited's nuclear study centres and in Canadian universities.

Projects, programs and activities, nuclear or otherwise, which involve federal initiative, funds or lands, and which are likely to have a significant effect on the environment, are now subject to an Environmental Assessment and Review Process under the direction of the federal Department of the Environment (in other cases AECB expects that such assessment and reviews by the competent authorities will be completed before a facility licence is issued).

The preparation of national safety codes and standards for nuclear reactors is carried out in cooperation with the Canadian Standards Association and the Canadian Nuclear Association. Board officers participate in the safety codes and guides program sponsored by the International Atomic Energy Agency and in the work and meetings of the IAEA's Technical Review Committees.

In the case of nuclear reactors, operators and supervisors must be authorized to operate through examination by the Board, following training given by the utility operating the reactor.
XII HEAVY WATER PLANTS

Deuterium oxide (heavy water) per se does not present a radiological hazard. Heavy water production plants are defined as "nuclear facilities" and are subject to the licensing procedure previously described. However, because the process currently employed to extract the deuterium from natural fresh water involves the use of large amounts of hydrogen sulphide, a highly toxic gas, the plants pose a potential risk to the health and safety of the public and plant staff. Alternate processes which may use less toxic substances are currently being assessed but are not yet commercial.

Applications and proposals pertaining to the siting, design, construction and operation of such plants are scrutinized by officers of the Board and also by three Heavy Water Plant Safety Advisory Committees established by the Board to oversee the plants in Nova Scotia, Ontario and Quebec respectively.

XIII MANAGEMENT OF RADIOACTIVE WASTES

Radioactive wastes originate from nuclear reactors, particle accelerators, the mining, milling and processing of uranium ore, the production and fabrication of nuclear fuels, and the production and use of radioisotopes. The majority of these wastes must be isolated and stored in radioactive waste management facilities which are licensed by the Board as nuclear facilities. Small amounts of gaseous and liquid radioactive wastes may be disposed of under licensed and carefully controlled conditions in the atmosphere or in streams carrying effluent from the nuclear facility in which they are produced. Mine wastes and mill tailings are usually stored near the mine or mill sites. Irradiated fuel bundles from nuclear reactors are normally held in water-filled storage bays on the site of the reactor pending removal for reprocessing or for permanent isolation. They are not considered to be waste until it is decided that they should be disposed of. Other solid wastes are packaged and shipped to radioactive waste management facilities for storage or disposal.

Major radioactive waste management facilities now licensed and operating are at the Bruce Nuclear Power Development near Tiverton, Ontario, for waste from the Douglas Point Generating Station and other Ontario Hydro nuclear generating stations; at the Gentilly Nuclear Power Station near Gentilly, Quebec; and at the Department of National Defence establishment near Suffield, Alberta. Licences have also been issued for waste incinerators at Hamilton, Ontario, and Edmonton, Alberta; for temporary operation of the Eldorado Nuclear Limited waste storage area at Port Granby, Ontario; and for operation of a limited capacity repository for waste from the radioactive cleanup program, at the Chalk River Nuclear Laboratories of AECL.

Radioactive waste management areas are also operated by Atomic Energy of Canada Limited, at the Chalk River Nuclear Laboratories at Chalk River, Ontario, and at the Whiteshell Nuclear Research Establishment at Pinawa, Manitoba for wastes from their research operations. These well-established facilities will be included in a general facility licence for all AECL establishments.
The Board has established a Radioactive Waste Safety Advisory Committee which advises it on matters relating to radioactive waste management and reviews applications for the siting, construction, and operation of radioactive waste management facilities.

Recent experience with the problems associated with the cleanup and disposal of radioactive waste and contaminated material at Port Hope and other locations has served to emphasize the importance of planning for the permanent identification and safety of radioactive wastes, with particular attention being paid to wastes from abandoned mining and milling operations.

XIV TRANSPORTATION OF RADIOACTIVE MATERIALS

Any shipment of prescribed substances must comply with packaging and labelling requirements and any other regulations established by an agency that has statutory authority in respect of the proposed method of transportation. In the absence of such authority, the regulations of the Canadian Transport Commission or the requirements established by the Atomic Energy Control Board apply.

The Board conducted a comprehensive study of incidents that occurred in the transportation of nuclear materials for the years 1957 to 1975. Out of a total of 402,210 shipments, only sixty-one incidents were reported; none of these resulted in serious damage or injuries.

