PERKINS COIE

A LAW PARTNERSHIP INCLUDING PROFESSIONAL CORPORATIONS
607 FOURTEENTH STREET, N.W. • WASHINGTON, D.C. 20005-2011 • (202) 628-6600

July 15, 1991

Ms. Sandra L. Wastler
Office of Nuclear Safety and
Safeguards
U.S. Nuclear Regulatory Commission
2120 L Street, N.W.
Washington, D.C. 20535

Dear Ms. Wastler:

Pursuant to NRC's Federal Register Notice dated June 3, 1991 (56 Fed. Reg. 25142), please find enclosed the comments of U.S. Ecology, Inc. regarding NRC's proposed draft Environmental Impact Statement for the Envirocare of Utah, Inc. radioactive waste disposal facility located at Clive, Utah.

U.S. Ecology is a California corporation, headquartered in Louisville, Kentucky and engaged in the disposal of radioactive waste at both its Richland, Washington facility and its Beatty, Nevada facility. U.S. Ecology is vitally concerned that the licensing of the Envirocare of Utah site be conducted in accordance with all applicable and relevant environmental standards. U.S. Ecology also believes that the EIS for the Envirocare facility raises important policy issues of wide-ranging significance for the entire radioactive waste disposal industry which NRC should carefully consider before proceeding with its final EIS scoping process. Accordingly, we are hereby submitting the following comments.

Please call me at (202) 434-1618 if you should have any questions or comments regarding this submission.

Sincerely,

Anthony J. Thompson
Counsel for U.S. Ecology, Inc.

Enclosure

TELEX 44-0277 PCSO UI • FACSIMILE (202) 434-1690
ANCHORAGE • BELLEVUE • LOS ANGELES • PORTLAND • SEATTLE • SPOKANE

PERKINS COIE

July 15, 1991

COMMENTS OF U.S. ECOLOGY RE: DOCKET NO. 04008989 -- ENVIROCARE OF UTAH, INC.; INTENT TO PREPARE A DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) -- SCOPING PROCESS

I. INTRODUCTION

1. The Nuclear Regulatory Commission (NRC) reported in the Federal Register that Envirocare of Utah, Inc., has filed a revised license application, environmental report and safety analysis report for authorization to receive, store, and dispose of uranium and thorium byproduct material (as defined in section 11e.(2) of the Atomic Energy Act (AEA), as amended) at its site near Clive, Utah. The applicant proposes to dispose of "high-volume, low-activity section 11e.(2) byproduct material" on a site where the applicant currently disposes of naturally occurring radioactive material (NORM) and which has also recently been licensed to dispose of low-level radioactive waste (LLRW) by the Utah Bureau of Radiation Control (UBRC).

2. The UBRC, exercising Utah's Agreement State authority pursuant to section 274(b) of the AEA, 42 U.S.C. § 2021(b), does not possess the regulatory authority to grant

a license for disposal of 11e.(2) byproduct material. The authority to license the disposal of such material at sites in Utah remains with NRC.

3. In its Federal Register notice (56 Fed. Reg. 25,142 (June 3, 1991)), NRC announced a "scoping process" to solicit comments by any interested parties on the scope of the proposed environmental impact statement (EIS) associated with Envirocare's application.

4. U.S. Ecology, Inc., a California corporation headquartered in Louisville, Kentucky, is in the business of managing and disposing of LLRW at two sites in the United States -- the Beatty, Nevada site and the Richland, Washington site. U.S. Ecology believes that the Envirocare application raises numerous important issues as a result of the differences between existing regulatory requirements for disposal of section 11e.(2) byproduct material contained in 40 C.F.R. Part 192 and 10 C.F.R. Part 40, Appendix A and those for disposal of LLRW contained in 10 C.F.R. Part 61 and Utah's conforming regulations. Because both types of wastes are to be disposed of at the same site, these issues must be resolved.

Issues of even broader dimension also are raised. These issues arise in connection with other potentially conflicting

regulatory requirements -- i.e., those applicable to the disposal of "mixed" hazardous and radioactive wastes.

All of these issues must be considered in the context of the scope of Utah's Agreement State status. In particular, Utah licensing decisions that may not square with NRC requirements must be considered. Similarly, these issues and related economic concerns should be addressed as they pertain to LLRW disposal within the Northwest Compact.

This EIS and the scoping process associated therewith provides NRC with an excellent opportunity to address some of these significant issues. Resolution of these issues is important both to Envirocare, as it seeks to expand its disposal capability, and to others involved in the radioactive waste disposal business. Through the EIS, NRC will be able to speak out on the public record to sister agencies (EPA and DOE), Congress, and current and potential licensees about a number of important radioactive waste disposal issues.

