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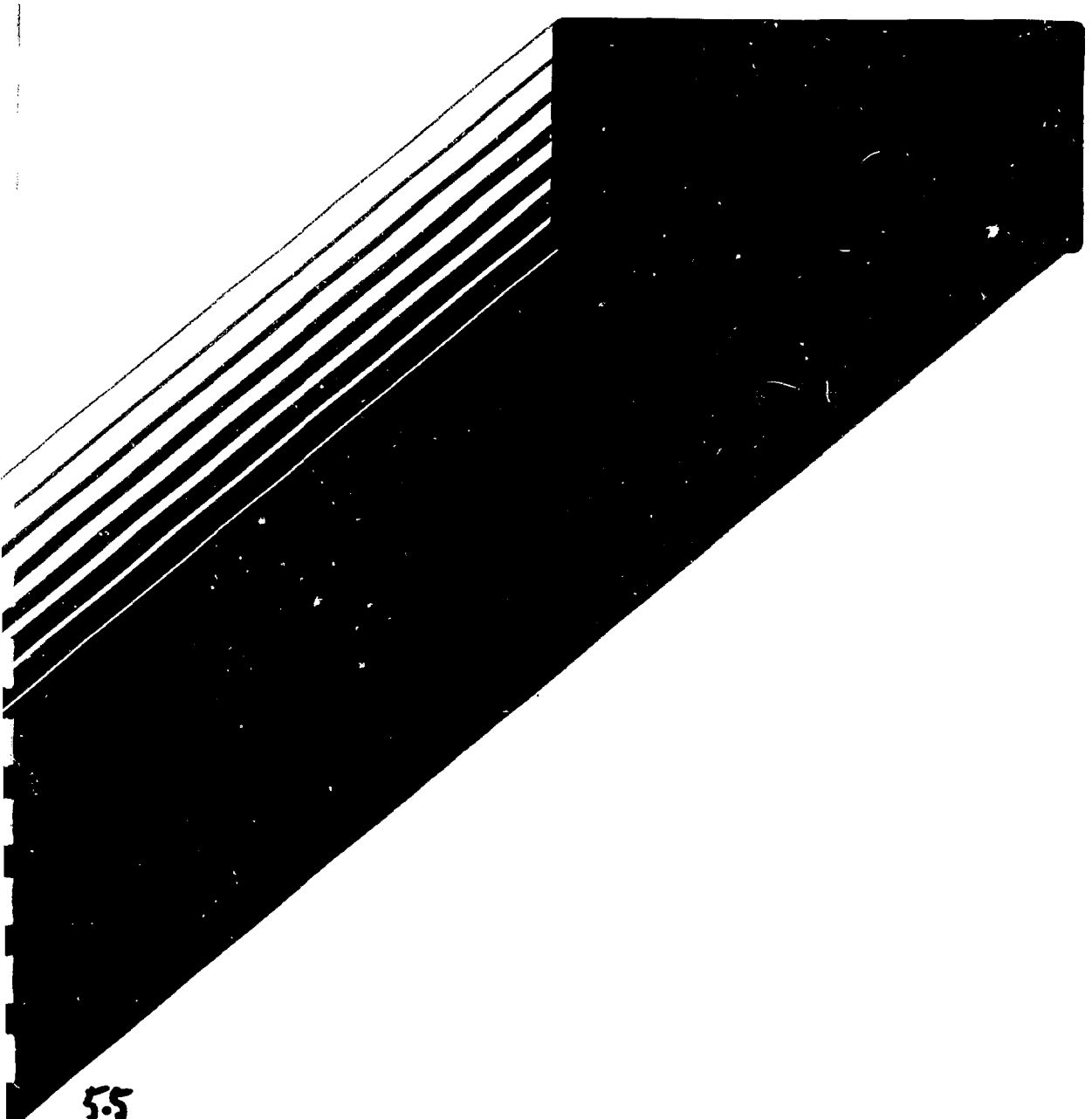

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EXPORTING THE CANADIAN LICENSING PROGRAM

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"EXPORTING" THE CANADIAN LICENSING PROGRAM

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SUMMARY

This paper deals with the problems of an overseas regulatory agency in licensing a Canadian-supplied nuclear plant which is referenced to a plant in Canada. Firstly, the general problems associated with the use of a reference plant are discussed. This is followed by a discussion of specific problems which arise from the licensing practices in Canada. The paper concludes with recommendations to simplify the task of demonstrating the licensability of an overseas CANDU plant.

