THE ATOMIC ENERGY CONTROL BOARD
AND NUCLEAR FACILITY QUALITY ASSURANCE
- A REVIEW AND UPDATE

by

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Before moving to the subject of nuclear facility quality assurance and the Atomic Energy Control Board's responsibility and role in that overall activity, I would like to use this opportunity to say a few words about the origin of the Board and the general scope of its duties.

The AECB was created in 1946 to implement and administer the Atomic Energy Control Act which was proclaimed that same year.

Needless to say, Canada in 1946 was a very different place to what we see today. In considering the AEC Act in the year following the end of the Second World War, the legislators were understandably very preoccupied with Canada's military security. This factor, and an attitude of caution based on a lack of knowledge of the nature and role that nuclear technology would have in the future, were probably the main reasons for the carte-blanche type of AECB authority which was written into the Act.
Under the Act the AECB is empowered to make regulations to control so-called atomic energy materials and equipment, and also to award financial grants in support of atomic energy research. "Atomic energy materials and equipment" is deliberately broad terminology and, in effect, the Act charges the AECB to regulate and control all activities which bear in some way on the application of nuclear energy.

While perhaps the safety assessment and licensing of nuclear-electric power facilities is one of the most visible tasks of the Board, it is certainly not the only one. Other types of nuclear facility subject to the AEC Act include fuel fabrication plants, heavy water plants, research reactors, particle accelerators, irradiators, uranium and thorium mines, and radioactive waste management centres. The possession of greater than very small quantities of radioisotopes, the export of nuclear-energy-related hardware or technology, are other activities for which prior permission from the AECB must be sought. The AECB is also responsible for ensuring the implementation of Canada's nuclear materials safeguards policy at home and abroad. At home, Board staff work with visiting International Atomic Energy Agency Safeguards Inspectors making sure that the full-scope stipulations of the UN 'Treaty on the Non-Proliferation of Nuclear Weapons' are being complied with. As technical advisors to the Department of External Affairs, Board staff play a leading role in the establishment of strict safeguards agreements with foreign countries purchasing Canadian nuclear material.
I should emphasize that the Board is required to exercise control of prescribed materials, nuclear facilities, and the other areas of interest to it, in a comprehensive manner. Thus, in the case of nuclear facilities the regulatory interest covers the siting, procurement, design, manufacture, construction and installation, commissioning, operation and decommissioning phases of each project. As you can see this amounts to far more than initial safety assessment and license-granting.

These are some of the more important responsibilities of the AECB under the existing AEC Act.

Today in Canada there are some 21 nuclear-electric power reactors, and 5 heavy water plants operating and under construction. These figures do not include similar planned facilities, or any of the various other kinds of nuclear facility which tend to be smaller, but nevertheless important.

The power facilities and heavy water plants are located in four eastern provinces, Ontario, Quebec, New Brunswick and Nova Scotia. Collectively, these facilities represent a national program that is expanding and is very much of interest and importance to Canadian society. While at the present time the program and the commitment is substantial, its rate of expansion and ultimate size are matters that Canadian society must render judgement on.
The present size of the nuclear-electric power program, the projections for the future, and the increased interest of the public, were some of the more compelling, basic reasons for the drafting of a new Act to replace the 32 year-old AEC Act. This new Act entitled the "Nuclear Control and Administration Act" (NCAA) is to be re-introduced before the federal parliament. The NCAA contains features that make it a much more relevant legislative instrument to control the application of nuclear technology in Canada in 1978. Under the NCAA the existing AECB will be re-titled the Nuclear Control Board (NCB). The authority of the NCB will be as extensive as under the existing AEC Act although the greater specificity of the new Act will likely require increased exercise of that authority. Because of its greater detail, it should be much less necessary under the new Act to make interpretations concerning authority and responsibility. One result of this will be that interfacing by the NCB with other federal and provincial jurisdictions should be much less confusing. I do not propose to review the NCAA for you now. However, I will tell you that the new Act makes mandatory, public hearings for certain nuclear facilities. Large power reactors and heavy water plants are specifically identified in this category.

Having given you a general idea of the scope of the Board's interests, and its legislative mandate, I will review the past and present status of AECB quality assurance-related activities and then suggest some developments which are likely to take place in the near future.
In the more distant past, applicant and licensee quality assurance programs were not formally identified by the Board as being of major importance. This was so even though a great deal, if not all, of the AECB staff activities concerning power and other facilities were essentially of an evaluation and verification nature. In fact these activities were not carried out in the context of a comprehensive, integrated program for each facility.

