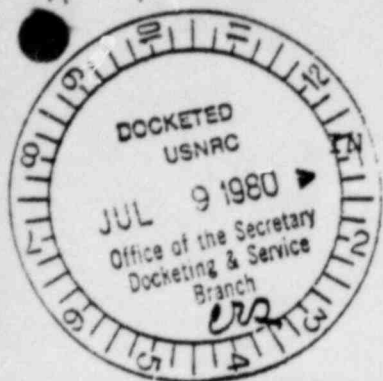


July 3, 1980



THE MATTER PROPOSED RULEMAKING ON THE STORAGE AND DISPOSAL OF NUCLEAR WASTE

(WASTE CONFIDENCE RULEMAKING)

PR-50,51 - 44FR61372

On November 26, 1979, Bechtel requested an opportunity to file a statement addressing the engineering issues relating to NRC waste confidence rulemaking for nuclear waste disposal. This statement is pursuant to that request and is filed with the intent of contributing to the purpose of that proceeding. Specifically, Bechtel wishes to make a statement regarding the degree of assurance now available that radioactive wastes can be safely disposed of, the scheduling of the development of such disposal facilities, and the ability to safely store spent fuel on-site past the expiration of existing facility licenses. Wherever possible, Bechtel has avoided repetition of the myriad supporting details or references which are anticipated to be well elucidated in other statements, such as those of the ANS and AIF, but has provided observations which Bechtel believes to be specific to the experience of a large engineering service company. Bechtel's statement pertains to mined geologic disposal because it is the preeminent existing technological option; Bechtel does not intend to imply that mined repositories are the only suitable disposal technique.

BECHTEL'S QUALIFICATIONS

Bechtel believes that it is well qualified to make this statement as it is one of the largest and most experienced engineering service companies with past projects in tunneling, underground cavities, uranium processing, fuel reprocessing, power plant, and other nuclear facilities. Established in 1898, Bechtel now has a permanent staff numbering over 30,000, including over 9,000 graduate engineers and technical personnel. In addition, more than 40,000 craftsmen are employed directly by Bechtel in construction projects in the United States and abroad.

Bechtel has provided development, engineering, procurement, construction, and project management services to both public and private clients on projects of varying scope and size in more than 60 countries throughout the world. These projects, including those currently under way, have a constructed value of over \$95 billion. Bechtel entered the nuclear field three decades ago in 1948, with the facility design for one of the first atom smashers - the AEC's Van de Graff Nuclear Accelerator at Los Alamos. Following this entry, Bechtel has undertaken the engineering and/or construction of more nuclear power plants than any other engineering service organization.

Bechtel has also been active in the field of nuclear fuel processing and waste management. Bechtel's initial major participation in this field was the complete engineering design, procurement and construction of the first commercial nuclear fuel reprocessing plant (NFS) in the United States. Shortly thereafter, Bechtel undertook the engineering design, procurement and selected construction management responsibilities for the fuel reprocessing plant at Barnwell, South Carolina. In 1973, Bechtel was awarded the engineering responsibility for the planned nuclear fuel reprocessing plant to be located at Oak Ridge, Tennessee. Bechtel has also been one of the leading engineering-construction firms concerned with nuclear power plants and their associated on-site waste handling, spent fuel storage facilities, etc.

In 1977, Bechtel was awarded the design contract for the Waste Isolation Pilot Plant (WIPP), a geological repository in bedded salt. Bechtel has also been involved in many other activities concerning waste management with Bechtel's extensive activities on the National Waste Terminal Storage (NWTS) project serving as a prime example. While studies such as NWTS are extremely important to the overall development of a waste management technology, Bechtel's statement for these proceedings is intended to reflect the position of an engineering company that has actually designed and constructed facilities with the technical and economic magnitude of a waste repository.

WASTE REPOSITORY SAFETY

With the background of experience just described and the judgement resulting from this experience, Bechtel wishes to state that it is confident that radioactive wastes can be safely disposed of on the basis of existing technology in any of a number of host media. This professional opinion is based on the following four general considerations: (1) the experience of having essentially completed preliminary engineering (Title I) design for a mined geologic repository; (2) the experience of having completed engineering, procurement, and construction of many projects incorporating underground chambers in basalt, granite, tuff, etc.; (3) knowledge of the results of research on underground repositories carried out to date; and, (4) knowledge of similar conclusions reached in other countries.

REPOSITORY DESIGN EXPERIENCE

As stated earlier, Bechtel was awarded the design contract for the Waste Isolation Pilot Plant, a nuclear waste repository in bedded salt of the Permian basin near Carlsbad, New Mexico. The contract scope included analyses, data preparation, and review of various documents prepared to support NEPA-Government requirements in addition to preliminary design. In the performance of this contract to date, Bechtel has had to consider the possible ramifications of structure, general arrangement, safety, geohydrology, operations, etc., on repository design and to make

modifications in the general design to alleviate potential problems, incompatibilities, operational difficulties, etc. Design, construction, and operation had to be thought out in sufficient detail as to uncover potential problems before the actual detail design was begun. Engineering solutions typical of any project development have been sufficient to handle the minor problems encountered. The performance of this design effort would be expected to reveal problems which would affect overall safety; no such problems were encountered. One of the best ways to achieve an even higher degree of assurance of the feasibility and safety of this repository is to undertake the actual construction of the project.

Bechtel also performed and reviewed extensive analyses of many of the various environmental impacts of the WIPP project. Among these analyses, perhaps the most significant with respect to both the environmental impact of the project and the degree of confidence in the overall safety analysis was the modeling of release of the waste into the surrounding geohydrology and the subsequent migration of the nuclides with their eventual release to the biosphere. This analysis indicated that although no credit was taken for engineered barriers or the host rock, the resulting radiation exposure to the maximally-exposed individual is small relative to the annual exposure from natural background radiation.

