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

OFFICE OF THE
CHAIRMAN

PDR

August 29, 1985

The Honorable Pete V. Domenici, Chairman
Subcommittee on Energy Research and Development
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

The U.S. Nuclear Regulatory Commission staff, in response to your inquiry of July 26, 1985, concerning additional information for the Price-Anderson hearing record of June 25, 1985, has prepared a summary of on-going and past studies of accident consequences related to transportation, storage, or disposal of nuclear wastes.

We hope this reply provides additional insight on offsite damages likely to result from waste-related nuclear accidents, and will be helpful to the Subcommittee with regard to consideration of renewal for the Price-Anderson Act. Should additional information on Price-Anderson related topics be required, please contact my office.

Sincerely,

Nunzio J. Palladino

Nunzio J. Palladino
Chairman

Enclosure:
As stated

INSERT FOR THE RECORD
COMMITTEE HEARING ON PRICE-ANDERSON
JUNE 25, 1985

At the hearing before the Senate Committee on Energy and Natural Resources on S. 1225 to renew and amend the Price Anderson Act, interest was voiced concerning estimates of damages that would likely result from accidents relating to the transportation, storage, or disposal of nuclear wastes. In response to a request from Senator Domenici of July 26, 1985, NRC staff has prepared the following information for the record of on-going and past studies relating to postulated high-level radioactive waste accidents in the Civilian Waste Repository Program.

The Commission has one study underway and a second planned which are concerned with transportation accidents involving nuclear wastes. The first is referred to as the MODAL Study, and is an assessment of how packages designed to carry spent nuclear fuel and high-level radioactive waste would perform in severe accident conditions. The MODAL Study has been underway for a number of years, and the prime contractor, the Lawrence Livermore National Laboratory (LLNL), is at present bringing the study to closure. The Commission is in the process of arranging for a peer review of the LLNL Modal Study reports by an independent academic institution. Additional information regarding the Modal Study's technical objectives and present schedule are given in Attachment 1.

The second study on transportation impacts, which is currently in the planning stage, is the updating of NRC's Final Environmental Statement (FES) on the Transportation of Radioactive Material by Air and Other Modes (NUREG-0170, December 1977). The original FES evaluated the health consequences arising from the transportation of radioactive materials in general (i.e., not just from nuclear wastes). The Commission intends to update the FES by incorporating: more recent statistics on radioactive material shipments; projections for future shipments of high- and low-level wastes; and recently improved computer models for estimating environmental and health impacts. It is estimated that the update of the FES will require about 3 years to complete. Attachment 2 is a copy of the 1977 edition of the FES.

The Commission has no ongoing or planned studies regarding accidental consequences for the storage of spent fuel or high-level radioactive waste. Previous NRC evaluations have shown no significant risk to public health and safety from the storage of spent fuel. The storage of high-level waste solidified in a form for repository disposal would be enveloped by the accident evaluations for spent fuel because of the physical and radiological characteristics of the solidified high-level waste. Attachment 3 (NUREG-1140, a Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other

Radioactive Material Licensees) contains a summary on pages 56-60 of accident consequences calculated for storage of spent fuel. On page 57, this document references a 1979 3-volume generic environmental impact statement (NUREG-0575) on spent fuel handling and storage, a copy of which is maintained in the NRC public document room. Attachment 4 is an environmental assessment prepared by the NRC in connection with proposed dry storage of spent fuel in metal casks at the Virginia Electric and Power Company. Pages 45-51 of this report provide an assessment of accident consequences for this site-specific application.

As part of the efforts in developing proposed regulations relative to the decommissioning of nuclear facilities, the NRC staff initiated a series of studies through technical assistance contracts to evaluate post-accident cleanup and decommissioning of fuel cycle and non-fuel cycle facilities that were postulated to have experienced a significant accident. Attachment 5 (NUREG/CR-3293, "Technology, Safety and Costs of Decommissioning Reference Nuclear Fuel Cycle and Non-Fuel Cycle Facilities Following Postulated Accidents") contains the major findings of these studies while Attachment 6 (NUREG/CR-2210) provides safety and cost information for the conceptual decommissioning of five different types of referenced independent spent fuel storage installations.

The Commission has one ongoing study with the Sandia National Laboratory regarding safety and accidents during the pre-closure phase of nuclear waste handling operations at a high-level radioactive waste geologic repository. Since the repository is a first of a kind facility without operating or licensing experience, this research is being conducted to develop a systematic methodology to identify and quantitatively evaluate what structures, systems, components and operations are critical to safe design and operation during the pre-closure phase of a high-level radioactive waste repository. This research will allow the NRC to assess the importance and contribution of pre-closure safety of each of the many systems, structures, components and operations that comprise a geologic repository during waste handling and emplacement.

