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

November 30, 1987

CHAIRMAN

The Honorable Tom Bevill, Chairman Subcommittee on Energy and Water Development Committee on Appropriations United States House of Representatives Washington, D. C. 20515

Dear Mr. Chairman:

The Senate has adopted an amendment proposed by Senator Murkowski to H.R. 2700, the Energy and Water Development Appropriation Bill. The amendment would prohibit the transport of plutonium by air from a foreign nation to any foreign nation through the territory or air space of the United States unless transported in a package that had been certified safe after testing by the Nuclear Regulatory Commission (NRC). The amendment requires that the NRC, in addition to meeting all other applicable law, shall conduct two tests prior to certification: (1) "an actual crash test of a cargo aircraft traveling at maximum cruising speed, appropriately loaded with sample full scale packages containing test material," and (2) "an actual drop test from maximum cruising altitude of a sample full scale package containing test material."

The NRC is opposed to this amendment for two basic reasons: (1) the qualification test criteria used by the NRC already assure a high degree of protection for public health and safety, and (2) conducting such a test would be costly and could be potentially dangerous.

Public Law 94-79, enacted on August 9, 1975, placed the following restriction on the Nuclear Regulatory Commission:

"The Nuclear Regulatory Commission shall not license any shipments by air transport of plutonium in any form, whether exports, imports, or domestic shipments; provided, however. that any plutonium in any form contained in a medical device designed for individual human application is not subject to this restriction. This restriction shall be in force until the Nuclear Regulatory Commission has certified to the Joint Committee on Atomic Energy of the Congress that a safe container has been developed and tested which will not rupture under crash and blast-testing equivalent to the crash and explosion of a high-flying aircraft."



As a result of Public Law 94-79, the NRC established a certification program to: (1) evaluate the conditions which could be produced in severe aircraft accidents, (2) develop qualification criteria prescribing tests and acceptance standards for packages used to transport plutonium by air, and (3) develop and test a plutonium package design to demonstrate its ability to meet the qualification criteria. Enclosed is a summary discussion of the qualification criteria with NUREG-0360, "Qualification Criteria to Certify a Package for Air Transport of Plutonium."

The NRC considered the possibility of conducting a full-scale aircraft crash test in connection with its program to certify the Model PAT-1 package in 1978, but abandoned the idea for several reasons which still prevail: (1) the engineering tests specified in the qualification criteria provided a high degree of assurance that packages could withstand aircraft accidents, (2) a single crash test would not be representative of all the aircraft accident conditions which could arise and thus the data from such a test would be of limited technical use, (3) there were concerns that the safety of the pilot and the public could be jeopardized in conducting the test, and (4) the relatively high cost of performing the test was not commensurate with the value of the expected results. Moreover, to our best knowledge, the type of test specified in Senator Murkowski's amendment, crashing a large jet aircraft at maximum cruise speed, has never been conducted. We believe that extensive studies would be needed to determine if such a test was feasible and could be conducted safely.

The cost for the NRC to conduct a full-scale aircraft crash test would likely be a multi-million dollar effort. Considering the limited amount of technical data that could be expected to result from a single test, we do not believe the cost and staff effort required to perform an aircraft test is justified.

In summary, we believe that a full-scale aircraft crash test is unnecessary because of the high degree of protection to public health and safety provided by the existing NRC qualification criteria.

Sincerely,

Lando W. Zechf.

Enclosure: Summary Discussion of Oualification Criteria

cc: Rep. John T. Myers



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November 30, 1987

CHAIRMAN

The Monorable J. Bennett Johnston, Chairman Subcommittee on Energy and Water Development Committee on Appropriations United States Senate Washington, D. C. 20510

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Sincerely,

Lando W. Zech, J.

Enclosure: Summary Discussion of Qualification Criteria

cc: Senator Mark O. Hatfield

ENCLOSURE

SUMMARY DISCUSSION OF QUALIFICATION CRITERIA

The qualification criteria developed by the NRC for plutonium package certification are contained in NUREG-0360, "Qualification Criteria to Certify a Package for Air Transport of Plutonium." Because of the nature and wording of Public Law 94-79, the criteria are very stringent and are intended to provide a high degree of assurance that plutonium packages can withstand virtually all aircraft accidents. The criteria address the requirements of Public Law 94-79 that testing be equivalent to the crash and explosion of a high-flying aircraft by prescribing physical tests which simulate the conditions produced in severe aircraft accidents. The requirement of Public Law 94-79 for the container not to rupture is addressed in the criteria by specifying post-test acceptance standards equivalent to those of the International Atomic Energy Agency. In addition to physical tests and acceptance standards, the criteria also specify various engineering assessments to be made on plutonium package designs and require that certain operational controls be observed in transport.

The physical tests prescribed in the criteria clearly and conservatively encompass a reasonable upper limit of severity for accidents occurring during take-off, landing, or ground operations with minimal reliance being placed upon factors which could mitigate damage done to cargo. Considering the conservatism inherent in the qualification criteria for protecting against take-off and landing accidents, and the numerous factors present in an accident situation which could mitigate package damage, the criteria also assure a high-degree of protection against accidents which occur in other phases of flight. This includes accidents of extreme severity such as mid-air collisions and high speed crashes.

Before the NRC certified the Model PAT-1 package to Congress on August 4, 1978, the qualification criteria received independent reviews by both the Commission's Advisory Committee on Reactor Safeguards and a special committee established by the National Academy of Sciences. The results of the review performed by the National Academy of Sciences are reported in NUREG/CR-0428, "Review of Criteria for Packaging Plutonium for Transport by Air." The committee's conclusion was as follows:

"The committee is confident that the qualification criteria described or referenced in this report will result in a packaged container that will not rupture in the crash and explosion of a high-flying aircraft. Each of the engineering tests called for in the qualification criteria is at or near the extreme limit for the particular type of abuse it simulates. By conducting the tests sequentially a single package is subjected to a substantial amount of stress and damage. An actual crash of an aircraft is not likely to subject the package to a similar or greater amount of damage than the qualification tests prescribed in the Commission's qualification criteria."

In view of the stringent engineering tests and conservative acceptance standards specified in the qualification criteria, the NRC does not believe that it is necessary to conduct an actual aircraft crash test in order to assure the safety of plutonium air transport packages. The qualification criteria specify that a series of physical tests be performed on full-scale sample packages. The tests include an impact test at 422 feet per second, a 70,000 pound crush test, a puncture test, a ripping/ tearing test where a steel beam is dropped on the cask two times from a height of 150 feet, and a 60 minute fire test using aviation fuel. Each test (e.g., impact, crush, puncture, ripping/tearing, fire, etc.) is conducted at or near the extreme limit for the particular type of abuse being examined. The tests are performed in sequence so that the total damage suffered by a package is the sum of the damaging effects of each individual test. It is highly improbable that in any one, or even in several, full-scale aircraft crash tests that all of these conditions could be represented.

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