UNDERGROUND EXPERIENCE

Bechtel's experience on the WIPP and similar projects, along with the remainder of the worldwide experience in underground salt formations, has great significance specifically to salt repository design and generally to other mined geologic repositories. The salt experience is important to structural design, construction techniques, and operating procedures while the experience in repository arrangements and safety analysis is important to repository design in general. Bechtel's confidence in the degree of assurance now available that radioactive wastes can safely be disposed of is also based, however, on Bechtel's experience in the design and construction of underground chambers in many other host rocks.

The experience associated with tunneling and/or underground power facility design and construction in granite, tuff, or basalt is significant to the considerations of repository design. Hundreds of these types of facilities have been built in these rock types both domestically and internationally. There are even examples of chambers open for mining operations, for which long-term chamber stability is not always a design requisite, which have been subsequently used for other continuously-manned industrial activities. In summary, Bechtel draws on both the experience gained through designs for repositories, and a large body of general mining and nonmining underground cavity design to form the basis for its confidence in the ultimate safety of underground repositories.

Bechtel recognizes that radioactive waste repositories do involve design considerations not common to mining or the other common underground cavities. These considerations are primarily the impact of the decay heat emitted by the waste on the surrounding rock and the impact of the radioactive emissions on the surrounding rock. The understanding of these considerations is greatly improved, however, when the mass of research results already available and pertaining specifically to the considerations are taken into account. Testing on bedded salt began in the early 1960's in Lyons, Kansas, and the results of these tests have been described by the American Physical Society as sufficient to establish the safety of salt repositories. Further research in salt has been carried out in the ASSE mine in Germany, and at Avery Island in Louisiana. Basalt has been the subject of research at Hanford dating back to 1968. Shale has been the subject of research programs, including in situ heater experiments in the Eleana and Conasauga formations. In situ heater tests have been completed in granite in the Climax stock at the Nevada test site, in Cornwall, England, and in Stripa, Sweden. Further tests are underway in granite in Canada and actual spent fuel tests are underway in the Climax granite. Various in situ testing programs have been supplemented with extensive laboratory testing programs.

None of these repository test programs has revealed to date any unexpected results bearing on the overall safety or structural design of a repository. Certain detail problems, some anticipated and some unanticipated, have been revealed which will have to be addressed in the design. For instance, tests in granite have revealed a surface decrepitation at elevated temperatures which will have to be avoided by limiting design temperatures in repositories. All of these details can be handled by normal design procedures so as to have no impact on the confidence in the overall safety. Further research may result in future designs which may be more economical, but there is now sufficient evidence to support the requisite degree of assurance that radioactive waste can be safely disposed of.

INDEPENDENT STUDIES

Bechtel's confidence in waste repository design is also based on the knowledge that, after exhaustive independent study, professional scientists and engineers in many different countries have come to the same conclusions. Details of and references to most of these studies have been given in the DOE statement; Bechtel does not intend to repeat them here. Particular attention is drawn, however, to the study published by the Swedish company, Kärnbränslesäkerhet (KBS). This particular study is of particular importance because of the special attitude under which it was undertaken. The study was undertaken to define a manner in which Sweden could, if absolutely necessary, build a repository which the most skeptical members of the public and government could accept as being absolutely safe, i.e., meeting the requirements of

the law of conditions, immediately and without any further research and/or development. The five volume report describes the design and construction of just such an "if all else fails" repository.

SUMMARY OF BECHTEL'S CONFIDENCE

We have presented four basic reasons for Bechtel's confidence in the high degree of assurance now available that radioactive waste can be safely disposed of:

1. The experience of having essentially completed an actual Title I design for a mined geologic repository.
2. The experience of having completed engineering, procurement, and construction of many projects incorporating underground chambers in basalt, granite, tuff, etc.
3. Knowledge of the results of research on underground repositories carried out to date.
4. Knowledge of similar conclusions reached in other countries.

The reasons presented were selected as being either of special importance to a practicing engineering service company or viewed from a slightly different perspective than other statements being made to the Commission. Bechtel's confidence can be stated more specifically in the following three points.

1. Mined geologic repositories can be designed and constructed to safely dispose of radioactive waste in a number of different host media.
2. Through the research and design carried out to date, repository technology has reached a point where waste repositories in a number of media are technically feasible as opposed to being only scientifically feasible. A very effective way to continue the development of this technology is to design and construct one or more prototype projects. The problems encountered and resolved through engineering optimization and design are not likely to be the problems anticipated and addressed by researchers; but can best be identified through actual project development.
3. Further research and development with the objective of repository safety will probably be less productive than further research with the objective of more economical designs.

SCHEDULE

Bechtel does not propose to undertake detailed engineering planning and scheduling of a generic repository project in this forum. Such plans and schedules are highly dependent on factors which can only be assumed at this time; any schedule statements are likely to be quoted out of context. Bechtel has reviewed, however, some of the repository schedules submitted, e.g., that of DOE, and is confident that a shorter schedule would result from detailed consideration of an actual project.

ON-SITE STORAGE

Bechtel believes that the superb safety record of the last twenty years of spent fuel storage is ample evidence that spent fuel can be stored on-site for a substantial additional period of time. The major problem, however, is not perceived to be whether there will be sufficient on-site storage for the volume of spent fuel likely to be generated. Off-site storage facilities are likely to be required and design of such a facility, either a new design or a modification of some existing facility, should begin shortly.

SPENT FUEL

Bechtel would like to express the opinion that spent fuel is not waste, but rather a resource of significant value.