



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

PDR

March 16, 1984

The Honorable Morris K. Udall, Chairman
Subcommittee on Energy and the Environment
Committee on Interior and Insular Affairs
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

Enclosed are our responses to the questions contained in your letter of November 29, 1983 concerning the orderly development of low-level radioactive waste disposal sites under interstate compacts.

Sincerely,

Nunzio J. Palladino
Nunzio J. Palladino

Enclosures:
As stated

cc: Rep. Manuel Lujan

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PDR COMMS NRCC
CORRESPONDENCE PDR

RESPONSES TO QUESTIONS
FROM THE
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
UNITED STATE HOUSE OF REPRESENTATIVES
CONCERNING
THE ORDERLY DEVELOPMENT OF LOW-LEVEL RADIOACTIVE WASTE
DISPOSAL SITES UNDER INTERSTATE COMPACTS

RESPONSES TO QUESTIONS FROM REP. UDALL

Question 1: Is 10 CFR 61 legally defensible in absence of a general environmental standard promulgated by the EPA? If EPA promulgates an environmental standard for low-level waste that is either less or more stringent than the NRC regulatory criteria, would the NRC criteria be threatened by challenges to its validity, as was the case with the NRC's uranium mill tailings regulatory criteria?

Answer.

Part 61 is legally defensible in the absence of a general EPA standard. Part 61 is self-contained in that it includes limits for radioactivity at the site boundary. Although there is discretionary authority under the Atomic Energy Act, there is no statutory obligation for EPA to promulgate a general standard covering materials regulated under Part 61. Therefore, the existence of any general standard set by EPA is not a legal prerequisite to the validity of Part 61. Since the NRC rule must implement the EPA standard, however, EPA's promulgation of standards in conflict with Part 61 would present a serious problem of interagency coordination and create public confusion. However, EPA's statements on this subject, discussed in more detail in the answer to Question 2, suggest that incompatibility between Part 61 and EPA's standard is unlikely.

Question 2:

Does NRC support promulgation by EPA of a low-level waste environmental standard? Please explain in detail, if an EPA standard is supported, what the NRC believes the applicability of the standard should be, what issues it should address, and how the standard would impact NRC's regulatory system.

Answer.

NRC does not support promulgation of a low-level waste environmental standard by EPA. Given the detailed requirements in 10 CFR Part 61 for the protection of public health and safety from the radiological risks associated with low-level waste disposal, we believe an EPA standard is unnecessary. In developing the Part 61 licensing requirements, NRC staff consulted extensively with EPA staff to insure that the exposures expected from meeting these requirements at low-level waste disposal facilities would be consistent with EPA's anticipated standards. In the attached February 1983 letter to the General Accounting Office on these standards, EPA itself acknowledged that our performance requirements for general public exposure were based on the "proper range of from 1 to 25 millirem per year" and that our requirements "should be compatible with an EPA standard in that range." EPA also said that "we would not expect our standards to adversely affect any initial site selections made on the basis of NRC regulations." In addition, a March 18, 1982 Agency Comment Letter to the Commission, also attached, on the proposed Part 61 regulation and draft environmental impact statement, EPA stated that "The 25 millirem per year is in the correct range of values if, as the NRC indicates, that range includes 1 to 25 millirems per year. We were assured by NRC analyses and their own statements in the DEIS that they should be able to establish a regulatory limit compatible with any future EPA standard established using ALARA principles."

If EPA standards will in fact be compatible with NRC regulations, we question the need for the standards. Their continuing development serves to keep alive the possibility that Part 61 will have to be revised to be compatible with EPA's standard. We doubt that this regulatory uncertainty can have anything but a negative effect on site selection, the development of interstate compacts, and the states' assumption of responsibilities for disposal under the Low-Level Radioactive Waste Policy Act of 1980. Attached for the record are additional comments made by the Commission in its prepared testimony and responses to questions from the Senate Committee on the Judiciary concerning the Rocky Mountain Waste Compact (S. 1991) submitted on January 12, 1984. In addition, we have included for the record the NRC staff response to the EPA dated January 14, 1984, concerning EPA's Advance Notice of Proposed Rulemaking on environmental standards for low-level waste disposal (48 FR 39563).

Furthermore, it may be prudent for Congress to re-evaluate the need and desirability of having EPA set standards applicable to NRC licensees for source, special nuclear and byproduct materials. Such a re-evaluation might eliminate future jurisdictional problems such as the potential problem in low-level waste management. In the past, the NRC staff has attempted to be responsive to the mandates set by Congress in both the mill tailings and the high-level waste areas, only to be frustrated by EPA's different priorities

for action and/or different philosophical approach to implementing these laws. Assigning standard-setting responsibility over licensed uses of source, special nuclear and byproduct materials appeared appropriate when President Nixon created the EPA under Executive Order Number 3 in 1970. At that time, the Atomic Energy Commission had the responsibility for both promoting and regulating nuclear energy. This is no longer the case. Today the NRC is responsible for regulating nuclear energy and the Department of Energy is responsible for research and development activities.

