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IN RESPONSE, PLEASE
REFER TO: M911219A

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

Mtg 12/19/91

January 15, 1992

OFFICE OF THE
SECRETARY

MEMORANDUM FOR THE RECORD

FROM: Samuel J. Chilk, Secretary

SUBJECT: STAFF REQUIREMENTS - PERIODIC BRIEFING WITH ADVISORY COMMITTEE ON NUCLEAR WASTE - 10:00 A.M. THURSDAY, DECEMBER 19, 1991, COMMISSION CONFERENCE ROOM, ONE WHITE FLINT NORTH, ROCKVILLE, MD (OPEN TO PUBLIC ATTENDANCE)

The Commission* met with the ACNW to discuss:

1) The ACNW's December 2, 1991 responses to Commissioner Rogers on the Staff's Capabilities in Performance Assessment and Computer Modeling for HLW and LLW Disposal Sites;

2) the status of the ACNW's effort on a Systems Approach to Reviewing the Overall High-Level Waste Program; and

3) a report on geologic dating of Quaternary Volcanic Features and Materials.

There were no staff requirements as a result of this meeting.

cc: The Chairman
Commissioner Rogers
Commissioner Curtiss
Commissioner Remick
Commissioner de Planque
OGC
EDO
OIG
ACNW
CAA
PDR - Advance
DCD - P1-24

* Commissioner Curtiss was not present at the Commission meeting.

DOL. 21 (501) JPC JRG JPK KSD

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

June 12, 1992

MEMORANDUM FOR: The Chairman

FROM: James M. Taylor
Executive Director
for Operations

SUBJECT: RESPONSES TO QUESTIONS FROM JUNE 11, 1992, BRIEFING

As a result of the briefing you and Commissioner Curtiss received on June 11, 1992, covering the status of the repository program at Yucca Mountain, you asked seven questions. The staff response to those questions is provided in the enclosure.

James M. Taylor
Executive Director
for Operations

Enclosure: As stated

cc: Commissioner Rogers
Commissioner Curtiss
Commissioner Remick
Commissioner de Planque
SECY
OGC

Question 1. What are the release limits of the EPA High-Level Waste Standards, 40 CFR Part 191?

Answer 1.

For 10,000 years after disposal, there must be

(a) less than one chance in ten that releases will exceed EPA's table of release limits, and

(b) less than one chance in one thousand that releases will exceed ten times EPA's table.

If more than one radionuclide is released, a "sum-of-the-fractions" rule is to be applied. For example, suppose that only two radionuclides were projected to be released, with the Am-241 release at 50% of its limit and the Am-243 release at 60% of its limit for a total of 110% of EPA's table. Then the repository would fail to meet EPA's standards unless the likelihood of those releases was less than one chance in ten. The release limits of EPA's standards are listed below, and a more extensive table comparing those release limits to the radionuclide inventory of a spent fuel repository is attached.

Radionuclide	Release Limit per 1,000 MTHM
Americium-241 or 243	100
Carbon-14	100
Cesium-135 or 137	1,000
Iodine-129	100
Neptunium-237	100
Plutonium-238, 239, 240 or 242	100
Radium-226	100
Strontium-90	1,000
Technetium-99	10,000
Thorium-230 or 232	10
Uranium-233, 234, 235, 236 or 238	100
Any other alpha-emitting nuclide	100
Any other radionuclide	1,000

Table A1 - Repository Inventory and Allowable Releases for 100,000 MTHM of Spent Fuel

Table A1

Nuclide	Repository Inventory at 1000 Yr, Ci*	EPA Release Limit, Ci**	Allowable Release, %
Am-241	9.2E7	10,000	1.1E-2
Am-243	1.6E6	10,000	6.3E-1
C-14	1.0E5	10,000	10
Cs-135	2.2E4	100,000	450
Cs-137	1.0	100,000	----
I-129	3.8E3	10,000	260
Np-237	1.0E5	10,000	10
Pu-238	9.8E4	10,000	10
Pu-239	3.2E7	10,000	3.1E-2
Pu-240	4.4E7	10,000	2.3E-2
Pu-242	1.7E5	10,000	5.9
Ra-226***	2.8E2	10,000	3600
Sr-90	1.5E-1	100,000	----
Tc-99	1.4E6	1,000,000	71
Th-230***	1.6E3	1,000	63
Th-232	1.3E-3	1,000	----
Sn-126	5.6E4	100,000	180
U-233***	3.3E2	10,000	3000
U-234	1.9E5	10,000	5.3
U-235	2.0E3	10,000	500
U-238	3.1E4	10,000	32

*These inventory figures and release limits are for 100,000 MTHM (3000 reactor-years) of spent nuclear fuel. The C-14 inventory is from R. A. Van Konynenburg's presentation to ACNW, October 26, 1990. Other inventories are from Arthur D. Little, Inc., "Technical Support of Standards for High-Level Radioactive Waste Management," EPA 520/4-79-007, 1977.

**The EPA standards require that a "sum-of-the-fractions" rule be applied if more than one radionuclide is released. "Unlikely" releases are allowed to be 10 times larger than the limits listed here.