1. INTRODUCTION

The sale of a nuclear power plant to a foreign country often requires that the design be referenced to a plant in the exporting country. This practice ensures that the design criteria are similar to those in the country of origin. The practice, while it simplifies the licensing process, does not make it an automatic check-list type of operation. The regulatory agency must develop a thorough knowledge of the design details and the licensing requirements of the exporting country. It will have to make many licensing decisions which are specific to the plant in question as discussed in the rest of this paper.

The regulatory agency will have to cope with differences in the as-built condition of their plant. Typically, the nuclear island parts of the plants will be similar but there will be differences in the balance of the plant. These will affect the plant-wide assessments known as safety design matrices which are part of the Canadian licensing practice. These assessments complement the traditional accident analyses and are used to demonstrate that the plant can be kept shut down, adequately cooled, and its safety status monitored.

2. GENERAL CONSIDERATION

In some cases the exported plant may be different in size or design details. The referencing in this case is a conceptual one and the regulatory agency cannot simply check for identity with the reference plant but must check for similarity in design criteria, application of codes and standards, safety margins, and conclusions of safety assessments.

2.1 Site Considerations

The suitability of each site has to be evaluated individually. The geological and soil properties may result in some changes to the design of structures. Of particular interest is the seismic history of the area and the rock properties which determine the design basis ground motion. These may result in changes from the reference plant in design and analysis of seismically-qualified structures and components.

The risks from external missiles also have to be evaluated individually for each site. Specific evaluations must be made of the probability and consequences of aircraft crashes, tornadoes, and explosions from hazardous cargoes on railroads and canals.

The arrangement of cooling water and electrical supplies may dictate changes from the reference plant in the design of structures and in the layout of plant services. For this reason the conclusions of some safety assessments from the reference plant may not be applicable, particularly those involving events such as fires and flooding.

Finally, local data for meteorology, population, and land use must be used to derive emission limits and accidental doses.

2.2 Locally-Supplied Material

Every country wishes to maximize the content of locally-supplied material. This means that locally-prevailing codes and standards have to be evaluated and compared with those of the supplying country. Extensive re-engineering may be required to accommodate the specifications of locally-supplied material.

If the original design was based on British units it may have to be converted to accommodate metric-sized components. The simplest solution is to select the next largest size in metric equipment. However, where space considerations are paramount, as in the steel reinforcing in parts of nuclear structures, it may be preferable to optimize the design for metric-sized components. This approach requires that the designer be prepared to supply his detailed calculations as well as his finished design.

Similar concerns arise in the area of electrical engineering. The use of different voltages and frequencies requires re-engineering to ensure that assumptions regarding transient analyses remain valid, e.g. pump run-down following loss of power. What appears to be a simple substitution may in fact have far-reaching implications. For example, the use of lower efficiency lighting fittings will involve extensive redesign of cables and switchgear to preserve specified lighting levels.

The regulatory agency in the importing country has to make many important decisions as to whether safety is compromised by the substitution of local material and the resultant re-engineering. For important and specialized safety equipment, such as shut off rod drives, it may be preferable to accept the equipment developed by the supplier and use interfacing equipment to make it suitable for the local voltage and frequency.

2.3 Project Organization

On a foreign project the contractors and their areas of responsibility will be different from those on a domestic project. Therefore, the overseas regulatory agency will have to evaluate independently the overall quality assurance program for their project. In particular, they will have to ensure that the responsibilities of the various contractors permit the coordination required for plant-wide assessments such as safety design matrices.

2.4 Quality Assurance

The quality control and assurance procedures used in the reference plant are those which are appropriate for the exporting country and derive their force from its culture and ethics. Procedures such as signing check lists and posting hold-off tags may not be so effective in another country and may need to be adapted or supplemented with extra supervision.