FEB 23 1983

Mr. J. Dexter Peach
Director
Resource, Community and Economic
Development Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

The Environmental Protection Agency (EPA) has reviewed the General Accounting Office (GAO) draft report, "Regional Low-level Radioactive Waste Disposal Sites--Progress Being Made But New Sites Will Not Be Ready By 1986" (GAO/RCED-83-48). Public Law 96-226 requires the Agency to review and prepare comments on the draft report so that GAO may consider EPA's view prior to publishing the final report.

We believe that the subject of availability of the necessary shallow land burial disposal capacity for the Nation's low-level radioactive waste is indeed appropriate for GAO review. The identification of potential alternatives also seems appropriate. Among the alternatives listed in the report was the use of temporary above ground storage. We believe that before this or any other alternative is endorsed that a more complete quantitative comparison of the health impacts of such an alternative would be prepared. This analysis should consider the increased risks due to normal conditions of storage and possible abnormal conditions such as deterioration of containers or fires.

This draft report references and quotes from the GAO report "Cleaning Up Nuclear Facilities--An Aggressive and Unified Federal Program is Needed" (EMD-82-40, May 23, 1982). At several points in the draft report (pages viii, 15, and 29), the findings of the earlier report are reiterated. This emphasizes the previous report's conclusion that EPA has given the development of radiation standards a low priority and that Congress might consider giving that responsibility to another agency or group if EPA's performance did not improve. We believe the facts support the opposite conclusion and that EPA is now placing emphasis on and has improved its performance greatly in developing radiation related standards and guidance that the Agency is mandated to develop.

For example, on January 5, 1983, 6 months after the GAO report was published, EPA issued a final standard for the disposal of mill tailings from inactive uranium mills. Further, on December 29, 1982, EPA proposed a standard for the disposal of high-level radioactive waste. The Agency also published an Advance Notice of Proposed Rulemaking dealing with radiofrequency radiation on December 23, 1982. If the perspective of the May 1982 report is to be quoted, we believe these recent accomplishments should also be noted.

Clearly, EPA has had to establish relative priorities for the various radiation standard activities that require action. We have attempted to schedule these projects so that they coincide with legislative mandates of Congress, as well as the needs of other agencies, States, and industries, and to make optimum use of our resources to ensure that standards are available when they are needed. We believe that our program on low-level radioactive waste has been managed consistent with these priorities while at the same time preserving the overall radiological quality of the environment.

The draft report also gives the impression (pages viii, ix, 29, and 41) that the current absence of EPA standards for low-level radioactive waste disposal may have an adverse effect on disposal site selection and discourage the participation of potential site developers. Although some may hold that view, EPA does not believe that this viewpoint is justified for the following reasons:

1. We pointed out in our comments on the Nuclear Regulatory Commission's (NRC's) proposed 10 CFR 61 regulations on shallow land burial of low-level radioactive waste that we believe their performance requirements for general public exposure are based on the proper range of from 1 to 25 millirem per year. NRC's detailed requirements should be compatible with an EPA standard in that range. EPA's standards for low-level radioactive waste disposal would be developed in a more rigorous way recognizing tradeoffs for environmental and economic costs and benefits and would cover additional exposure modes and methods of disposal. However, we would not expect our standards to adversely affect any initial site selections made on the basis of the NRC regulations.

2. EPA's views on site selection were expressed in a 1974 joint publication with U.S. Geological Survey (USGS) on siting criteria. These were recently reiterated at the NRC sponsored meetings on the subject. Therefore, the present published EPA information should be useful to the States and NRC, and also be adequate for site selection.

3. As the GAO draft report points out, the U.S. is over five years away from a final operating license for a new site. As indicated in the President's budget request for FY 1984 regulatory action for low-level waste should be completed by the time that States and disposal site operators need them for operation of the facilities.

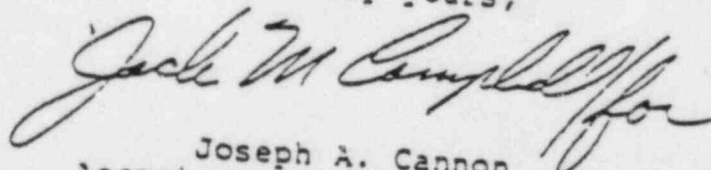
4. We should note that EPA has had an active low-level radioactive waste program for several years. The Agency's Office of Air, Noise and Radiation has been responsible for many of the studies and findings that have led the Nation to realize the need for improved disposal facilities. Our studies at two of the previously used sites, Maxey Flats, Kentucky, and West Valley, New York, were instrumental in pointing out the necessity of thorough efforts in site selection, and led us to work with USGS on site selection criteria. These joint efforts led to the previously mentioned joint publication which has served as a basis for such criteria, both nationally and internationally.

5. EPA believes that the several social, political, economic, and technical factors discussed are far more likely to cause delays in opening of new burial grounds than the availability of EPA environmental standards.

Based upon the above discussion the Agency recommends that appropriate changes be made in the GAO draft report. We have enclosed suggestions of specific changes which we believe will more accurately reflect EPA activities and the context in which they should be viewed.

We appreciate the opportunity to review this GAO draft report.

Sincerely yours,



Joseph A. Cannon
Associate Administrator for
Policy and Resource Management

Enclosure



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 18 1982

OFFICE OF
THE ADMINISTRATOR

Mr. Samuel Chilk
Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Chilk:

In accordance with Section 309 of the Clean Air Act, as amended, the U.S. Environmental Protection Agency (EPA) has reviewed the Nuclear Regulatory Commission's (NRC) proposed Licensing Requirements for Land Disposal of Radioactive Waste (46 FR 38081) and the accompanying Environmental Impact Statement (NUREG-0782).