***Inventory increases after 1000 years.

Question 2. What does Part 60 require as subsystem performance objectives?

Answer 2.

(a) Containment of HLW within waste packages must be substantially complete for 300-1,000 years, assuming anticipated processes and events. (The exact time period is to be determined by the Commission considering age and nature of waste, etc.)

(b) After the containment period, the release rate of each radionuclide from the engineered barrier system is to be less than one part in 100,000 per year, again assuming anticipated processes and events.

(c) The pre-emplacement groundwater travel time from the disturbed zone to the environment is to be at least 1,000 years.

(d) On a case-by-case basis, the Commission may approve some other containment period, release rate, or travel time.

Available information indicates that the current performance objectives are likely to be achievable without undue cost, except possibly for the release rate of gaseous carbon-14 from the engineered barrier system. However, perceived uncertainties about the meaning of terms associated with "substantially complete containment" and "pre-emplacement groundwater travel time" may cause difficulties in implementation, and may require revisions to the current performance objectives. The staff has projects in place to evaluate these matters.

Question 3.

Could we propose a dose standard today to substitute for the EPA release standard?

Answer 3.

Yes. A simple dose standard could be phrased: "Releases from the repository by any reasonable pathway shall not cause any individual to receive an effective dose equivalent exceeding X millirem in any year in the future." Such a limit would protect <u>any</u> individual in the future from significant individual risk from direct exposure. In fact, EPA is likely to include a similar requirement for undisturbed performance (25 millirem/yr for 10,000 years) when its standards are reissued.

There might be two significant drawbacks to the simple dose standard suggested above. First, a "static biosphere" assumption would need to be specified to avoid uncertainties about future locations and lifestyles of humans. Second, this type of individual protection standard does not take into account the potential for a distributed risk of very small exposures to a large population. Typically, such risks are limited by requiring that releases be "as low as reasonably achievable." However, application of an ALARA provision in repository licensing is likely to be very difficult.

Question 4. Does assured retrievability of waste packages for as long as 100 years offer any better approach to achieve a 1000-year package requirement?

Answer 4.

The most reliable and useful information for projecting waste package performance is expected to be that obtained under controlled laboratory test conditions. For example, the ability to conduct tests under a wide range of physical, chemical and radiological conditions will be helpful in developing extrapolation methods for projecting waste package performance for times longer than those over which the tests were conducted. Substituting in situ studies for laboratory tests is not likely to produce data that would be any more reliable or useful. Collection of in situ information, even if carried out for 100 years, would cover only 10-30 percent of the required waste package lifetime, so there would still be a need to develop methods for extrapolation of observed performance. In addition, it would be difficult and expensive to retrieve and sample a statistically significant number of the 10,000 to 20,000 waste packages expected for a repository.

To some extent, the retrievability and package lifetime criteria of 10 CFR Part 60 are linked. Part 60 requires that a performance confirmation program be carried out before and during repository operations (roughly 50 years). This program would provide information on

the actual performance of waste packages in the repository environment. If that performance were significantly different from the performance initially projected from laboratory data, the waste packages could be retrieved and remedial measures taken. The ability to retrieve wastes is important in allowing a relatively long-term performance confirmation program to be carried out, confirming projections based on short-term laboratory data.

The staff does not anticipate that retrievability can or should be maintained for periods longer than about 100 years. A fundamental principle of repository development has been non-reliance on long-term institutional controls as a means to achieve safe waste disposal. For this reason, periodic retrieval and inspection of waste packages would not be appropriate.

Question 5. Is there an alternative to deal with the potential for carbon-14 releases to exceed EPA's release limits?

Answer 5.

Several alternatives are available, all of which would be based on the very small individual doses that could be caused by carbon-14 releases. First, EPA could include an alternative dose standard such as: "Releases shall not exceed Table 1 unless it can be shown that individual doses will not exceed a small fraction of individual safety limits (less than a few mrem/yr EDE)." Second, EPA could restrict application of the Table 1 release limits to releases to groundwater or to the land surface. DOE has suggested that EPA's existing NESHAP (Clean Air Act) standards for airborne releases (10 mrem/yr) would be applied to gaseous releases from a repository. Finally, EPA could revise the carbon-14 release limit (or delete it), based on a recognition that there is no potential for carbon-14 releases to cause any significant dose to any individual. The staff considers that any of these alternatives would provide a workable solution.

Question 6. What is the issue with radioiodine?

Answer 6.

The only radioisotope of iodine which persists in HLW is I-129 which has a very long half-life, 15.7 million years. Iodine is expected to be relatively soluble and mobile in a geologic environment. Therefore, assessments of repository performance often show I-129 to be one of the first radionuclides to be released to the environment. Because of its long half-life (and resulting low specific activity), I-129 poses virtually no individual risk, but only the risk of collective dose from slight exposures of large numbers of people over many of its long half-lives.

Some performance assessments for hypothetical repositories, including the Swedish Project 90, have found I-129 to cause the largest individual doses for a wide range of potential release scenarios. It is important to note that the projected I-129 doses are quite small (nanorem/year), and the reason I-129 causes the largest doses is because most other radionuclides are retained by the repository for a long enough time to allow virtually complete radioactive decay. The dominance of I-129 is not an indication of its hazard, but of the ability of a repository to provide essentially complete isolation of other radionuclides.