However, while formal requirements for, and adoption of, the overall quality assurance approach were still being developed, Board staff support of quality assurance standards-writing activities by the Canadian Nuclear Association and the Canadian Standards Association was active and began at the outset of these activities. Other early, positive actions taken by the staff included general discussions on quality assurance with electric power utilities and the preparation and presentation of conference papers describing, in philosophical terms, an evolving regulatory view of quality assurance and quality assurance programs.

Still looking back in time, quality assurance requirements for power facility pressure-retaining components have been in existence for a number of years. Through our colleagues in the various provincial jurisdictions the Board staff have consistently required that code requirements for these extremely important components be complied with. Since these code requirements include
specific quality assurance program requirements the AECB interest in quality assurance at that level has been longstanding. But, as I indicated, this interest was pursued by the provincial jurisdictions on behalf of the AECB, so no component quality assurance activity was engaged in directly by Board staff.

Moving closer to the present, one utility has been formally instructed by means of a condition in a nuclear facility construction licence to establish and implement an effective quality assurance program for the project. The overall program developed by this facility owner has been examined by Board staff and, in collaboration with representatives of the jurisdiction of the province in which the facility is located, Board staff have carried out two formal audits of the construction site activities and several quality assurance-related site visits in a little over a year and a half. The intent of this regulatory activity has been to confirm the adequacy of the construction phase quality assurance program.

Now a few words about some of the other important activities in the life-cycle of a nuclear facility. The design of safety-related equipment intended for a nuclear facility is evidently of great interest from a quality assurance standpoint. Earlier this year, Board staff had the first of a series of quality assurance program discussions with a major nuclear design consultant. That organization
recently submitted its quality assurance manual to the Board. These documents and the discussions, as with those connected with the utilities, are aimed at the eventual establishment of an effective quality assurance program by that organization which the AECB can formally approve in writing.

The manufacture and supply of adequate quality, safety-related hardware to nuclear facilities is also of very considerable importance. Late in 1977 Board staff began an information-gathering survey of equipment suppliers to gain first-hand, a general impression of their performance and effectiveness. Suppliers of important safety-related pressure-retaining components were subjected to this survey, which is not yet complete. The performance of other equipment suppliers will likely be surveyed directly by Board staff and I will say a few words about this later on.

The survey visits to suppliers evidently gave the impression that the AECB was auditing the organizations involved. Some utilities, in apparent agitation, recommended to the Board staff that they participate with the utility representatives when they conducted joint audits. Let me say that Board staff do fully intend to observe the conduct by utilities of supplier audits. However, this will be done to verify the effectiveness of the utilities' performance in the context of specific facility quality assurance programs. As I noted earlier, the purpose of the present AECB surveys is to gain
a direct general impression of the status of the hardware supply sector of industry in order to formulate a rational overall regulatory approach to supplier performance evaluation.

Still on the subject of suppliers, Board staff did on two occasions within the past year and a half visit suppliers of safety-related equipment to perform actual audits directly. These were ad hoc visits made necessary by concerns expressed by others. In each of these two cases interim measures were effected by the organizations involved and their clients, to ensure that equipment being produced would be at an acceptable quality level. This kind of fire-fighting exercise is regrettable and equipment purchasers bear a considerable responsibility for it's being necessary in the first place. Equipment purchasers must ensure prior to awarding a contract that a supplier can immediately perform in compliance with the relevant quality assurance codes and regulatory requirements, or alternatively, will be able to so-perform prior to commencement of the work. Where it appears to be impossible to meet either of these requirements the facility owner through the purchaser, is responsible for ensuring the quality of the equipment being supplied by participating directly himself in the supplier's operation.

The commissioning and operating phases of a nuclear facility life-cycle are also properly included within the embrace of an overall quality assurance program. These activities have not so far been examined by Board staff in a formal quality assurance
program context but this is our intention. I have not specifically mentioned the similar inclusion of decommissioning within overall facility programs; while this would be a requirement we feel this need not be pursued at this time with high priority.