The Commission in the late 1970's and early 1980's funded several projects relating to risk analysis methodology and probabilistic safety analysis for spent fuel and high-level radioactive waste repositories. These studies analyzed various risk scenarios associated with a geologic repository using mathematical models of chemical and physical processes that govern the generation, movement, and ultimate disposition of nuclear wastes. The Commission continues to fund several Sandia National Laboratory studies of post-closure repository risks but, given the large uncertainties inherent in long-term analysis of geologic systems, the Commission has placed emphasis on the reliance of multiple barriers to waste migration (similar to the "defense-in-depth" philosophy followed in reactor licensing) rather than

placing primary emphasis on probabilistic risk analysis of potential radiological impacts. Some of the published studies on risk methodology which may be of interest to the Committee are:

Attachment 7, NUREG/CR-0458, "Risk Methodology for Geologic Disposal of Radioactive Waste: Interim Report," dated October 1978.

Attachment 8, NUREG/CR-577, "A Probabilistic Safety Analysis for Solidified High-Level Nuclear Waste Management Systems: A Status Report," dated July 1979.

Attachment 9, NUREG/CR-0578, "High Level Waste Repository Site Suitability Study - Status Report," dated July 1979.

Attachment 10, NUREG/CR-1931, "Risk Analysis Methodology for Spent Fuel Repositories in Bedded Salt: Reference Repository Definition and Contributions from Handling Activities," dated July 1981.

Attachments:
As stated

TRANSPORTATION MODAL STUDY

The Modal Study, undertaken for the NRC by the Lawrence Livermore National Laboratory, seeks to determine how well packages designed to meet NRC performance criteria will withstand the forces generated in the worst sorts of accidents. The study is based on data from severe non-nuclear accidents that have actually occurred, supplemented by data from various package test programs. Comparing the forces resulting from severe accidents with those the casks are designed to withstand will give a measure of the degree of protection afforded by casks that conform to regulatory requirements. Any accidents which produce forces in excess of those the casks are designed to withstand will be studied in more detail to assess the potential for release of radioactive material. The probability of such an accident actually occurring will be evaluated and the resulting risk to the public health and safety will then be compared with the risks previously calculated in NUREG-0170. Another objective of the study is to provide a document which relates regulatory performance criteria to real-world accidents in simple, straightforward language.

The two volume Modal Study contractor report is scheduled to be completed this summer. Volume 1 will contain the main text, the conclusions, and the recommendations. Volume 2 will contain the data and analysis. Prior to publication, the Study will be subjected to peer review by one or more major universities.

ATTACHMENT 1

ATTACHMENT LIST (2 THROUGH 10)

SUBJECT: Past and on-going NRC studies of accident consequences related to the transportation, storage, or disposal of nuclear wastes

Insert for the Record
6/25/85 Price-Anderson Hearing
Committee on Energy and Natural Resources
United States Senate

Requested by Chairman Domenici in a 7/26/85 letter

ATTACHMENT	2	NUREG-0170 Vol. 1	Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes (Includes NUREG/CR-2325)
ATTACHMENT	3	NUREG-1140	A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees - Draft Report for Comment
ATTACHMENT	4	DOCKET 72-2	USNRC/NMSS Environmental Assessment Related to the Construction and Operation of the Surry Dry Cask Independent Spent Fuel Storage Installation - Virginia Electric and Power Company - April 1985
ATTACHMENT	5	NUREG/CR-3293	Technology, Safety and Costs of Decommissioning Reference Nuclear Fuel Cycle and Non-Fuel Cycle Facilities Following Postulated Accidents
ATTACHMENT	6	NUREG/CR-2210	Technology, Safety and Costs of Decommissioning Reference Independent Spent Fuel Storage Installations
ATTACHMENT	7	NUREG/CR-0458	Risk Methodology for Geologic Disposal of Radioactive Waste: Interim Report
ATTACHMENT	8	NUREG/CR-0577	A Probabilistic Safety Analysis for Solidified High-Level Nuclear Waste Management Systems: A Status Report
ATTACHMENT	9	NUREG/CR-0578	High Level Waste Repository Site Suitability Study -- Status Report
ATTACHMENT	10	NUREG/CR-1931	Risk Analysis Methodology for Spent Fuel Repositories in Bedded Salt: Reference Repository Definition and Contributions from Handling Activities