Question 7. What is the basis for the Linear Hypothesis?

Answer 7.

In the NRC's BRC Policy Statement, the linear hypothesis was defined as follows:

"Linear, no-threshold hypothesis" refers to the theory that there is a proportional relationship between a given dose of radiation and the statistical probability of the occurrence of a health effect (such as latent cancers and genetic effects), and that there is no dose level below which there is no risk from exposure to radiation.

Additional information from the BRC Policy Statement is attached.

APPENDIX—DOSE AND HEALTH EFFECTS ESTIMATION

I. Dose Estimation

In estimating the dose rates to members of the public that might arise through various practices for which exemptions are being considered, the Commission has decided to apply the concept of the "total effective dose equivalent." This concept, which is based on a comparison of the delayed health effects of ionizing radiation exposures, permits the calculation of the whole body dose equivalent of partial body and organ exposures through use of weighting factors. The concept was proposed by the International Commission on Radiological Protection (ICRP) in its Publication 26 issued in 1977. Since that time, the concept has been reviewed, evaluated, and adopted by radiation protection organizations throughout the world and has gained wide acceptance. The "total effective dose equivalent" concept is incorporated in "Radiation Protection Guidance to Federal Agencies for Occupational Exposure-Recommendations Approved by the President," that was signed by the President and published in the Federal Register on January 27, 1987 (52 FR 2822). The Commission recognizes that, in considering specific exemption proposals, the total effective dose equivalent must be taken into account.

II. Estimating Health Effects From Radiation Exposure

A. Individual Risks.

In the establishment of its radiation protection policies, the Commission has considered the three major types of stochastic (i.e., random) health effects that can be caused by relatively low doses of radiation: cancer, genetic effects, and developmental anomalies in fetuses. The NRC principally focuses on the risk of fatal cancer development because (1) the mortality risk represents a more severe outcome than the nonfatal cancer risk, and (2) the mortality risk is thought to be higher than the risk associated with genetic effects and developmental effects on fetuses.[2] However, even though radiation has been shown to be carcinogenic, the development of a risk factor applicable to continuing radiation exposures at levels equal to natural background[3] requires a significant extrapolation from the observed effects at much higher doses and dose rates.[4] This results in significant uncertainty in risk estimates as reflected by the views of experts in the field. For example, the Committee on the Biological Effects of Ionizing Radiation (BEIR III) of the National Academy of Science cautioned that the risk values are "...based on incomplete data and involve a large degree of uncertainty, especially in the low dose region." This Committee also stated that it "...does not know whether dose rates of gamma or x-rays (low LET; low linear energy transfer radiation) of about 100 mrads/year (1 mGy/year) are detrimental to man." More recently, the BEIR V Committee of the National Academy of Science/National Research Council stated that it "recognizes that its risk estimates become more uncertain when applied to very low doses. Departures from a linear model at low doses, however, could either increase or decrease the [estimation of] risk per unit dose." The Commission understands that the Committees' statements reflect the uncertainties involved in estimating the risks of radiation exposure and do not imply either the absence or presence of detrimental effects at such low dose levels.

The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) stated in their 1988 Report to the General Assembly that "...there was a need for a reduction factor to modify the risks (derived at high doses and dose rates)...for low doses and dose rates....[A]n appropriate range (for this factor) to be applied to total risk for low dose and dose rate should be between 2 and 10." This factor would lead to a risk coefficient value between 7×10^{-5} and 3.5×10^{-4} per rad (7×10^{-3} and 3.5×10^{-2} per Gy) based on an UNSCEAR risk coefficient of 7.1×10^{-4} per rad (7.1×10^{-2} per gray) for 100 rad (1 gray) organ absorbed doses at high dose rates. The report also stated, "The product of the risk coefficient appropriate for individual risk and the relevant collective dose will give the expected number of cancer deaths in the exposed population, provided that the collective dose is at least of the order of 100 person-Sv (10,000 person-rem). If the collective dose is only a few person-Sv (a few hundred person-rem), the most likely outcome is zero deaths."

In December 1989, the BEIR V Committee published a report entitled "Health Effects of Exposure to Low Levels of Ionizing Radiation," which contained risk estimates that are, in general, similar to the findings of

[2] Further discussion of these topics is provided in "Sources, Effects and Risks of Ionizing Radiation," United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), 1988 Report to the General Assembly with Annexes.

[3] Natural background radiation can vary with time and location. In Washington, D.C., natural background radiation (excluding radon) results in individual doses of about 90 mrem per year (0.9 mSv/yr), while in Denver, Colorado, the value is about 160 mrem per year (1.6 mSv/yr). In both cases, naturally occurring radioactive material in the human body contributes approximately 40 mrem per year. Radiation from inhalation of the daughter products of radon contributes an average additional dose of 200 mrem per year (2 mSv/yr) to members of the U.S. population (NCRP Report No. 93, "Ionizing Radiation Exposure of the Population of the United States").