XV NUCLEAR REGULATORY RESEARCH AND DEVELOPMENT

Since its establishment, the Board has awarded grants to universities to support basic research, mainly in nuclear physics. During 1975-6, these grants totalled $8,542,900, of which two thirds went to the University of British Columbia's TRIUMF project. However, as of April 1, 1976, the National Research Council has assumed responsibility for such grants; in future, the Board will emphasize mission-oriented research and development programs through contracts with the private sector, universities and industry.

Research and development work is concentrated in several areas: nuclear safety, safeguards techniques, management of radioactive wastes, nuclear power plants, heavy water production plants, mine safety, and epidemiological studies. In addition, the Board has entered into contracts involving public and industrial safety in various areas, including the biological sciences, protection against radiation, and dosimetry. For fiscal 1976, credits totalling $590,000 are available for this program.

XVI NUCLEAR LIABILITY

Under the Nuclear Liability Act the operator of a nuclear establishment assumes exclusive and absolute liability for personal injuries or property damage caused by a nuclear incident on the actual premises of his establishment or during
the transportation of nuclear substances from or to his establishment. The Act limits the operator's liability to $75 million for each establishment. With a view to covering cases where total claims arising out of a nuclear incident exceed $75 million, the Act provides for the establishment of a Nuclear Damage Claims Commission, which will evaluate and pay such claims.

The Act specifies two types of insurance: "basic" and "supplementary". Basic insurance is designed to cover potential hazards, and would presumably be for relatively small amounts in the case of research reactors and for a maximum of $75 million in the case of a large nuclear plant. Supplementary insurance for the difference between the limit of $75 million and the amount prescribed in the basic insurance will be covered by the federal government through a reinsurance contract with the private insurance industry.

XVII RADIOACTIVE CONTAMINATION LOCATIONS

At the beginning of 1976, natural radioactivity levels were exceeded or suspected of being exceeded in approximately fifty places in Canada. These places include uranium mine dumps and slag heaps connected with various metallurgical operations, and locations in public buildings, residential and commercial areas where radioactive backfill and material recovered from demolished buildings had been used in past years. The best-known example is that of Port Hope, Ontario, where radioactive plant wastes and contaminated building materials have been identified on several sites. The abandoned metallurgical plant in Deloro, Ontario is also seriously contaminated by slag resulting from ore processing operations and various wastes that were left exposed in the vicinity of dwellings. On these two sites, residents' houses were evacuated pending remedial action.

The problems of identifying contaminated areas, responsible agencies, and action to be taken are complicated by the fact that some of the many contaminated places across the country are associated with companies that no longer exist. To solve the problems, a federal-provincial Task Force was set up early in 1976 to accelerate the clean-up of the contaminated area in Port Hope and to help the Board evaluate the extent of radioactivity elsewhere in Canada. In some places clean-up operations were carried out smoothly and quickly, but in others they were costly and extensive. In Port Hope, 3,500 houses and buildings were completely inspected. Contaminated soil and materials are being removed from approximately five hundred locations. The Board has opened offices in Port Hope, Uranium City and Elliot Lake to provide local co-ordination for the efforts being made by the three levels of government and to receive the public's inquiries. At Uranium City, the preliminary survey suggests that about 150 properties will require remedial action.

XVIII FEDERAL-PROVINCIAL RELATIONS

The provinces consider that the management and exploitation of natural resources is a provincial responsibility, and the federal authority over uranium and thorium raw materials and their utilization, dating back to the 1940's, is a perennial point of argument. The Atomic Energy Control Board has agreed that
provincial rules for prospecting and staking of claims should apply. The Board's licences for development and mining have until recently invoked applicable provincial mine safety statutes and regulations, however, the more recent licences have directly included the concerns of the provinces by use of appropriate clauses, following close consultation and review with provincial representatives.

The Board has with cooperation of provincial ministries utilized provincial officials as inspectors under the health and safety sections of its regulations. It is expected that this arrangement will need revision because of the competition for trained manpower, and the growing need for more thorough inspection.

Meetings have been arranged by the Board with those provincial ministries and departments that are concerned, in provinces producing or likely to produce uranium, in order to share discussion on problems of regulation and to enable coordination of the many agencies involved. Significant progress in our coordinating efforts has been achieved in Saskatchewan.

Another area of overlap between federal and provincial regulations is waste management. Radioactive waste management facilities including those from uranium mining and milling operations, are licenced by the Board, and control of these is coordinated closely with provincial agencies.

The provinces have been traditionally involved in Board activities through its Safety Advisory Committees. However, it is intended that closer staff contacts between agencies be utilized as a more positive means for input into Board activities.