The responsibility of the Board concerning quality assurance programs and its view of their importance, were reflected in an AECB staff re-organization which took place in January of this year. In this re-organization a new group was formed with the name 'Quality Assurance and Standards Division'. Amongst other things, this new Division is functionally responsible for the overall evaluation, verification and approval of quality assurance programs for nuclear facilities (all nuclear facilities) and any other installations and activities which may be of regulatory interest. The general result of this change when it is fully implemented will be that the Board staff's present activities in the quality assurance field will be consolidated and extended, so as to cover more comprehensively overall nuclear facility quality assurance programs.

I would like now to identify for you, and say a little about, some of the actions and activities being anticipated by Board staff for the future. Certain of these are underway to some degree already:

1. The preparation and promulgation of formal general quality assurance requirements. These requirements will be in the form of regulations, and licensing and other reference documents. These documents will deal with administrative
matters such as the timing of submission of applicant facility quality assurance program manuals as well as with the features which must be embodied in quality assurance programs.

2. The evaluation, verification and approval of applicant/licensee overall facility quality assurance programs. While such programs might well be generic and not project-specific, Board staff will verify the effectiveness of each program in the context of a specific nuclear facility.

3. The evaluation, verification and approval through the applicant/licensee, of the quality assurance programs of major participants in nuclear facility projects. Design consultants would be considered as major participants depending on the scope and importance of the service they are to perform.

4. Stemming to some extent from 3 above, the evaluation and verification of the quality assurance programs of suppliers of safety-related equipment to nuclear facilities. Although the suppliers' obligation to perform their work well is obvious, the clients of such suppliers also bear, in the Board staff view, a major responsibility for the performance of such organizations.
You may be interested in some other of our views concerning supplier quality assurance programs and performance. The Board staff will not base their satisfaction with such programs exclusively on examination of documentation. Certainly documentation in some form is, and always will be, important and will come under study. It is, however, the adequacy of the quality of the hardware which is the objective and as a consequence Board staff will, through the documentation, examine the hardware directly. Quality assurance program documentation should be meaningful and contribute in some identifiable way to the effectiveness of the program. Confident that you will agree I would say that much paper does not necessarily mean much quality.

5. Strong and active support for the establishment of a credible and effective supplier survey and certification system in Canada. A system of this kind is crucially important if meaningful nuclear facility quality assurance is to be established. It is not practicable with an expanding nuclear program for either the jurisdictions or clients to ensure supplier competence and product quality effectively without such a system.

In establishing a system of this kind a great deal of consideration must be given both to its probable effectiveness and its credibility. With regard to this latter point:
the public confidence and interest will certainly not be served by a system where the self-interest of one or more of the participants plays a part.

Not by chance the Canadian Standards Association has been establishing the basis for a national supplier quality assurance system certification program. The Board staff is actively participating in this work with the intention of formally associating the AECB with the program once we are certain it meets our criteria.

6. The establishment of formal agreements with authorized inspection agencies, other organizations, and individual specialists. These agreements would cover the provision to the Board of services of a quality assurance nature. The agreements would likely be both for the continuous supply of a service of some kind, and also for ad hoc work.

7. Strong and active support for trial use of the soon-to-be published preliminary CSA N286 standards dealing with 'Overall Quality Assurance Programs for Nuclear Power Stations'. These standards cover the procurement, design, manufacture, construction and installation, commissioning, and operation quality assurance program requirements for nuclear power stations. These standards are needed now for application to operating facilities as well as those which are being designed, or constructed.
AECB staff will continue checking the implementation of the CSA Z299 series of quality assurance standards to ensure that the standards are good and without loopholes, and that they do lead to effective quality assurance programs.

8. The rational application of quality assurance program requirements in all respects to all nuclear facilities, installations and activities of interest to the AECB.

Let me sum up. The conviction of the Board staff is that the licensing of nuclear facilities should not and cannot take place without the establishment and implementation of effective quality assurance programs for these facilities. In large measure public confidence in the future will rest on these programs and on the visible existence of an industry quality assurance ethic. The AECB has already begun to move along the road to full application of quality assurance program requirements to nuclear facility licensees and applicants, and to the verification of the effectiveness of such programs. I have outlined briefly for you the extent of our journey so far, and have suggested some of the milestones which are a little further down the road, and which we will likely have to pass.
We at the AECB are determined to complete that journey and we believe it would be very much in the interest of the utilities, designers, suppliers and the rest of the industry to join voluntarily with us in making the trip.

This conference, and your presence here, are important signs that Ontario Hydro is going to play its part in the overall endeavour.

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