[4] The health effects clearly attributable to radiation have occurred principally among early radiation workers, survivors of the atomic bomb explosions at Hiroshima and Nagasaki, individuals exposed for medical purposes, and laboratory animals. Natural background radiation causes an annual dose that is at least two orders of magnitude less than the dose received by human populations from which the cancer risks are derived. Experiments at the cellular level, however, provide similar indications of biological effects at low doses.

the 1988 UNSCEAR report. The BEIR V report's estimate of lifetime excess risk of death from cancer following an acute dose of 10 rem (0.1 Sv) of low-LET radiation was 8×10^{-3}. Taking into account a dose rate effectiveness factor for doses occurring over an extended period of time, the risk coefficient is on the order of 5×10^{-4} per rem, consistent with the upper level of risk estimated by UNSCEAR.

In view of this type of information, the NRC, the Environmental Protection Agency, and other national and international radiation protection authorities have established radiation protection standards defining recommended dose limits for radiation workers and individual members of the public. As a matter of regulatory prudence, all these bodies have derived the value presumed to apply at lower doses and dose rates associated with the radiation protection standards by a linear extrapolation from values derived at higher doses and dose rates. This model is frequently referred to as the linear, no-threshold hypothesis, in which the risk factor at low doses reflects the straight-line (linear) dose-effect relationship at much higher doses and dose rates. In this respect, the BEIR V report notes that "in spite of evidence that the molecular lesions which give rise to somatic and genetic damage can be repaired to a considerable degree, the new data do not contradict the hypothesis, at least with respect to cancer induction and hereditary genetic effects, that the frequency of such effects increases with low-level radiation as a linear, non-threshold function of the dose."

The Commission, in the development of the BRC policy, is faced with the issue of how to characterize the individual and population risks associated with low doses and dose rates. Although the uncertainties are large, useful perspective on the bounding risk associated with very low levels of radiation can be provided by the linear, no-threshold hypothesis. Consequently, such risk estimates have been a primary factor in establishing individual and collective dose criteria associated with this policy. The estimations of the low risk from potentially exempted practices can be compared to the relatively higher potential risks associated with other activities or decisions over which the NRC has regulatory responsibility. Through such comparisons, the Commission can ensure that its radiation protection resources and those of its licensees are expended in an optimal manner to accomplish its public health and safety mission.

In this context, the risk to an individual as calculated using the linear, no-threshold hypothesis is shown in Table 1 for various defined levels of annual individual dose. The values in the hypothetical lifetime risk column are based on the further assumption that the annual dose is continuously received during each year of a 70-year lifetime. To provide further perspective, a radiation dose of 10 mrem per year (0.1 mSv per year) received continuously over a lifetime corresponds to a hypothetical increase of about 0.25% in an individual's lifetime risk of cancer death. Ten millirem per year (0.1 mSv per year) is also a dose rate that is a small fraction of naturally occurring background radiation and comparable to the temporal variations in natural background radiation due to fluctuations that occur at any specific location.

The Commission prefers to use factors of ten to describe such low individual doses because of the large uncertainties associated with the dose estimates. Use of values such as 0.7 or 12 imputes a significance and sense of certainty that is not justified considering the levels of uncertainty in the dose and risk estimates at these low levels. Thus, order of magnitude values such as 1 and 10 are preferable to avoid providing analysts and the public with a sense of certainty and significance that is not commensurate with the actual precision and certainty of the estimates.

B. Collective or Population Risk

In the application of the fundamental principles of radiation protection, collective dose provides a useful way to express the radiological impact (i.e., potential detriments) of a practice on the health of the exposed population. Because of the stochastic nature of risk, analysis of exposures of large groups of people to very small doses may result in calculated health effects in the population at large. Collective dose is the sum of the individual total effective dose equivalents resulting from a practice or source of radiation exposure. It is used in comparative cost-benefit and other quantitative analytical techniques and, therefore, is an important factor to consider in balancing benefits and societal detriments in applying the ALARA principle. For purposes of this policy, individual total effective dose equivalents less than 0.1 mrem per year (0.001 mSv per year) do not need to be considered in the estimation of collective doses. The Commission believes consideration of individual doses below 0.1 mrem per year imputes a sense of significance and certainty of their magnitude that is not justified considering the inherent uncertainties in dose and risk estimates associated with potentially exempted practices. The Commission also notes that doses in the range of 0.01 to 0.1 mrem per year correspond approximately to lifetime risks on the order of one in a million. The NRC has used collective dose, including rationales for its truncation, in a number of rulemaking decisions and in resolving a variety of generic safety issues.

Table 1

Incremental Annual Dose*	Hypothetical Incremental Annual Risk**	Hypothetical Lifetime Risk From Continuing Annual Dose**
100 mrem (1.0 mSv)	5×10^{-5}	3.5×10^{-3}
10 mrem (0.1 mSv)	5×10^{-6}	3.5×10^{-4}
1 mrem (0.01 mSv)	5×10^{-7}	3.5×10^{-5}
0.1 mrem (0.001 mSv)	5×10^{-8}	3.5×10^{-6}

* The expression of dose refers to the Total Effective Dose Equivalent. This term is the sum of the deep [whole body] dose equivalent for sources external to the body and the committed effective [whole body] dose equivalent for sources internal to the body.

