

C.F.



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

November 27, 1990

Mr. Don J. Womeldorf, Chief
Low-Level Radioactive Waste
State of California
Department of Health Services
714/744 P Street
Sacramento, CA 94234-7320

Dear Mr. Womeldorf:

This is in response to your letter to me, dated November 8, 1990, about comments from the Environmental Protection Agency (EPA) and the need for liners at a low-level radioactive waste disposal facility (LLWDF). Your interpretation of the Nuclear Regulatory Commission (NRC) regulatory requirements in 10 CFR Part 61 is correct regarding the use of liners at a disposal site for LLW. Liners are not required by Part 61 either for mitigation of radionuclide migration or for environmental monitoring, nor are liners considered necessary to meet the performance objectives of Part 61. In fact, in the specific instance of the proposed California LLWDF, a liner may be counterproductive in that it would introduce the potential for accumulation of water within the disposal unit, which would otherwise not likely occur at an arid site and could increase long-term risk to human health and the environment. The basis for our position is described in the enclosure.

In this context it is important to consider several key principles upon which Part 61 is based. The first is to ensure long-term stability of the disposal facility through an appropriate combination of facility design, site characteristics, and waste form. This stability provides for long-term isolation of the LLW in a manner that minimizes contact of emplaced wastes with water. Further, Part 61 is based on minimizing the presence of liquids in waste, the contact of water with waste during receipt and emplacement, and the contact of water with waste after the site is closed. Finally, the Part 61 requirements are directed at selection of a site with suitable and predictable characteristics that promote stability and containment of the waste. Thus, the basic principles embodied in Part 61 are directed at achievement of a stable, passive disposal system that avoids the need for active care and maintenance after site closure. For any given site, the combination of natural site features coupled with disposal facility design, operations, waste classification and waste form requirements will collectively provide for compliance with the performance objectives in

9101220334 901127
PDR WASTE PDR
WM-3

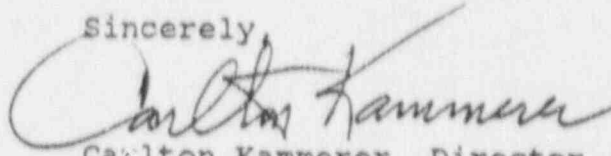
AD9.5
WM-3
NL14

Part 61. Following closure, only passive surveillance and confirmatory monitoring should be necessary to continue to confirm site performance. NRC has confidence that the California low-level waste regulatory program will ensure that the California LLWDF will provide for the passive stability and performance envisioned in Part 61.

In addition, in your October 25, 1990 letter to Jacqueline Wyland at EPA Region IX, we understand you provided EPA with pertinent information that they may not have had when developing their comments dealing with protection of groundwater and surface water resources. Also, it is our understanding we have requested additional information on environmental impacts from US Ecology, the license applicant for the California LLWDF. This additional information could help to mitigate EPA's concerns and will support preparation of the final environmental impact statement.

I trust that this reply responds to your request.

Sincerely,



Carlton Kammerer, Director
State Programs
Office of Governmental and
Public Affairs

Enclosure:

NRC Response to Liner Issue

cc: Daniel McGovern
Regional Administrator, Region IX
U.S. Environmental Protection Agency

Sylvia K. Lowrance, Director
Office of Solid Waste
U.S. Environmental Protection Agency

Richard J. Guimond, Director
Office of Radiation Programs
U.S. Environmental Protection Agency

Stuart Gummer, Chairman
Colorado River Basin Regional Water
Quality Control Board

Douglas Romoli, Project Manager
California Desert District
Bureau of Land Management

Finally, in your October 25, 1990, letter to Jacqueline Wyland at Region IX, U.S. Environmental Protection Agency, you provided copies of pertinent portions of US Ecology's application dealing with protection of groundwater and surface water resources. We, also, understand you have requested additional information from US Ecology on their environmental monitoring program which resulted from your review of their application. This information should, also, assist in helping resolve this issue in responding to comments and in preparation of the final environmental impact statement.

I trust that this reply responds to your request.

Sincerely,

Carlton C. Kammerer, Director
State Programs
Office of Governmental and Public Affairs

cc: Daniel McGovern
Regional Administrator, Region IX
U.S. Environmental Protection Agency

Sylvia K. Lowrance, Director
Office of Solid Waste
U.S. Environmental Protection Agency

Richard J. Guimond, Director
Office of Radiation Programs
U.S. Environmental Protection Agency

Douglas Romoli, Project Manager
California Desert District
Bureau of Land Management

DISTRIBUTION: EDO 005987 C. File NMSS r/f HThompson RBangart JGreeves DMorris
Dir. r/f JAustin JSurmeier PLohaus JKennedy JShaffner RFonner SF r/f
SECY EDO r/f CJenkins LLWM t/f JSniezek HDenton JBlaha JTaylor
PDR YES X PDR NO Category: Proprietary or CF Only
ACNW YES X NO