EPA believes it is appropriate for NRC to use both performance objectives and prescriptive requirements in its proposed regulations. These proposed regulations and the supporting analyses are an important step in solving the nation's low-level radioactive waste (LLW) problems. The information presented by NRC will be of considerable assistance to EPA in its low-level radioactive waste standards program.

EPA is concerned that the handling of low-level waste licensing in Agreement States may become inconsistent; so EPA recommends that NRC help the Agreement States adopt consistent state regulations and procedures.

NRC solicited comments on possible duplicative requirements for effluent releases and broker activities under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). This "Superfund" law exempts from notification "any release of source, special nuclear, or byproduct material ... in compliance with a legally enforceable license, permit, regulation, or order issued pursuant to the Atomic Energy Act of 1954" (CERCLA Section 101(10)(K)). Radioactive releases from nuclear waste disposal facilities which are not in compliance with an NRC license, permit, regulation, or order fall within the reporting requirements of CERCLA. Furthermore, as part of the notification regulations under CERCLA, EPA is planning to develop a notification scheme for releases of radioactive materials not licensed under the Atomic Energy Act of 1954 or the Uranium Mill Tailings

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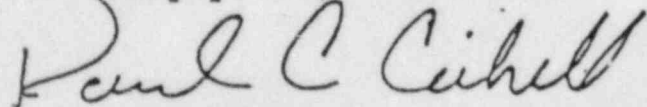
Radiation Control Act of 1978. EPA wishes to minimize duplicative reporting requirements for releases reported to other agencies. EPA intends to work with NRC to minimize duplicative reporting requirements to the extent possible.

EPA has regulatory responsibility for the disposal of hazardous wastes under the Resource Conservation and Recovery Act, as amended (RCRA). RCRA, Section 1004(27), specifically exempts "source, special nuclear, or byproduct material as defined in the Atomic Energy Act of 1954, as amended." Additionally, Section 1006(a) of RCRA states that "Nothing in this Act shall be construed to apply to ... any activity or substance which is subject to the ... Atomic Energy Act of 1954 (42 U.S.C. 2011 and following) except to the extent that such application (or regulation) is not inconsistent with the requirements of such Acts." RCRA does not address the issue of hazardous chemicals mixed with radioactive materials. We believe the most positive way for NRC and EPA to establish jurisdiction over these wastes is in a memorandum of understanding. Such a memorandum would enable both agencies to avoid excessive costs and duplicative licensing of wastes. Furthermore, close coordination of EPA's RCRA and NRC's nuclear waste requirements is necessary in areas such as manifest tracking systems, groundwater protection, technical requirements, and financial assurances, since some NRC licensed wastes may be disposed of in EPA permitted facilities. A memorandum of understanding could serve as a vehicle for accomplishing this.

Hazardous and toxic chemicals are frequently present in these nuclear wastes. EPA is particularly concerned that these hazardous and toxic non-radioactive chemicals and their health impact are not considered in this proposed rule and EIS. We consider the rule and EIS deficient in this regard. Accordingly, EPA has rated this draft EIS ER-2 (environmental reservations and additional information requested).

EPA has divided its enclosed comments into major and minor comments on both the proposed regulations (10 CFR 61) and the supporting draft Environmental Impact Statement (EIS). Should you have any questions on our comments, please call Dr. W. Alexander Williams (755-0790) of my staff.

Sincerely yours,



Paul C. Cahill

Director

Office of Federal Activities

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Detailed Comments
of the
U.S. Environmental Protection Agency (EPA)
on the
U.S. Nuclear Regulatory Commission's
proposed licensing
Requirements for Land Disposal
of
Radioactive Waste (10 CFR 61)
and draft
Environmental Impact Statement
(NUREG-0782)

1. The 500 millirem per year performance objective for an inadvertent intruder limit is not appropriate as a "regulatory limit." It is not a regulatory limit which will be monitored against for compliance. Nor is it a triggering level for an action such as an accident-related Protective Action Guide. The 500 millirem per year as applied in Part 61, is the design basis for the waste classification system. We believe that if "As Low As Reasonably Achievable" (ALARA) principles were applied, the exposure to the inadvertent intruder would be lower than 500 millirem per year. This is evident from NRC's own analyses in the regional case studies, which use realistic assumptions and the proposed prescriptive requirements.

2. Setting an individual exposure limit at the site boundary is appropriate. The 25 millirem per year is in the correct range of values if, as the NRC indicates, that range includes 1 to 25 millirem per year. We are assured by the NRC analyses and their own statements in the DEIS that they should be able to establish a regulatory limit compatible with any future EPA standard established using ALARA principles.