** Risk coefficient of 5×10^{-4} per rem (5×10^{-2} per Sv) for low linear energy transfer radiation has been conservatively based on the results reported in UNSCEAR 1988 (Footnote 2) and BEIR V (see also NUREG/CR-4214, Rev. 1).

III. Dose and Risk Estimation

The Commission recognizes that it is frequently not possible to measure risk to individuals or populations directly and, in most situations, it is impractical to measure annual doses to individuals at the low levels associated with potential exemption decisions. Typically, radionuclide concentrations or radiation dose rates can only be measured before the radioactive material is released from regulatory control. Estimates of doses to members of the public from the types of practices that the Commission would consider exempting from regulatory control must be based on input of these measurements into exposure pathway models, using assumptions related to the ways in which people might become exposed. These assumptions incorporate sufficient conservatism to account for uncertainties so that any actual doses would be expected to be lower than the calculated doses. The Commission believes that this is an appropriate approach to be taken when determining if an exemption from some or all regulatory controls is warranted.

Department of Energy
Washington, DC 20585

Yucca Mtn
Transcript
VOL. 21
303

JRC
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October 6, 1992

The Honorable James R. Curtiss
Commissioner
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Commissioner Curtiss:

During the Nuclear Regulatory Commission's meeting of June 24, 1992, you directed to me certain questions involving the Department's legal obligations under the Nuclear Waste Policy Act, and suggested that some of the Department's correspondence involving these issues had not enunciated consistent positions.

You first inquired whether the Department would be legally obligated either under the Act or under the Standard Contract to accept spent nuclear fuel in 1998 even if a Monitored Retrievable Storage facility were not ready to receive it at that time.

As was stated in a February 7, 1991, letter from the Department's General Counsel to the General Accounting Office, the Department's obligation to begin accepting spent nuclear fuel in 1998 arises "following commencement of facility operations." Neither the statute as a whole nor the Standard Contract purports to obligate the Department to begin accepting spent nuclear fuel in the absence of an operating facility at which the spent fuel can be either stored or disposed of in the fashion contemplated by the Act. I am enclosing for your information a copy of the February 7, 1991, letter from the Department's General Counsel which addresses this and several other related legal questions bearing on this program.

All of the Department's recent correspondence is entirely consistent on this point. My letter of February 14, 1992, to Commissioner Sanda indicated that neither the Act nor the Standard Contract imposes an unconditional obligation to accept spent nuclear fuel by January 31, 1998. This point is entirely consistent with the Secretary's letter of May 27, 1992, to Mr. Keesler, which emphasized the Department's policy commitment to meet the program schedule which calls for a Monitored Retrievable Storage facility to be operating by 1998. The Secretary's letter of May 29, 1992, to Mr. Howard concerned storage of spent nuclear fuel at a utility site, and again emphasized the importance the Department attaches to meeting all of its responsibilities under the Nuclear Waste Policy Act.

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Finally, there is nothing inconsistent with the Department's descriptions of its legal obligation to accept spent fuel and the points made by former Secretary Hodel in his letter of February 7, 1984, to which you directed my attention during the June 24, Commission meeting. In sum, this letter stated that the Standard Contract, together with the "overall thrust" of the Nuclear Waste Policy Act, created an obligation of the Department "to accept spent fuel in 1998 whether or not a repository is in operation." Although the Nuclear Waste Policy Act itself explicitly required the Department to commit to accept spent nuclear fuel only "following commencement of operation of a repository," the Standard Contract established a less confining condition to the legal obligation to begin accepting spent fuel. It did so by paraphrasing the statutory condition such that it describes the obligation to begin accepting spent nuclear fuel as arising "after commencement of facility operations," and elsewhere by defining the term "facility" as including not only a repository but also "such other facility(ies) to which spent nuclear fuel...may be shipped by DOE prior to its transportation to a disposal facility." This definition includes a Monitored Retrievable Storage facility constructed and licensed under the Nuclear Waste Policy Act. Thus under the Standard Contract, as was stated by then-Secretary Hodel, once a Monitored Retrievable Storage facility is available, the Department will be obligated to begin accepting spent fuel "whether or not a repository is in operation."

Finally I want to emphasize that at no time during my appearance before the Commission on June 24, 1992, did I intend to convey any doubt of the consistency of positions adopted by the Department on these questions. Any hesitancy that I may have exhibited about speaking extemporaneously to some of the legal points that can be raised by this intricate statute should not be misinterpreted as implying any view on my part that the Department has been at all inconsistent in its carefully studied approach to these issues.

I hope this information will be helpful to you and the Commission.

Sincerely,

John W. Bartlett

John W. Bartlett, Director
Office of Civilian Radioactive
Waste Management

Enclosure

Department of Energy
Washington, DC 20585

FEB 7 1991

Martin J. Fitzgerald, Esq.
Special Assistant to the General Counsel
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Fitzgerald:

This responds to your letter of September 20, 1990, in which you raise a number of issues concerning the obligation of the Department of Energy (DOE) to accept and dispose of high-level radioactive waste (HLW) and spent nuclear fuel (SNF) pursuant to the Nuclear Waste Policy Act of 1982, as amended (NWPA).

