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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

October 27, 1989

MEMORANDUM FOR: ✓ Thomas Cox, Section Chief  
Policy Development and Technical Support Section  
Policy Development and Technical Support Branch, NRR

FROM: Drew Persinko, Senior Technical Assistant  
Policy Development and Technical Support Section  
Policy Development and Technical Support Branch, NRR

SUBJECT: TRIP REPORT--MEETING WITH ATOMIC ENERGY CONTROL  
BOARD (AECB) AND ATOMIC ENERGY OF CANADA  
LIMITED (AECL)--OCTOBER 18-20, 1989

On October 18, 1989, Frank Gillespie and I met with representatives of the Atomic Energy Control Board (AECB) to discuss the reactor licensing process in Canada and the AECB review of the CANDU 3 reactor design. AECB representatives attending the meeting were:

- Zygmund Domaratzki, Director General, Reactor Regulation Directorate
- Pierre Marchildon, Manager, Power Reactor Division
- Peter Wigfull, Manager, Safety Evaluation Division
- Joe Molloy, Manager, Components and Quality Assurance Division

In presenting an overview of the licensing process in Canada, the AECB noted that there are no private utilities in Canada owning nuclear plants, AECL is the only major consultant and there are few regulatory documents. Figure 1 depicts the overall regulatory framework in Canada.

The following points were made by the AECB:

1. Plant licenses are given for 2 years and are renewed every 2 years. Plants are backfitted on a case-by-case basis to bring them up to standards that existed when originally licensed--not up to current standards.
2. AECB meetings are not generally open to the public. There is no fine system to ensure compliance.
3. The single/dual failure concept originated in the late 1960s and early 1970s to reduce the likelihood of common mode failures. This approach has now evolved to a five category approach. In the present five category approach, events are categorized in one of five categories depending on estimated frequency. Maximum permissible whole body and thyroid dose limits are specified for each category.
4. Areas of review by the AECB for earlier CANDU reactors included:
  - a. emergency core cooling (ECC) effectiveness
  - b. fuel/pressure tube behavior without ECC
  - c. thermosyphoning
  - d. pressure tube integrity

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- e. fission product/hydrogen behavior in containment
- f. steam and feedwater line ruptures in the powerhouse
- g. environmental qualification of equipment
- h. computerized shutdown system and correctness of the software
- i. containment venting following accidents

It should be noted that station blackout and complete core melt were considered by the AECB but were not included on the list because it was felt that the probabilities of such occurrences were sufficiently low.

5. In addition to the areas listed above, the AECB anticipates reviewing the following areas during its review of the CANDU 3:
  - a. shutdown coolers
  - b. grouping of systems
  - c. no dousing tank in containment
  - d. on-power refueling from one side of the reactor
6. It was felt by the AECB representatives that the CANDU designs have not focused on severe accidents to the extent U.S. reactors have. AECB has recently let a contract for approximately \$125,000 to perform severe accident related work. It was pointed out, however, that LOCA plus loss of emergency core cooling is a design basis accident for CANDU reactors.
7. CANDU reactors produce approximately 10 times more spent fuel than U.S. reactors because they use natural uranium and refuel often.
8. Low-level radioactive effluent release is an area for staff consideration since it appears that allowable releases are higher than for U.S. plants.

The AECB intends to compile a document that will be used to guide the review of the CANDU 3. Work on this document is expected to begin in late 1989--early 1990 and the document is expected to be completed in spring 1990. Concurrently, the AECB expects to begin review of selected aspects of the CANDU 3, however, the major portion of the CANDU 3 review is expected to begin in spring 1990. The staff's review of the CANDU 3 and publication of Safety Evaluation Reports will lag the AECB's review in order for the staff to utilize AECB knowledge of the CANDU design that has been obtained from experience. AECL intends to submit reports on selected technical aspects of the CANDU design to the NRC beginning in April 1990. The reports will transfer technology on the CANDU design and provide technical information for staff use in conducting reviews of existing and future plants apart from CANDU.

On October 19, 1989, we toured the Darlington nuclear facility and spoke with the AECB project officers located onsite. Darlington A is a four-unit facility that employs a vacuum building and an interconnecting containment as part of its design. The lower parts of the steam generator and the heat transport pumps are located inside containment while the balance of these components are located outside containment.

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On October 20, 1989, we met briefly with AECL representatives Dennis Shiflett, Vice President, and D. S. Lawson, President. We toured the Sheridan Park Engineering Laboratory and observed the capabilities of the computer-aided design system used to design the CANDU 3. Ongoing projects in the laboratory included developing a machine to non-destructively locate garter springs surrounding the pressure tubes and relocate them, if necessary, and developing remotely controlled devices to replace components under the calandria vessel at Pickering.

Original Signed by

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