3. It is not appropriate to adopt the contaminant level of 4 millirem per year from the National Interim Primary Drinking Water Regulations as a performance objective for contamination of public drinking water supplies from LLW disposal. The National Interim Primary Drinking Water Regulations were established in the context of levels of contamination, which if exceeded, would require mitigating action by the water supply authority. It is also not appropriate to allow one group of radioactive materials users to contaminate a water supply to a limit which would preclude other releases from nuclear power plants, hospitals, and other users. It does not appear from the NRC analysis that the LLW disposal requirements are so sensitive to this limit that a lower value would be difficult to meet. It should also be noted that the 10 picocurie per liter value for uranium and thorium is not part of the National Interim Primary Drinking Water Regulations. EPA would not object to the use of the National Interim Primary Drinking Water Regulations for protection of groundwater. In forthcoming RCRA land disposal regulations we expect to use the drinking water regulations as one aspect of groundwater protection.

4. The NRC's intentions in applying 10 CFR 20 to the operational phase of LLW disposal is unclear. This arises out of the lack of specificity in Section 61.43 in view of the requirement of Section 61.41. This ambiguity is enhanced in the DEIS: see Vol. 1, Section 5.1.3 (page 35); Section 5.2 (bottom of page 38); Vol. 2, Section 6.3 and Section 6.4 (page 6-13); and Section 6.6 (page 6-18).

It is our understanding, after talking to NRC staff, that the offsite exposures during operation of the disposal site (approximately 20 years) should be held to the same limits as the long-term offsite exposures. To make this clear, it should be stated that Section 61.43 (use of 10 CFR 20 limits) applies to occupational exposures only. Section 61.41 should be broadened to include direct radiation exposure.

5. Section 61.59.b makes it clear that active institutional controls may not be relied on for more than 100 years following transfer of control of the disposal site to the owner. This is appropriate for risk assessment and as a basis for design criteria. However, the regulations should contain a positive requirement that active institutional controls should be established for this period, since this is the design basis of the facility. It is also clear from the DEIS (Vol. II, page 4-69) that institutional maintenance of records of the nature of the hazard is desirable over a longer period of time. This should also be made a positive requirement of the license transfer to the site owner, although it is realized that it cannot be depended upon.

6. Class A segregated wastes will be put in separate trenches from the stable Class B wastes and will have potentially permeable trench covers. The active maintenance of such trenches can be expected to be extensive for many years. NRC should indicate how they plan to develop long-term stability of the Class A trenches. Although Class A wastes may not present a serious radiological public health hazard, they may, in the eastern United States, under certain hydrogeological conditions, cause site instability problems, pose a "public nuisance", and, more important, the non-radioactive chemical portion of Class A wastes may cause significant ground and surface water pollution just as sanitary landfills may.

7. We urge the NRC to give a high priority to fulfilling its pledge to conduct performance, safety, and cost/benefit analyses for other readily available disposal methods such as hydrofracture, deep well injection and disposal in a mined cavity. These alternatives could show lower intruder impacts. Promulgation of 10 CFR 61 should not be delayed to permit consideration of these alternatives, however.

8. Because it is based solely on the intruder scenario, Table 1 presents some practical incongruities. For example, tritium and some of the short half-life isotopes would have heat rates that clearly would be impractical (i.e., self boiling of tritiated water and, decomposition of the solidifying medium). Also, it does not appear that some of these high specific activities exist in any actual waste stream.

9. Part 61 shows no consideration of hazards from other chemicals and toxic substances that may be associated with the waste. This is a particularly significant omission because some of these materials may have essentially infinite lives compared to many of the radioactive constituents. As a minimum, Part 61 regulations should indicate that these materials must be handled in a manner compatible with RCRA requirements.

10. The NRC proposes to develop a manifest tracking system which is "somewhat similar" to the EPA's hazardous waste manifest system. NRC and EPA should seriously consider coordination and possible integration of the two systems. At the least, the two systems should be compatible because of the possible future need to transfer wastes from NRC regulatory authority to EPA authority, or vice versa (i.e., slightly radioactive LLW whose primary hazard is from non-radioactive substances) and for future interaction between NRC and EPA on the ocean disposal of LLW.

Minor Comments on 10 CFR 61

1. (Sect. 61.52.a.6): It states that, "Waste must be placed and covered in a manner that limits the gamma radiation at the surface of the cover to levels that are a few percent above the background levels of the site." This would be difficult to enforce in its present form due to the ambiguity of "a few percent" and the variability of background levels.

2. (Sect. 61.55, Table 1): The table should have a title and appropriate labels for the columns.

3. Methane, carbon dioxide, and other waste decomposition gases generated within a shallow disposal trench can build up sufficient pressures to directly affect the stability of any engineered trench covers, particularly if the trench covers are impervious and not properly vented. Gases can also be generated from the decomposition of wastes in arid disposal sites, even in the absence of significant precipitation.

Gases from sanitary landfills have travelled underground for hundreds of feet. Gases from Class A trenches, therefore, have the possibility of affecting the stability of the Class B trenches if proper precautions are not taken. Gas generation is a long continuing process which commonly extends for 50 years or more, requiring active repair and maintenance work on the trenches. Part 61 does not indicate any consideration of this phenomena.

4. We recommend that the following additional or similar requirement be added to Subpart D, "a disposal medium with a permeability sufficiently low to cause the accumulation of water in the trench should not be used, especially for Class B wastes, unless compensating measures are taken to prevent or reduce the leaching of radioactive materials from the waste such as (1) installing an impermeable trench cover to keep water out of the trench or (2) preparing wastes in a low-leachable form."