XIX INTERNATIONAL RELATIONS

In accordance with the Atomic Energy Control Act, the Board acts, as necessary, to enable Canada to participate effectively in agreed measures of international control of atomic energy, and to ensure cooperation and the maintenance of contacts with other countries in connection with research on, and the production, use and control of atomic energy. Canada participates in the International Atomic Energy Agency (IAEA) and is now a full member of the Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development. Officers of the Board staff act as Canadian representatives on the NEA Committee on Radiation Protection and Public Health, the Committee on the Safety of Nuclear Installations, and the Committee on Radioactive Waste Management.

At the instigation of the Board, a meeting was held last October in Elliot Lake under the auspices of the NEA Committee on Radiation Protection and Public Health. This was an international meeting, attended by a number of world experts in personal dosimetry and area monitoring of radiation in atmospheres of uranium and other mines with radiological problems.

In activities of the IAEA, Board staff officers are members of the Technical Review Committees on Siting, on Quality Assurance, on Governmental Organization, and on the Safeguards Advisory Committee. A Board representative also sits on the IAEA Safety Codes and Guides Program Senior Advisory Group.
The Board administers or is preparing for bilateral arrangements with other countries on exchange of information, particularly in the regulatory and safety fields. Steps have been taken with United States counterparts to identify the needs for across-the-border (or near border) coordination in case of an emergency affecting both countries.

XX FUTURE CONSIDERATIONS

The important aspects of the Atomic Energy Control Board's forward program include the following subject areas where increased effort is required in parallel with the growing nuclear power industry:

1. Expansion of the nuclear industry, from the mining stage to electrical power production, involves input from federal and provincial agencies with regulatory or other authority in the fields of health, environment, occupational safety, housing, transportation, labour relations, natural resources and mining, and others. There must be improved functional coordination of federal and provincial agencies in order to avoid unnecessary duplication of effort and unilateral actions that might lead to confusion and confrontation. At the same time, liaison with labour unions, producers and utilities must keep pace.

2. The Board must become more visibly independent of the promotional and commercial aspects of the nuclear industry. A strong, consistent regulatory function will help achieve public acceptance of the industry. The Board is trying to achieve additional strength and credibility.

3. Regulatory controls and licensing steps for management of both low and high level radioactive wastes will be clarified. With experience from the Port Hope situation, clean-up in other areas that may be identified will proceed more readily; prevention of repetition of such situations will be the goal of all participating agencies. Particular attention will be given to near- and long-term storage of wastes from nuclear power installations. Because of apparent waste problems, the whole nuclear industry tends to be questioned by the public.

4. Develop or support the development of data on occupational exposure of atomic energy workers including uranium miners in order to be able to identify any changes needed in exposure limits.

5. The Board identifies need for mission-oriented research and development largely through its licensing activities, where gaps in technical knowledge or areas requiring verification may be encountered. The program, which is carried out under contract, permits the Board to move in when the need is seen, and arrange for appropriate work to be undertaken. The program will be expanded in both the engineering and the health-safety aspects of nuclear regulation.
6. The Board recognizes the need for public hearings and for development of a public information function that is a source of reliable, independent data on nuclear and related matters. There is also a need to consult with public interest groups as well as the technological community when making regulations. Action is being planned in these areas.

7. With regard to new nuclear fuel cycles, e.g. thorium fuel, and to future nuclear processes, e.g. fusion, for the production of electrical power, these would come within the ambit of the current Atomic Energy Control Act such that appropriate regulatory controls could be introduced as needed. For the time being the Board staff is keeping abreast of related developments both at home and abroad.

XXI CONCLUDING STATEMENT

In the lifetime of the nuclear industry, a period of not much more than 30 years, tremendous changes have taken place in the ability to develop and utilize nuclear power, in the use of nuclear technology in science and industry, and in the application of radioisotopes to many facets of our daily lives. The scale of undertakings has expanded not only within the few countries initially involved but more importantly in the world as a whole. Countries now members of the "nuclear club" cover a great spectrum of size, wealth, technology, social development and other factors. Regulatory bodies in all countries are facing the same problems of keeping adequate control over the burgeoning industry in the face of new demands from a concerned public for trustworthy and understandable information, increasing national and international requirements for security and the need for an acceptable level of safety in this major wing of the energy family.

In Canada, the AECB is proposing an updating of the 30-year old AEC Act to clarify responsibilities and to meet the modern requirements of what is now a major industry. In terms of health, safety and the environment, the AECB intends to be involved through licensing action from the first stage in any undertaking at which a hazard may be posed to people or the general environment. This will call for a genuinely cooperative action by many federal and provincial departments and agencies in order to meet the varied requirements of geography, demography, industry and numerous other facets of Canadian life.