24 August 1982

REPORT BY
THE ACRS SUBCOMMITTEE ON
TRANSPORTATION OF RADIOACTIVE MATERIALS
ON THE
REVIEW OF THE ACTIVITIES OF THE TRANSPORTATION CERTIFICATION BRANCH OF THE OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

The ACRS Subcommittee on Transportation of Radioactive Materials has completed its review of the activities and performance of the Transportation Certification Branch of the Office of Nuclear Material Safety and Safeguards and our findings are reported herein.

Meetings of the Subcommittee were held as follows:

29 October 1980, in Washington, DC
10 March 1981, in Washington, DC
20 May 1981, in Washington, DC
1-2 October 1981, in Oak Ridge, Tennessee
14 April 1982, in Washington, DC
24 August 1982, in Washington, DC

Members of the Subcommittee participating in this review were:

M. Bender
C. P. Siess
J. C. Mark
D. W. Moeller (part time)
S. Lawroski (part time)

The Subcommittee had the assistance of the following consultants, all expert in one or several phases of the activities reviewed:

J. W. Langhaar
L. B. Shappert
Z. Zudans

During its review, the Subcommittee had the benefit of discussions with representatives of the following:

NRC Staff

- Office of Nuclear Material Safety and Safeguards (NMSS)

  Division of Fuel Cycle and Material Safety
  Transportation Certification Branch (TCB)

- Office of Nuclear Regulatory Research (or Office of

  Standards Development) (RES)

- Office of State Programs (OSP)

- Office of Inspection and Enforcement (IE)

  Headquarters
  Region III
  Region IV

Other Federal Agency

U.S. Department of Transportation (DOT)

Industry

Chem-Nuclear Systems
Nuclear Assurance Corporation

Request for ACRS Review

During September 1980, R.E. Cunningham, Director, Division of Fuel Cycle and Material Safety, NMSS, requested that the ACRS review the activities of the TCB as they relate to the review procedures for certifying packages for the transportation of radioactive materials. This request was discussed with representatives of NMSS and the TCB at the Subcommittee meeting on 29 October 1980, and the request for the review was transmitted to the ACRS in a memorandum from C. P. Siess, Chairman of the Transportation of Radioactive Materials Subcommittee, dated 6 November 1980. During its 248th meeting, on 5 December 1980, the ACRS discussed the requested review with the Commissioners, and such a review subsequently was endorsed by the Commission.

We were asked to review the following aspects of the activities of the TCB:

- ° Adequacy of technical review to provide assurance that existing regulations are met.
- ° Adequacy of guidance to Applicants and Staff.
- ° Adequacy of documentation to substantiate conclusions and findings of the certification review.

The review was to be limited to TCB activities relating to those packages required for Type B and Fissile Type A quantities. These are the packages that must be certified to resist accident conditions as well as normal conditions of transport. Spent fuel casks are included.

Scope of Subcommittee Review

Although the requested review was limited in scope to the activities of the TCB, the Subcommittee considered it desirable to become familiar with the entire spectrum of regulatory activities relating to transportation of radioactive materials in order to place the activities of the TCB in perspective. To this end, we heard presentations from and had discussions with representatives from other NRC offices, from the DOT, and from industry, as listed above. Although not requested, we include in this report some general comments on the multiplicity of agencies involved in the regulation of transportation of radioactive materials.

Our review dealt chiefly, and in depth, with the TCB activities relating to the technical review of package designs for conformance with 10 CFR Part 71, and its review and approval of operating procedures and Quality Assurance (QA) programs for both the manufacture and the use of packages.

The Subcommittee agreed that it would not review or comment on the adequacy of the current regulations but would limit its review to how they were applied and enforced. In this respect, it should be noted that an extensive revision to 10 CFR Part 71 has been proposed and is being reviewed by the Subcommittee. However, the proposed revisions are of such a nature that they would not change the findings or conclusions of this report.

Review Procedure

To assist in our review of the technical activities of the TCB, we were provided with complete copies of the Applicant's Safety Analysis Report (SAR) and the TCB Staff's Safety Evaluation Report (SER) for three packages: a fresh fuel shipping package, a waste shipping package, and an irradiated fuel shipping package. Each set of reports was reviewed by one of our consultants and their questions and comments were addressed by the TCB Staff at the meeting of the Subcommittee on 1-2 October 1981.

Our discussions with representatives of the industry were devoted chiefly to operational and QA procedures. Chem-Nuclear Systems is the operator of the Barnwell waste disposal site and both owns and transports packages. The Nuclear Assurance Corporation owns and leases spent fuel casks.