5. Part 61 or its explanatory preamble should contain a clear statement that, "The intent of site selection is to insure that off-site migration or releases of radioactivity from waste disposed in a facility shall not exceed specified health and safety limits. Although it is reasonable to expect success of a properly sited facility in providing the necessary confinement, this cannot absolutely be guaranteed in advance of actual use."

Major Comments on DEIS for 10 CFR 61

1. The need for cooperation between EPA and NRC in the development of a final 10 CFR 61 is indicated by the intention of NRC to include "Specific concentration limits for the disposal of important naturally occurring and accelerator produced nuclides" in a planned regulatory guide on the classification of waste. (See page 42 of DEIS Vol. 1 and page 7-22 of Vol. 2). Natural radionuclides, particularly radium, are expected to be included in EPA regulations under the Resource Conservation and Recovery Act. Positive steps should be taken to ensure compatibility under these two jurisdictions.

2. In the preamble of the regulation (p. 38091, column 2) and in the DEIS, it is indicated that engineered barriers such as concrete covers are assumed to have an effective life of 500 years. Outside of comments received at public hearings, there is no indication of any basis for such an assumed lifetime. NRC should discuss data which confirm the lifetime of engineered barriers and criteria for approving barrier designs.

3. Monitoring at LLW disposal facilities will be an important activity and will require a regulatory guide from NRC. This should be added to NRC's commitment to prepare regulatory guides in the future. (Vol. 2, Section 2.2 p. 2-4). This guide should establish "action levels" for elevated levels of radioactive materials in the environment to indicate when increased monitoring and corrective actions should begin.

4. The NRC calls for Class B wastes to be stable for 150 years. We believe that criteria should be given that will reasonably assure a 150 year waste stability.

5. Actual experience at existing sites has shown that under certain hydrogeological conditions, such as outlined in Base Case 3, the direct overflow of contaminated water to land surface has been a very important, if not the dominant, pathway. The "direct to land surface overflow" pathway also has a very short travel path and does not give the benefits of delay for decay afforded by the longer travel paths and slower travel times of the ground-water pathway. The short- and long-term impacts of the "overflow to land surface" pathway should be evaluated and compared with the ground-water pathway for Base Case 3 and for all similar test cases.

6. (Vol. 4, Append. M, Sect. 3): The DEIS should make estimates of maximum individual and population health risks, projected over time, for each of the pathways evaluated. As a part of this evaluation, the integrated activity moving through each pathway and its resultant population dose should be presented.

7. (Vol. 2, Sect. 3.8, p. 3-48, and Append. G, p. G-98): The doses for transportation are based on a 1972 USAEC report on the transportation of LLW from nuclear power plants. We believe that the quantities of wastes and level of radioactivity in them are considerably higher in actual experience per shipment than was predicted in the 1972 estimates. Therefore, estimated dose levels should be adjusted accordingly. Also, Table 5.5 and the discussion on p. 5-15 should be adjusted accordingly.

8. The DEIS considers the time value of money in the estimation of the postoperational (closure and institutional control) costs but does not consider the time value for the design and operational costs. The operational costs which occur in the years 1 through 20 should also be discounted. Otherwise, combining the operational and postoperational costs to represent the total disposal costs for each alternative may result in an incorrect cost ranking of alternatives.

9. The cost estimates for institutional control need to be reexamined. After the several manipulations involving constant dollars, inflation and a nominal interest rate are made. It is unclear on what basis the final institutional control costs are stated.

10. The DEIS is deficient throughout in its failure to account for and assess the potential environmental impact and health risk from the non-radioactive chemical, hazardous, and toxic materials in the LLW. The contamination of ground and surface waters and risk to inadvertent intruders could be significant from non-radioactive materials.

Minor Comments on DEIS for 10 CFR 61

1. The short-term impacts of LLW disposal have been underestimated. In the Summary, in Chapters 3 and 4 of Volume 2, and in Appendices D and G, the radionuclides considered are only those with long half-lives

or those occurring in "significant" quantities in LLW. For short-term impacts, such as radiation doses delivered during the operational phase of a waste disposal facility (including occupational, population and accident doses), the source term should include the presence of shorter-lived, gamma-emitting radionuclides:

2. The ground-water pathway is not significant for many arid zone sites. In arid regions, attention should be given to the upward translocation of radionuclides by plants and animals and by the upward "wicking" effects of the strong evaporation potential on capillary water in the soil. Transport, and possibly erosion, by wind should also be considered.

3. The EIS does not give any specific distances for separating the Class A and Class B trenches. This distance could be significant in assuring overall site stability.

4. It is difficult to follow the projections of waste volumes as given in Tables D.25-D.26, which are based on Tables D.9 and D.11-14. For example D.9 gives untreated waste volumes by "region" while Tables D.25-26 list wastes by "spectrum".

5. Carbon-14 from Light Water Reactors (LWR) would more appropriately be scaled to Co-60. In the LWR, C-14 is produced both in the fuel and coolant. Except in cases of gross fuel failure, C-14 in the fuel stays there. Consequently, C-14 that ends up in LLW originates from activation in the reactor coolant. Therefore, it would seem more appropriate to scale C-14 to an activation product such as Co-60.

6. (Vol. 2, p. 6-7, last sentence); An explanation or reference should be given for the assumed release fraction 0.1 of the radioactivity within the waste packages involved in a fire.