Also the codes and standards reflect the jurisdictional procedures used in the exporting country. The regulatory agency in the importing country must ensure that equivalent procedures will apply for their project in areas such as inspection and certification of components and the qualification of welders and welding procedures.

The regulatory agency may have unique problems because a large number of local suppliers may be manufacturing for the first time to the higher requirements of nuclear codes.

These concerns may be resolved by additional supervision and consulting services by the foreign supplier, and by the overseas training of local staff. The regulatory agency must ensure that they are satisfied about all these topics before the project contracts are signed.

2.5 Evolving Criteria

During the construction period of a plant new safety requirements may be identified. The regulatory agency must ensure that they have the leverage to require the incorporation of such improvements if the safety considerations so warrant.

A related consideration is that the calculational techniques used in the assessment of the reference plant may have been supplanted by more modern techniques. These may have to be evaluated without having a licensing precedent established in the exporting country.

3. CONSIDERATIONS FOR CANADIAN-SUPPLIED PLANT

3.1 Safety Criteria and Standards

The Atomic Energy Control Board (AECB) specifies general criteria and philosophy and places on the designers the responsibility for developing detailed design rules. The trend is to build up an assembly of acceptable designs based on the precedents of former licensing actions. This practice contrasts with that of detailed regulations of design criteria as practiced elsewhere and its merits have been recognized since the accident at Three Mile Island. The disadvantage, for export purposes, is that overseas agencies have to make an extra effort to understand the safety philosophy and licensing criteria.

The process defines an upper (rather than a lower) bound of acceptability and may not have established appropriate precedents for every licensing situation encountered overseas. For example, some common services at the reference plant may be oversized to allow for additional future units on the site. The extent of the nuclear codes and standards in Canada has been developing at a rate which is appropriate for the size of the nuclear industry and for the number of participants. Other countries with more widely-based nuclear programs have had to develop a more extensive set of codes and standards. These codes and standards facilitate the task of an overseas regulatory agency.

3.2 Design Procedures

In Canada, detailed design proceeds in parallel with construction. The information submitted in support of an application for a construction licence, while considerably detailed, is still in a conceptual or preliminary form. Some safety concerns will be identified and resolved on a case-by-case basis as the design develops. This presents obvious difficulties when an overseas plant is referenced to a Canadian plant which is still under construction.

3.3 Availability of Information

The formal licensing submissions made to the AECB, in the past, were summary documents. They presented the conclusions of safety assessments and gave general descriptions of design features. This was appropriate when licensing recommendations were made by a part-time committee called the Reactor Safety Advisory Committee. The formal submissions were supported by detailed documentation such as Design Reports, Design Manuals and Operating Manuals. The AECB staff who supported the review work performed by the Reactor Safety Advisory Committee had access to this supporting documentation and, in fact, to any safety-related documentation prepared by the licensees or their consultants.

Now, the AECB staff are responsible for licensing review and recommendations but the format of licensing information is generally the same as in the past. Consequently, some safety-related information such as detailed design calculations may not be designated as formal licensing submissions and may not be included in the documentation submitted to an overseas client.

Moreover the process, while it is expected to change for future plants, does not now identify all the documentation which was used to arrive at licensing decisions in Canada.

Licensing submissions used on a reference plant in Canada generally belong to the licensee but may reference information owned by consultants. The arrangements which make possible the assembly and submission of this information in Canada may not automatically make this information available overseas. This applies particularly to information prepared by the licensee independently of his nuclear consultant.

3.4 Size

The 950 MW plant offered by Atomic Energy of Canada Ltd. is a new design which has not been built in Canada. In this case the reference plant will be of a different size, although similar in design concept. Instead of a direct physical comparison with the reference plant it will be necessary to confirm that there is a direct similarity of design criteria, specifications, safety margins, and scope and conclusions of safety assessments. Furthermore, there will be some evolution in design from the reference plant making philosophical differences in seismic design and system layout.