SUBJECT ABSTRACT: CALIFORNIA ON TECHNICAL ASSISTANCE
*SEE PREVIOUS CONCURRENCE

DFC :LLOB* :LLOB* :LLOB* :OCC* :TEDITOR* :LLWM :LLWM*

NAME: JShaffner/jj : Jim Kennedy : PLohaus : RFonner : EKraus : JGreeves : RBangart

DATE: 11/14/90 : 11/14/90 : 11/19/90 : 11/20/90 : 11/15/90 : / /90 : 11/19/90

DFC :NMSS* :NMSS *JS* :DEDO :EDO :GPA

NAME: GARlotto : RBernero : HThompson : JTaylor : CKammerer

DATE: 11/20/90 : 11/26/90 : 11/20/90 : / /90 : / /90

JS/D.WOMELDORF/11/13

OFFICIAL RECORD COPY

*HT
for taken
w CK
11/21/90
(20)*

*Concurred in 11/27 verbal
HT for JT
11/27/90*

NRC Response to California Department of Health Services
Request for Technical and Regulatory Assistance
on the Liner Issue

1. NRC Response

The NRC concurs with the California Department of Health Services' (DHS's) position that flexible membrane liners are not required to comply with NRC's requirements for low-level radioactive waste (LLW) disposal in 10 CFR Part 61. In addition, NRC concurs that liners are not necessary to monitor radionuclide releases or contain the waste for a properly designed disposal facility located in an arid environment as proposed by California. Further, NRC stresses that liners may not even be desirable for California's proposed LLW disposal facility because they could unnecessarily result in violations of NRC's requirements or increase the long-term risk to human health and the environment from the disposal facility. A decision to include liners in the design would significantly increase the engineering effort required to demonstrate that the design, operation, and closure of the facility complies with the performance objectives and technical requirements of 10 CFR Part 61.

2. Discussion

As described in Don J. Womeldorf's November 8, 1990 letter to the NRC, the Environmental Protection Agency (EPA) Region IX has recommended consideration and analysis of a liner and leachate collection system as part of the Southwestern Compact's proposed LLW disposal facility. EPA's rationale for recommending the liner and leachate collection system is that such a system would provide for rapid detection of any radionuclide releases to the vadose zone beneath the facility. Based on an analysis of the EPA recommendation, DHS concluded that liner and leachate collection systems are neither prescriptively required by NRC requirements in 10 CFR Part 61 nor necessary to comply with the performance objectives and technical requirements of Part 61.

NRC's requirements in Part 61 emphasize a systems approach to LLW disposal, including consideration of site characteristics, facility design and operation, waste form and classification, and facility closure. These requirements were developed in the early 1980's based on the lessons learned at the first generation of LLW disposal facilities in this country and on the new technologies emerging for the disposal of hazardous chemical and other wastes. The Commission selected the requirements after extensive analysis of alternative site, design, and waste characteristics.

At the time the Commission promulgated the requirements, the NRC was well aware of the potential adverse consequences of accumulation of water within disposal units as a result of low-permeability foundation materials or other barriers to flow such as flexible membrane liners. This accumulation of water led to releases of radionuclides from disposal units at the commercial LLW disposal facilities at West Valley, New York, and Maxey Flats, Kentucky. Similar

problems had also occurred at the LLW disposal facility operated by the Department of Energy at Oak Ridge, Tennessee. Extensive corrective actions, including pumping and treatment of leachate from the disposal units, continue to be necessary at these sites to prevent unacceptable discharge of contaminated water to the land surface.

Although these problems were caused in part by the low permeability of the natural foundation materials beneath the disposal units and high infiltration rates through unit covers, installation of flexible membrane liners or other engineered barriers to flow could have the same practical effect on accumulation of water within the disposal units. In the supplementary information that accompanied the Part 61 requirements, the Commission stated that:

"... reliance should be placed on siting requirements which will keep water away from wastes, result in low volumes of contaminated water being released, and provide a long travel time for decay. The Commission takes exception to any design which relies on a leachate collection and treatment system to reduce migration. Such a design is expected to result in a requirement for continued active site maintenance, therefore violating the performance objective in 61.44." [47 FR 57446; December 27, 1982]

Based on NRC's continuing oversight of California's LLW regulatory program, it appears that California DHS has adopted an approach that is consistent with the Commission's position and the requirements in Part 61.

The regulatory approach adopted by the Commission in Part 61 allows a license applicant and disposal site operator optimal flexibility in selecting technologies and procedures to ensure protection of the public health and safety and the environment. This approach is reflected in the structure of the requirements, which consist of overarching performance objectives in Subpart C and specific technical requirements on site suitability, design, operations, closure, waste characteristics, environmental monitoring, and other aspects in Subpart D of Part 61.

NRC believes that the regulatory framework embodied in Part 61 provides a more effective approach to minimizing the formation and migration of leachate from LLW disposal facilities than a policy that relies heavily on the use of liners and leachate collection systems. For LLW disposal, NRC does not believe that liners and leachate collection systems will totally eliminate the potential for groundwater contamination. If an applicant proposed a liner and leachate collection system as part of a disposal facility for LLW, the NRC would be concerned that the system could contribute to the accumulation of leachate within the disposal unit, which would require active long term maintenance to remove and treat and, if not removed, could result in unacceptable releases of contaminants to the environment.