7. (Vol. 2, Chap. 6, Sect. 6.2): Accident probability numbers would be helpful in placing the accidents and potential consequences in perspective. Data is available to at least make reasonable probability estimates.

9. (Append. E, Sect. 2.2): Consideration No. 1 should be expanded to include "and other discontinuities in the geologic media which increase the permeability significantly." For example, sand lenses or layers and desiccation cracks, as well as other unexpected features may be encountered, in addition to those listed.

9. (Append. E., Sect. 3.2.2): Texture and mineral composition are critical parameters for radionuclide retention by a geologic medium. It would be helpful to plot the composition of the Schwinn Formation on a United States Department of Agriculture (USDA) Textural Classification Chart in addition to the descriptive terminology of sandy loam and loamy sand. The advantage of using the USDA chart is

that it shows the percent clay, silt and sand fractions of the medium which are textural parameters correlative with permeability and the sorption potential of a disposal medium.

10. (Appendix J): Insufficient data are presented to make reasonable predictions about the sorption capabilities of the geologic media. For example, only the percentage of the silt-size fraction was given when the clay-size fraction of the medium is more important in assessing its capabilities to retain radionuclides. The Eh and pH are not presented either.

11. (Appendix J, Sect. 1.1.1): In the first sentence, change "underlain" to "overlain."

12. (Append. J, Sect. 1.1.3): The factors that contribute to increased permeability should be briefly described in this section. For example, in glacial tills, this includes sand lenses and desiccation cracks.

13. (Append. J., Sect. 1.1.9, 1.2.9 and 1.3.9): In a detailed site evaluation, the following additional information is needed: texture of the medium described in percentage of sand, silt, and clay-size fractions; mineral composition and organics described quantitatively for each size fraction and a weighted average for total sample; cation exchange capacity correlated to clay mineral and organics content; Eh and pH of medium; chemistry of the groundwater; and naturally occurring radionuclides in the medium.

14. Executive Order 12291 requires government agencies to use a 10 percent real discount rate in developing their regulatory impact analyses. The DEIS uses an "implied" real discount rate of approximately 1 percent in the cost analyses. We believe the use of 1 percent in the DEIS should be reconciled with the requirements of the executive order. In doing so, the DEIS should present a sensitivity analysis of alternative discount rates, possibly using 1, 5 and 10 percent.

15. (Appendix Q): The methodology for calculation of capital, operational, closure and institutional costs appears reasonable. What appears to be lacking is a consistent treatment of the date attached to each cost. For example, capital costs are presented in 1980 dollars, operational costs are provided as sums of money appropriate to the 20 year operating life of the site but no particular date is attached to this amount, and closure costs are presented as 1980 costs inflated to the end of site closure. In order to evaluate disposal costs appropriately, a consistent time treatment of money is needed.

16. The last term in the long equation for postoperational costs on p. Q-44 should be corrected.

17. In the discussion of financial arrangements, the license applicant is to prepare an estimate of the amount of money required for closure and long-term care. We urge the use of a very careful review process on these cost estimates because past experience has shown that the licensee, with one exception where the regulator took an active part, has traditionally underestimated closure and long-term costs.

18. (Appendix G, pp. G-12/13): The dilution factor Q was taken to be equal to its pumping rate in the intruder well pathway. This dilution factor should be taken as the total groundwater flow within the plume of contamination rather than the well pumping rate.

19. The methodology used to develop trench infiltration should be presented somewhere in the text or appendices. The reference cited in Appendix G on p. 68, paragraph 2, is insufficient. There is no indication that the "externally produced" value is ever allowed to vary within the analysis.

20. A clearer explanation of the basis for the indices used in calculating the interaction factors in Appendix G is needed.

21. (Append. G, p. G-68): The rate of infiltration was calculated by multiplying by the number of days for which the precipitation exceeds 0.01 in/day. This method is very simple but, in our opinion, does not meet the state of the art for estimating infiltration rates. Our technical staff is available to discuss other possible methods for calculating infiltration.

22. (Vol. 2, p. 5-22): The dose rates through the population well and surface water pathways for Case 1A (Table 5-6) is calculated to be approximately 10 times lower than for Case 1 (Table 5-3) simply due to replacing the backfill material on moderately permeable soil used in Case 1 with more permeable soil. This fact does not agree with current knowledge of the leaching process. This phenomena was explained by the waste-water contact time being longer in Case 1 than in Case 1A and a resultant higher rate of leaching. In reality, the pellicular water in the waste, which contains dissolved radionuclides, will be maintained in between the interstices of the waste all of the time. Therefore, any added percolation of gravity water will be mixed with the pellicular water during the course of percolation and will be independent of the true velocity of the water movement. Therefore, the rate of radionuclide release should change very little because of changes in the permeability of the backfill material.

23. (Vol. 1, p. 19, Table S.5): The values listed under Body & Bone need to be explained in a footnote as "the number of years at which this impact level exists."

24. At several points in the DEIS (e.g. Vol. 1, p. 23), the comment is made that "the potential hazard quickly drops to about 1000 millirem per year to bone at about 500 years following facility closure." The term "quickly" does not seem compatible with a 500 year time period.