The answers to some of your questions are interrelated. In order to avoid any redundancy or even confusion, I thought it would be useful to set forth the applicable statutory regime from which the particuler obligations arise. Then, I think, the answers will follow logically and can be dealt with in an abbreviated manner.

Disposal Authority

The authority for delivery, acceptance, and taking title to HLW and SNF is provided in sections 111(a), 123 and 302(a) of the NWPA. Section 111(a) of the NWPA acknowledges the Federal Government's responsibility to provide for the permanent disposal of HLW and SNF in order to protect the public health and safety and the environment. The generators and owners of the waste materials, however, have the primary responsibility to provide for, and pay the costs of, the interim storage of HLW and SNF until such materials are accepted by the DOE. See section 111(a)(5) of the NWPA.

Section 123 of the NWPA provides that delivery, and acceptance by the Secretary, of HLW or SNF for a repository constitutes a transfer of title to the Secretary of such HLW or SNF. A repository is defined in the NWPA as a system licensed by the Nuclear Regulatory Commission for the permanent deep geologic disposal of HLW and SNF, whether or not such system is designed to permit the recovery, for a limited period during initial operation, of any materials placed in such system. See section 2(18).

Section 302(a) of the NWPA authorizes the Secretary to enter into contracts with the generators and owners of HLW or SNF of domestic origin for the acceptance of title, subsequent transportation, and disposal of such HLW or SNF.

Section 302(a) provides further that:

> Contracts entered into under this section shall provide that-
>
> (A) following commencement of operation of a repository, the Secretary shall take title to the high-level radioactive waste or spent nuclear fuel involved as expeditiously as practicable upon the request of the generator or owner of such waste or spent fuel; and
>
> (B) in return for the payment of fees established by this section, the Secretary, beginning not later than January 31, 1998, will dispose of the high-level radioactive waste or spent nuclear fuel involved as provided in this subtitle.

Storage Authority

Section 142 of the NWPA authorizes the DOE to accept HLW and SNF for temporary storage at a monitored retrievable storage (MRS) facility before fulfilling its obligation to provide for the disposal of such materials, subject to certain limitations specified in sections 141, 145 and 148 of the NWPA.

DOE therefore has provided in the Standard Contract for Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste (the Standard Contract) that it will take title to the materials "after commencement of facility operations...." 10 C.F.R. §961.11, Article II. The Standard Contract defines a DOE facility to include not only a disposal facility, i.e. a repository, but "such other facility(ies) to which spent nuclear fuel and/or high-level radioactive waste may be shipped by DOE prior to its transportation to a disposal facility," e.g. an MRS facility.

Question 1:

Can DOE take title to high-level radioactive waste or spent nuclear fuel from private utilities prior to the commencement of operation of a repository? If so, what is DOE's legal authority for taking title?

Answer:

Under the Standard Contract, DOE can take title to HLW or SNF from private utilities prior to commencement of repository operations if an MRS facility has commenced operations.

Question 2:

What is DOE's legal obligation to "dispose" of high-level waste or spent nuclear fuel from the utilities? Under either the Act or its contracts, is DOE required to accept such waste beginning in 1998?

Answer:

As set forth above, under the NWPA, DOE is obligated to dispose of HLW or SNF from the utilities, beginning in 1998, following commencement of repository operations. Under the Standard Contract, DOE is obligated to accept waste, beginning in 1998, following commencement of facility operations.

Question 3(a):

What is the relationship of the statutory definition of "disposal" contained in the Nuclear Waste Policy Act to the Department's duty under (a) the Act and (b) the contracts, to "dispose" of utilities' high-level radioactive waste or spent nuclear fuel?

Answer:

Neither the NWPA nor the Standard Contract defines "dispose." Section 111(a) of the NWPA acknowledges the Federal Government's responsibility "to provide for the permanent disposal of high-level radioactive waste and such spent nuclear fuel as may be disposed of in order to protect the public health and safety and the environment...." In both the NWPA and the Standard Contract, "disposal" refers to the emplacement in a repository of HLW or SNF with no foreseeable intent of recovery, whether or not such emplacement permits recovery of the materials. Under 302(a) of the NWPA and Article IV of the Standard Contract, DOE has the responsibility to "dispose" of these materials in accordance with the NWPA and the Standard Contract. Thus, DOE believes that its obligation to "dispose" is the obligation to emplace in a repository. As described in 3(b), below, DOE can undertake temporary waste storage at an MRS.

Question 3(b):

Does either the statutory or contractual requirement to "dispose" of waste include temporary storage at an MRS?

Answer:

Neither the statutory nor the contractual "disposal" requirement includes temporary storage at an MRS. However, under the NWPA

and the Standard Contract, DOE can accept the materials for temporary storage at an MRS facility before fulfilling its obligation to provide for their "disposal."

Question 3(c):

If so, what is the Department's legal authority for providing temporary storage?

Answer:

Section 142 of the NWPA authorizes DOE to site, construct, and operate an MRS, subject to the limitations specified in sections 141, 145 and 148 of the NWPA.