Whether for the purpose of monitoring or containing potential radionuclide releases from the disposal facility, liners and leachate collection systems can only be used for LLW disposal facilities if they will not result in

accumulation of water within the disposal unit that would violate the performance objectives and the technical requirements in Part 61. For example, incorporating a liner and leachate collection system in the design for the Southwestern Compact's proposed disposal facility would require the applicant to demonstrate that the performance objectives would not be violated over the long term (e.g., 500 years or more depending on waste characteristics) as a result of water accumulation within the disposal trenches. Such a demonstration would be difficult since water accumulation could theoretically result in a continuing need to pump and treat the leachate, in direct discharge of contaminated leachate to the land surface, or in a concentrated discharge of contaminated leachate to the vadose zone when the liner failed.

Further, an applicant would have to demonstrate that use of a liner and leachate collection system would not violate the specific technical requirements of Subpart D of Part 61. Specifically, the applicant would have to describe how the proposed disposal system complies with the following technical requirements, among others, despite the potential for water accumulation within the disposal unit as a result of the liner:

61.51(a)(1) - "Site design features must be directed toward long-term isolation and avoidance of the need for continuing active maintenance after site closure."

61.51(a)(2) - "The disposal site design and operation must be compatible with the disposal site closure and stabilization plan and lead to disposal site closure that provides reasonable assurance that the performance objectives of Subpart C of this part will be met."

61.51(a)(3) - "The disposal site must be designed to complement and improve, where appropriate, the ability of the disposal site's natural characteristics to assure that the performance objectives of Subpart C of this part will be met."

61.51(a)(4) - "Covers must be designed to minimize to the extent practicable water infiltration, to direct percolating or surface water away from the disposed waste, and to resist degradation by surface geologic processes and biotic activity."

61.51(a)(6) - "The disposal site must be designed to minimize to the extent practicable the contact of water with the waste during storage, the contact of standing water with waste during disposal, and the contact of percolating or standing water with wastes after disposal."

The applicant would need to demonstrate that the facility has been designed, constructed, operated, and closed in a manner that ensures infiltration through the unit cover will be less than the flux rate through the liner over the lifetime of the unit. Such a demonstration would be difficult given the limited operational experience with the long-term performance of flexible membrane liners. The demonstration would also have to include, among other things, a description of how the liner complements and improves the ability of the site's natural characteristics to assure compliance with the performance

objectives and how the design minimizes to the extent practicable contact of percolating or standing water with wastes after disposal despite the potential for accumulation of water within the unit. This could be especially difficult for a disposal facility located in an arid environment, such as proposed by California, where the performance of the disposal system without a liner and leachate collection system may already comply with Part 61 and the inclusion of the liner only increases the potential for accumulation of water within the disposal unit.

The potentially adverse impacts of the liner on performance of the disposal facility and its compliance with Part 61 exist regardless of whether its intended purpose is to contain the waste or facilitate monitoring of radionuclide releases. Alternative monitoring technologies that provide for timely detection of contaminant releases are readily available and yet would not appear to solve the problems caused by liners and leachate collection systems. For example, the NRC is aware of monitoring systems proposed by the Department of Energy for the LLW disposal facility at the Nevada Test Site. DOE's proposed system provides for neutron moisture content logging, gamma spectroscopy, and soil gas sampling within and beneath the disposal unit. For a commercial LLW disposal facility, such monitoring systems could be used to provide "...early warning of releases of radionuclides from the disposal site before they leave the site boundary," in accordance with NRC requirements in 10 CFR 61.53(c), without unnecessarily promoting accumulation of water within the disposal unit. NRC has provided regulatory guidance on acceptable environmental monitoring programs in the Staff Technical Position on Environmental Monitoring.

One final comment is appropriate with respect to the "Joint NRC-EPA Guidance on a Conceptual Design Approach for Commercial Mixed Low-Level Radioactive and Hazardous Waste Disposal Facilities" and its relation to the proposed California LLW disposal facility. The NRC and EPA developed this joint guidance to provide one acceptable conceptual design for disposal of mixed waste in accordance with the requirements of NRC in 10 CFR Part 61 and of EPA in 40 CFR Part 264. It is important to emphasize that the guidance presents a "conceptual" design only; any application adopting this design approach would have to demonstrate compliance with both agencies' requirements. With respect to NRC's requirements in Part 61, an applicant would have to demonstrate that the disposal system does not suffer from the same limitations and potential problems described above for disposal units that include liners and leachate collection systems. In addition, the joint guidance should not be construed as a generic endorsement by NRC or EPA for this type of disposal facility design for LLW other than mixed waste. For the reasons cited above, it is desirable to avoid the potential complications associated with liners and leachate collection systems by avoiding their use altogether, except as required by EPA for hazardous waste disposal in accordance with the Resource Conservation and Recovery Act.