25. (Vol. 1, p. 20): The statement, "Maximum annual thyroid doses are in the range of 850 mrem at the intruder and population wells, 270 mrem at the population well, and 12 mrem at the surface water body" is ambiguous. This leaves in doubt what the dose is at the population well.

26. (Vol. 1, p. 26, Table S.7 & Vol. 2, p. 4-41, Table 4.19): Several of these costs (those with double asterisk) are not comparable with the others because they are based only on the 10% volume of waste employing that technique. To make the costs comparable, costs for the other 90% of the wastes should be figured and a weighted average presented.

27. (Appendix N): EPA's authority under the Marine Protection, Research, and Sanctuaries Act of 1972 for ocean disposal of radioactive waste should be listed.

28. (Appendix N): EPA's proposed guidance for Occupational Exposures should be discussed. (Federal Register, Vol. 46, No. 15, Friday, January 23, 1981, page 7836).

29. (Appendix N, p. N-5): EPA's schedule for its Low-Level Waste Standard is currently under review and may be revised. We will notify NRC of any such revision.

30. (Appendix N, p. N-19): National Primary Drinking Water Regulations is incorrect, it should be Interim National Primary Drinking Water Regulations.

31. (Appendix G): Tables G-3 through G-10 are poorly titled and measurement units are not well identified.

Question 3: A number of states are investigating use of storage facilities for low-level waste. What is the Commission's policy regarding the advisability and safety of low-level waste storage? What is the optimum quantity and duration of low-level waste in storage? When will licensing and regulatory guidance be in place for low-level waste storage?

Answer.

The technology for construction of facilities for interim storage of low-level radioactive waste is well established, and the general engineering and safety principles involved are well known. However, the duration of storage and the quantities, radioactive half-lives and other characteristics of the waste to be stored are important considerations in facility design and siting and in establishment of necessary institutional controls, and including financial arrangements for eventual disposal of the waste. While there does not appear to be any optimum quantity of low-level waste for storage, actual quantity in storage will depend upon some of the above-mentioned factors and the availability of disposal capacity. For users of short-lived radioisotopes, such as in medical applications, storage of waste for a few months has been employed to permit decay to innocuous levels. For nuclear power reactors, the NRC staff has taken the position that the duration of interim storage of low-level waste normally should be limited to five years. For other applications, longer durations might be appropriate and yet compatible with orderly development of disposal capacity. The licensing position and guidance (including duration) for storage of low-level radioactive waste at nuclear power reactors was put into place in 1981. This, along with the general licensing requirements of 10 CFR Parts 30, 40 and 70, and the radiation protection standards of Part 20, provide an adequate basis for licensing storage of certain low-level radioactive waste. The Commission has not planned nor budgeted activity to further develop special regulations and guidance tailored to low-level waste storage as we interpret the question, that is, as an alternative to disposal, or as a new step in the total disposal system. Additionally, the Commission does not endorse the use of engineered above ground storage to below grade disposal. We have recently responded to requests for information from two States. Copies of their letters and our responses are attached.

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

November 7, 1983

OFFICE OF THE
CHAIRMAN

The Honorable Anthony S. Earl
Governor of Wisconsin
Madison, Wisconsin 53707

Dear Governor Earl:

Thank you for your letter of September 7, 1983 regarding alternative strategies for managing low-level radioactive waste. The alternative you described would involve storage of the waste in above-ground facilities until the radioactive materials decay to innocuous levels. The residual material would then be removed and treated or disposed by methods determined by its chemical characteristics.

We have provided information on licensing considerations and the answers to your specific questions in the enclosure to this letter. While the questions and answers are relatively straightforward, we wish to emphasize some aspects of the concept of above-ground storage for decay. The practice of storing radioactive materials for decay before disposal is a method of waste management that has worked well for certain types of waste generators. It is a practice used principally by medical and academic institutions where the radioactive materials used have relatively short half-lives measured in days rather than years. The studies and analyses upon which our present regulations are based did not contemplate above-ground waste management facilities which would last for centuries. While the Commission would consider specific proposals for long-term waste management facilities, the necessary environmental impact assessments would have to be made, and the feasibility of constructing these facilities would have to be investigated prior to rulemaking.

Adopting an alternative to shallow-land disposal such as you describe of storing for decay all low-level wastes, including decommissioning waste from nuclear power plants, would involve a number of practical problems which need to be carefully considered. Some of the waste generated in your state would contain radioactive materials with very long half-lives and would not decay to innocuous levels for hundreds or even thousands of years. In addition to engineering design criteria for such a facility, some of the difficulties posed by very long-term or permanent above-ground waste management facilities include the long-term surveillance and maintenance required, establishment of methods and responsibilities for ensuring payment of final costs for retrieval and

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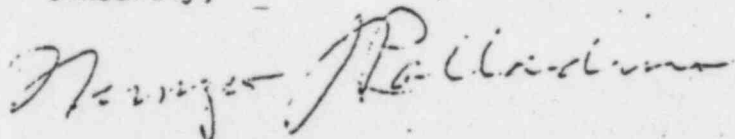
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disposal of residual waste materials, and establishment of criteria for future control or release of the facility, site, and environs for future use. However, while these important and complex issues are involved, we believe the use of above-ground facilities for storage of certain low-level waste is feasible. With appropriate controls and segregation, some radioactive material may be held for decay that may occur over a few decades.