On the other hand, the design is being developed with overseas applications in mind. Consequently, it will avoid the need for re-engineering for local seismic levels and metric-sized material and, in general, can be optimized for foreign markets.

4. ROLE OF THE AECB ORIENTATION CENTRE

These problems can be alleviated by close liaison between the overseas regulatory agency and the AECB. The AECB has established its Orientation Centre for this purpose. Liaison can take the form of correspondence, periodic meetings, training programs, and the secondment of personnel.

The objective of the Orientation Centre is to inform the overseas regulatory agency about the licensing and the safety criteria used in Canada. However, the flow of information is not all one way and the AECB learns valuable lessons from the licensing experiences of overseas agencies.

It is not the intention of the AECB to demonstrate that the overseas plant is similar to the reference plant and is licensable in Canada. This is clearly a task for the nuclear supplier and his client. Also, the AECB does not intend to rule on licensing situations overseas. That is clearly the task of the overseas regulatory agency.

The Orientation Centre's interaction with such agencies is intended to assist them to ensure that their national regulations take account of Canadian safety criteria and licensing practices. Later, a knowledge of Canadian practices is required for a review of safety-related provisions in contract documents. Later again, a more detailed knowledge is required to enable the agency to judge the acceptability of licensing submissions. Also the assistance of the Orientation Centre is available to confirm that the overseas plant is similar to the reference plant and that any differences conform to safety criteria applied in Canada.

The liaison involves topics such as:-

- safety criteria, and codes and standards
- quality assurance auditing
- licensing procedures
- acceptance criteria for licensing submissions
- procedures for examination and certification of operating staff
- compliance with operating licence.

5. RECOMMENDATIONS

5.1 Codes and Standards

The nuclear community is working hard to produce more codes and standards. However, the effort in this area should be accelerated to cater to the needs of overseas users of CANDU plants.

The procedural aspects of these codes reflect the Canadian system of jurisdictions and may not be applicable outside Canada. For example, an overseas plant may not have the equivalent of an on-site provincial inspector to qualify welding procedures. In such cases the codes should give guidance as to acceptable alternative procedures.

Canadian codes sometimes specify that safety-related reports should be written but are silent regarding their submission to a jurisdiction. This is satisfactory in Canada where the AECB staff have access to such reports, but is not satisfactory for overseas application. The codes should consider the need to demonstrate compliance with safety requirements in overseas situation.

5.2 Design Considerations

The design of plants for overseas locations should be standardized and take account of

- the highest seismic ground motion to be encountered
- metric-sized components
- materials available overseas
- internationally accepted codes and standards.

5.3 Licensing Information

Before bidding on a foreign project arrangements should be made to ensure that all licensing submissions made during the lifetime of the reference plant can be made available to the overseas client.

The AECB and its licensees are working to make licensing information publically available to the greatest possible extent. This will allow overseas agencies to become informed of generic issues as well as project-specific issues. It will allow the AECB to provide more comprehensive advice on overseas agencies in topics such as operating experience, and quality assurance auditing techniques. The effort to make licensing information publically available must be sustained and supported by all involved.

Canadian utilities should make information exchange agreements with overseas users of CANDU plants. These will allow the on-going exchange of information on regulatory compliance.

5.4 Licensing Procedures

The AECB should expand and document acceptance criteria and standard review techniques for licensing submissions.

Also the development of licensing documents and guides should be accelerated to respond to the needs of overseas regulatory agencies.

The AECB and licensees should identify all submissions which were considered during the granting of a licence.

The AECB should document and publish its position on every licensing document submitted. Under the present system the AECB could have reservations about some specific claims made by the licensee but still decide to issue a licence. An overseas regulatory agency needs to be informed as fully as possible about all the considerations which resulted in the issuance of a licence.

CONCLUSION

The task of an overseas regulatory agency is twofold. Firstly, it must satisfy itself about all claims made regarding similarity to the reference plant. Secondly, it must satisfy itself that all differences are in general conformity with the licensing criteria of Canada.

The task is complicated, at present, by the status of codes, standards, licensing documents and the confidential nature of some licensing information. Thus, the task would be simplified by the adoption of the above recommendations.