Question 3(d):

What is the difference between "storage" and "pre-disposal packaging?"

Answer:

The Act defines "storage" as the retention of HLW, SNF, or transuranic waste with the intent to recover such waste or fuel for subsequent use, processing, or disposal. The term "pre-disposal packaging" is not defined in either the statute or the Standard Contract and may be subject to varying interpretations. However, in previous public statements DOE has used "pre-disposal packaging" to refer to a potential use that could be made of an MRS: to prepare and package high-level radioactive waste and spent nuclear fuel for disposal, prior to transportation to the repository for emplacement.

Question 4:

If neither the repository nor an MRS facility is in operation by 1998, how will DOE be able to meet its statutory and contractual obligations to the utilities? If DOE is unable to accept waste by 1998, does the contract provision dealing with delays become operative? How does the Department expect that these provisions will be implemented?

Answer:

As previously noted, the obligation by DOE to accept the materials in 1998 arises "following commencement of facility operations." However, DOE anticipates that acceptance of the materials at an MRS facility can begin in 1998, in accordance with the Secretary of Energy's initiatives detailed in the

November 1989 "Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program". In any event, it would be appropriate to consider the effect of such contract provisions only after all the facts and circumstances are known. Therefore, the Department has not considered what actions it may pursue or whether the contract provision dealing with delays may become operative if no facility is available.

Question 5:

Does the Department plan to amend the contracts to modify the date for acceptance of waste? Would such an amendment require a legislative change to the Nuclear Waste Policy Act?

Answer:

DOE does not plan to amend the Standard Contract because, as stated above, DOE anticipates that acceptance of the materials will begin at an MRS facility in 1998.

I trust that these comments are responsive to your inquiry.

Sincerely,

Stephen A. Wakefield
General Counsel

The Secretary of Energy
Washington, DC 20585

May 29, 1992

Mr. James J. Howard
Chairman and Chief Executive Officer
Northern States Power Company
414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

Dear Mr. Howard:

Thank you for your letter of April 15, 1992, concerning an Administrative Law Judge's (ALJ) recommendation that the Minnesota State Public Utilities Commission (PUC) deny or defer to the State legislature Northern States Power Company (NSP) request to build a dry cask storage facility for spent nuclear fuel. The Department is very concerned that this ALJ decision, if adopted by the PUC, could force NSP to derate and possibly even shut down a safe, reliable, and economical nuclear power plant.

We fundamentally disagree with the conclusions reached by the ALJ with respect to whether the Department will succeed in siting and developing a permanent nuclear waste repository. I recognize that there are those who question the Department's ability to develop a monitored retrievable storage (MRS) facility and a permanent waste repository in a timely manner. Let me make very clear, however, that the Department is committed to fulfill the mandates imposed by the Nuclear Waste Policy Act.

Recent developments suggest that, contrary to the ALJ's decision, the Department will develop a permanent nuclear waste repository in a timely fashion. First, the schedule delays caused by litigation with the State of Nevada are largely behind us. Nevada has now issued the three permits that were the subject of litigation. We began new Yucca Mountain site characterization work last year and are making good progress. Second, we have accomplished specific milestones in our site suitability evaluation. These include completion of a baseline plan for the characterization work, completion of an interim evaluation of site suitability, and redesign of the underground Exploratory Studies Facility. Further, a panel of the National Academy of Sciences has provided a compelling basis for favorable resolution of one of the key-site suitability issues.

I am also heartened by the action taken by the House of Representatives on May 21, 1992, to include in H.R. 776 authority

to enable us to proceed with further site studies at Yucca Mountain without procedural delays by Nevada. This clearly demonstrates Congressional resolve not to permit spent nuclear fuel to permanently remain at reactor sites.

Our current schedule calls for having an MRS facility operating by 1998. The permanent repository will commence operation within 6 years of completion of the Nuclear Regulatory Commission reviews of the repository license application. We expect to start accepting spent fuel at the repository in 2010.

The MRS schedule assumes that the Nuclear Waste Negotiator will begin development of a negotiated agreement with the candidate MRS host in the first half of 1993. Because this is a voluntary process being carried out with a number of parties, it is not possible to establish a more precise date at this time. However, the Negotiator has identified a number of jurisdictions that are candidates for future negotiations leading to hosting an MRS facility. Applications for 20 Phase I grants have been received from jurisdictions interested in investigating the feasibility of hosting an MRS facility. The first part of a Phase II grant was recently awarded to a potential host jurisdiction to study siting an MRS within its jurisdiction in greater detail. We anticipate additional Phase II applications and grant awards.

This effort is necessary prior to formal negotiations between the potential host and the Negotiator over the siting of an MRS. Once the Negotiator finalizes an agreement with a potential host, and the proposed agreement is enacted into law by Congress, construction of an MRS could proceed promptly.

To meet our schedules, we have established specific interim milestones to impose discipline and accountability. Top-level milestones are listed on the enclosure to this letter. Several occur during the next 2 to 3 years and will provide a means for readily measuring our progress. As part of this measurement process, we are continually assessing the MRS and repository programs to ensure that we are taking whatever action is necessary to meet our goals. The results of our latest assessment will be submitted as part of the fiscal year 1994 budget to be presented to the Congress in January 1993.