Our discussions with representatives of other NRC offices and the DOT related chiefly to those aspects of the regulation of transportation that lie outside the scope of the TCB. However, in these discussions we attempted to determine the interfaces and communications between the TCB and the other offices or agencies.

Findings and Recommendations Regarding the TCB Activities

We find that the TCB is doing a generally excellent job of reviewing and certifying packages for the transportation of radioactive materials in accordance with the requirements of 10 CFR Part 71.

We find that the guidance to Applicants and Staff is generally adequate in content but not in form. The current 10 CFR Part 71 is an exceedingly and unnecessarily complicated document. The fact that it is used correctly in most cases by both Applicants and Staff results more from their experience and their understanding of its background and intent than from its clarity or organization. We note, however, that the interpretation and implementation of 10 CFR Part 71 is aided significantly by the several Regulatory Guides that have been issued.

We note two problems with the adequacy of documentation. In some instances, errors in the Applicant's SAR have been allowed to go uncorrected if the TCB Staff has found them to be unconsequential or if the acceptability of the design has been demonstrated by the Staff's independent calculations. This practice permits an erroneous document to exist and could be troublesome if the same or another Applicant tried to use or reference it in connection with another application.

There are many areas in which the Staff can or must exercise judgment in determining whether a package design is acceptable. We are satisfied that these judgments have been made in a competent and professional manner and with adequate conservatism. However, it is not clear that the bases for and existence of these judgments have always been documented for future reference. Lack of such documentation has the potential for inconsistent decisions in the future.

We note that most transportation incidents involving potential exposure of the public to radioactivity have resulted from deficiencies in handling and transportation and not from deficiencies in the design of packages. We note further that the feedback to the TCB from package users and transporters, from IE, and from the DOT is far from complete. We believe that more extensive feedback is desirable and that the TCB should review the incidents or accidents with a view toward changes in package design that might reduce the probability of serious procedural errors.

Appendix E to 10 CFR Part 71 contains requirements for quality assurance "applying to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, and modification" of packages. Since not all of the requirements in Appendix E apply to all of these activities, and since not all licensees will be involved in all of these activities, we believe that there would be merit in rewriting or reorganizing Appendix E to make clear what applies to whom. Alternatively, but not necessarily preferably, this could be done in one or more Regulatory Guides.

As indicated above, we have found that the TCB is doing a generally excellent job. Our recommendations are for improvements rather than corrections. We believe that our favorable findings result in a large part from the high degree of competence and extensive experience of the members of the TCB Staff. They are professionally well-qualified and the members in the various disciplines work well together to provide the necessary coordination of the review process.

Comments on the Overall Regulatory Structure

Our findings and recommendations above relate only to the activities of the TCB. This branch, however, has only a relatively small, though important, role in regulating the transportation of radioactive materials, and a substantial portion of our review was devoted to the roles played by others. The responsibility for regulating the transportation of radioactive materials is divided among several state, federal, and international agencies with widely different interests, concerns and capabilities.

Within the NRC, responsibilities are shared with IE, OSP and RES. IE is responsible for inspection of manufacturers of spent fuel casks and of NRC licensees' shipping and receiving activities. OSP is responsible for approving programs in Agreement States and maintaining liaison with them. And RES is responsible for writing and revising regulations and Regulatory Guides.

The DOT is responsible for the regulation of the actual transport of packages, and also for specifications regarding certain types of packages.

The Federal Emergency Management Agency is responsible for actions following an accidental release of radioactivity from a package in transport.

The several Agreement States have complete responsibility within their jurisdiction for those activities not involving NRC licensees.

The Department of Energy's activities relating to the transportation of radioactive materials are outside the jurisdiction of any of the other agencies where strategic materials are involved.

This dispersion and complexity of responsibility is statutory in origin and there may be little the NRC can do about it. The NMSS Staff is aware of the problems, at least in a general way, but it is not clear that anyone, inside or outside of NRC, has or could reasonably be expected to have a clear and complete picture of the full spectrum of activities in this area and of the effectiveness with which they are being carried out in actual practice.

We believe that a review of the entire regulatory process and organization in this area is needed in an attempt to more clearly define the role of each organization and to adjust those roles as might be useful and practical. We recommend that the NRC undertake such a review, including at least the NRC offices involved and their interfaces with the other agencies, but preferably including all of the agencies now sharing responsibility. In a review of NRC functions and activities, we believe that special attention should be given to the inspection and enforcement function if there is likely to be a substantial increase in the volume of radioactive material to be transported under NRC regulatory control.

For the Subcommittee on
Transportation of Radioactive
Materials

C. P. Siess
Subcommittee Chairman