The technology for construction of facilities lasting for decades is well established, and the general engineering and safety principles involved are well known. However, the duration of intended storage, and the quantities, radioactive half-lives and other characteristics of the waste to be stored are extremely important considerations in facility design and facility siting, and in establishment of institutional controls and regulatory criteria.

If we may be of further assistance in your efforts, please do not hesitate to contact us.

Sincerely,



Nunzio J. Palladino
Chairman

Enclosure: Licensing Waste
Storage and Disposal
Facilities

Licensing Low-Level Waste Storage and Disposal Facilities

NRC would handle an application for a facility that retained waste for a period of time (decades) followed by retrieval and shipment for final disposal as an application for waste storage. An application for a facility that would permanently isolate the radioactive wastes from man and his accessible environment, with no expectation of retrieval, would be handled as an application for disposal.

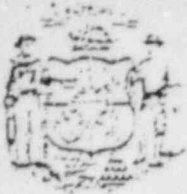
Current requirements for licensing a disposal facility for low-level wastes are set out in 10 CFR Part 61. Part 61 contains licensing procedures and performance objectives for near-surface land disposal methods, and technical requirements for near-surface shallow land burial disposal facilities. In addition to shallow land burial, alternative methods are being considered. NRC has not analyzed nor prepared the technical requirements for licensing such alternative facilities in detail, however, we believe the procedural, institutional, technical, and performance objectives of Part 61 apply to these disposal concepts, and we would apply these provisions in evaluating specific proposals. We are currently developing more precise guidance for other specific near-surface disposal methods. We do not currently have specific regulations under development which cover long-term surface storage to decay for low-level waste.

Answers to specific questions on waste storage

- Q. Will the NRC allow such facilities to be constructed and operated?
- A. Since storage is an interim measure preceding ultimate disposal, NRC would require that any storage application include a plan for final disposal of the waste to be held in storage. Such a plan would need to address not only final disposal activities but also institutional and financial issues, such as: Who will be responsible for disposal? What arrangements will be made to ensure funds will be available to cover disposal costs?
- Q. If allowed to be constructed and operated, what NRC regulations will apply to the facilities in addition to 10 CFR Part 20?
- A. Licensing would be carried out under 10 CFR Parts 30, 40, and 70.

The radiation protection standards in 10 CFR Part 20 would also be applicable. The waste transfer and manifest requirements in §20.311 would apply when stored wastes are transferred for eventual disposal.

- Q. Will the facilities have to be located on land owned by the Federal or State government?
- A. Current regulations do not require State or Federal ownership of the land used for storage of waste as long as the wastes are eventually shipped elsewhere for disposal. However, land used as a disposal site for low-level waste must be owned by the State or Federal government.



State of Wisconsin
Office of the Governor

Anthony S. Earl

September 7, 1983

Mr. Nunzio J. Palladino, Chair
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Palladino:

Several Wisconsin legislators and I are currently evaluating alternative strategies for managing low-level radioactive wastes generated in Wisconsin. This includes decommissioning wastes from nuclear power plants in our state. One of the alternatives we are studying is storage in above-ground facilities in Wisconsin. Once the wastes have decayed to innocuous levels of radioactivity, the residuals would be removed and treated or disposed by methods determined by their chemical characteristics. The above-ground facilities would be in addition to any storage facilities presently operated by generators of low-level radioactive wastes.

Based upon an initial review of Nuclear Regulatory Commission (NRC) regulations, there appear to be no NRC regulations explicitly applicable to the type of facility described above, other than the general radiation protection standards set forth in 10 CFR Part 20. Therefore, to assist in our review, we would appreciate your response to the following questions: (1) Will the NRC allow such facilities to be constructed and operated; (2) If allowed to be constructed and operated, what NRC regulations will apply to the facilities in addition to 10 CFR Part 20; and (3) Will these facilities have to be located on land owned by the federal or a state government?

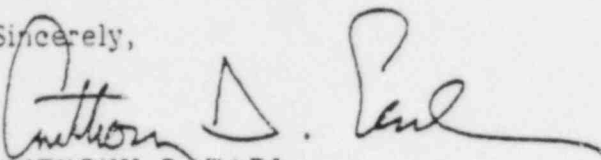
If you anticipate promulgation of new NRC regulations which will apply to these facilities, I urge you to quickly initiate an expedited rule-making

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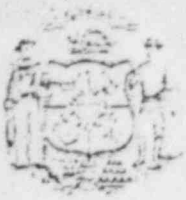
procedure to develop these regulations, as other states in addition to Wisconsin are interested in this management alternative. Please apprise me of the expected timetable for the development of the necessary regulations.

Sincerely,


ANTHONY S. EARL
Governor

/dsl

cc: Senator Joseph Strohl
Rep. Patricia Goodrich
Rep. Jeff Neubauer
James G. Kepler
William Menczer
John G. Davis



State of Wisconsin
Office of the Governor

Anthony S. Earl

September 7, 1983

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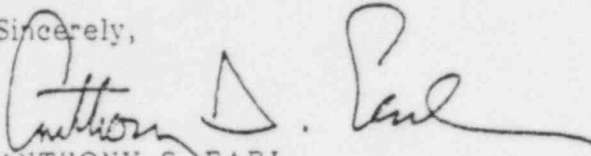
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Sincerely,



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