In sum, the Department has sound, integrated program plans that should enable us to begin spent fuel receipt at an MRS facility in 1998 and to begin accepting spent fuel at the repository in 2010. However, should it become clear that our currently-planned actions and progress towards the milestones listed in the enclosure will not ensure that the Department can accept spent nuclear fuel by 1998, we will take whatever actions are necessary and in

accordance with the law to meet our obligations under the Nuclear Waste Policy Act. Further, we would seek additional legislative authority if appropriate.

Under the Department's 10 CFR Part 961 regulations, the Department and NSP have a contract which commits the Department to accept title to, transport, and dispose of the spent fuel from Prairie Island. From our review of the shipment schedule for Prairie Island, combined with our commitment to accept spent nuclear fuel in 1998, we conclude that the spent fuel proposed to be stored in dry cask storage at Prairie Island will be shipped to an MRS facility within the 25-year time limit envisioned by the ALJ's recommendation.

I recognize that resolution of the waste disposal problem is critical to NSP and to the entire nuclear industry. It is a problem, therefore, which must have a satisfactory conclusion. The Department will continue to work to ensure that an MRS facility and a permanent repository are constructed expeditiously.

If the Department can provide more details for your use with the Minnesota PUC, we would be pleased to do so.

Sincerely,

James D. Watkins
Admiral, USN (Retired)

Enclosure

cc:
The Honorable Krista Sanda
Commissioner of the Minnesota
Department of Public Service

Enclosure

Key MRS Program Milestones

Complete Environmental Assessment of Potential Sites	June 1993
Submit Siting Recommendation to Congress	June 1993
Congress Complete Review of Siting Decision	September 1993
Complete Design in Support of Safety Analysis Report	September 1994
Issue Environmental Impact Statement (EIS)	August 1995
Submit License Application	September 1995
Start Construction of MRS Facility	September 1996
First Production of Transport Casks	January 1997
Start Receipt of Spent Fuel at MRS	January 1998

Key Yucca Mountain Milestones

Start Exploratory Studies Facility (ESF) Collar/portal Construction	November 1993
Start ESF In-situ Test Phase	September 1995
Start Repository License Application Design	June 1996
Issue Repository EIS Notice of Intent	May 1997
Start EIS Preparation	February 1998
Site Recommendation to the President	April 2001
Submit License Application to NRC	October 2001
NRC Complete Licensing Reviews	October 2004
Start Repository Construction	December 2004
Start Accepting Spent Fuel at a Repository	January 2010

The Secretary of Energy
Washington, DC 20585

May 27, 1992

Mr. Allen J. Keesler, Jr.
Chairman, American Committee
on Radwaste Disposal
Florida Power Corporation
P.O. Box 14042
St. Petersburg, Florida 33733

Dear Mr. Keesler:

Thank you for your letter of April 13, 1992, on behalf of the American Committee on Radwaste Disposal (ACORD), urging the Department of Energy (DOE) to review its position on DOE obligation to begin receipt of spent nuclear fuel (SNF) on January 31, 1998.

The Nuclear Waste Policy Act (NWPA) states that Congressional policy is to provide for the disposal of SNF in the near term, rather than leaving that problem to future generations. Congress viewed the disposal of SNF as a national problem and charged the DOE with responsibility for developing and implementing a Federal nuclear waste management system.

I take that responsibility most seriously. The DOE schedule to develop a nuclear waste management system, which was established in my November 1989 "Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program," is to begin SNF acceptance from reactors in 1998 for storage in a Monitored Retrievable Storage (MRS) facility and to begin accepting spent fuel at a repository in 2010.

We have confidence that we will be able to meet our schedule despite the uncertainties inherent in a program of this magnitude. As you note in your letter, we have made significant progress over the last several months in the MRS program.

The efforts of the Nuclear Waste Negotiator have been rewarded by 20 requests for Phase I grants from jurisdictions interested in exploring the feasibility of hosting an MRS facility. Several of these applicants have strong prospects to enter into negotiated agreements. Based on this progress, the Negotiator expects that one or more MRS facility hosts can be identified by early next year. This would enable us to begin spent fuel receipt in 1998.

If, contrary to our current expectations, we are not able to begin spent fuel receipt at an MRS facility by January 31, 1998, the Department has determined that it is not legally obligated to accept SNF. We understand ACORD desire for certainty regarding the management of SNF, but nothing in the NWPA, or in the implementing contracts, requires DOE to take spent fuel if, despite our best efforts, we have no operating MRS facility in which to put it.

However, should it become clear to me that our currently-planned actions will not ensure that the Department can accept SNF by 1998, we will take whatever actions are necessary and in accordance with the law to meet our obligations under the Nuclear Waste Policy Act. Further, we would seek additional legislative authority if appropriate.

In summary, the DOE remains firmly committed to living up to our responsibilities under the NWPA, including our programmatic schedule goals. We are making good progress toward that end and welcome ACORD interest and support.

Sincerely,

James D. Watkins
Admiral, U.S. Navy (Retired)