U.S. Ecology's comments on the scope of the proposed environmental impact statement associated with Envirocare of Utah's application for a license to dispose of 11e.(2) byproduct material are set forth below.

II. SPECIFIC ISSUES

1. Conflict Among Regulatory Programs. One issue raised by the Envirocare application is the basic incompatibility of NRC's AEA/radioactive waste disposal methodology and philosophy with that used for the disposal of hazardous waste under the Resource Recovery and Conservation Act, 42 U.S.C. § 6901 et seq. (RCRA). The problems that result from this incompatibility are well illustrated at the Envirocare site where there will be LLRW, NORM waste, 11e.(2) byproduct material, and "mixed" hazardous and low-level radioactive waste all in extremely close proximity. These important questions must be addressed with care and thoroughness in the EIS for the site.

NRC's letter (with attachment) to Don J. Wolmendorf, Chief - Low-Level Radioactive Waste, State of California Department of Health Services, from Carlton Kammerer, Director, State Programs, dated November 27, 1990 clearly demonstrates this basic incompatibility, notwithstanding the obligatory textual reference to the NRC/EPA joint regulatory guidance for disposal of "mixed" waste. NRC's concluding sentence in the package to Mr. Wolmendorf is a prime example of the problems with the so-called joint guidance:

> For 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.

Id. (emphasis added) (see Attachment 1).

2. Government Ownership. Another issue arises in association with the management philosophy of private versus government ownership of the waste disposal facilities at the Envirocare site. Utah has waived its government ownership requirement (R447-15-302) for Envirocare's NORM/LLRW disposal cell. It has done so on the basis that Utah law requires private ownership of hazardous waste disposal units and makes no provision for State ownership of radioactive waste disposal units. This issue becomes vastly more complicated where there are a variety of different types of waste disposal cells in close proximity to each other.

NRC's LLRW regulations require that an applicant submit evidence that arrangements have been made for assumption of ownership in fee by the Federal or a State government before a license can be issued. 10 C.F.R. Part 61.14(a) & (b). See also, NUREG 1199 at 1-4. The Nuclear Waste Policy Act provides the Secretary of Energy with "authority to assume title and custody of low-level radioactive waste and the land on which such waste is disposed of" (42 U.S.C. § 10171(b)(1)) but does not require the Secretary to accept such title and custody. The Uranium Mill Tailings Radiation Control Act (UMTRCA) requires state or federal ownership of 11e.(2)

byproduct material disposal sites. (42 U.S.C. § 2014). Thus, it appears that Utah's decision not to require state or federal ownership for Envirocare's NORM/LLRW disposal cell (a determination that is also presumably applicable to its "mixed waste" disposal cell) is inconsistent with the statutory requirement applicable to any 11e.(2) cell at the Clive site. Questions that must therefore be answered include: Can Utah follow such an approach in waiving the requirement for government ownership? Would NRC consider a waiver of the ownership requirement for the 11e.(2) cell since Utah has waived it for the NORM/LLRW cell? If not, how would the fact that federal or state ownership will be required for one cell but not the other(s) impact the final disposal picture at the site? How will this waiver impact DOE's willingness to accept clear title to an 11e.(2) cell at Envirocare's site when that license is terminated? All of these issues should be addressed in the EIS.

3. Inconsistencies Among Waste Control Horizons. Another example of differences that need to be addressed are the long-term control horizons associated with the radioactive waste disposal (300-500 years for LLRW, 200-1000 years to the extent practicable for 11e.(2) byproduct material waste, and thousands of years for high-level radioactive waste). These must be compared to the short-term horizons associated with a RCRA hazardous waste disposal. The differences in specific

regulatory control requirements between NRC's LLRW and 11e.(2) regulatory programs on the one hand, and the differences between both of those programs and the RCRA hazardous waste regulations on the other, are too numerous to list in these scoping comments. NRC must address in the EIS the major complications that can result from the relationship of these various programs when cells for different wastes exist at the same site. These differences range from broad philosophical differences (i.e., passive controls/natural materials/long time frames versus active controls/synthetic materials/shorter time frames) to highly specific requirements for protection against groundwater contamination and limits on radionuclide emissions. Some of the differences are likely to be obvious, some subtle, and some will be very significant. In any event, they must all be addressed.

4. Relationship Between 10 C.F.R. Part 61 and Part 40. There is some question about the authority for licensing Envirocare to dispose of 11e.(2) byproduct material because 10 C.F.R. Part 40 regulations basically deal with uranium production facilities that produce such tailings wastes. Since Envirocare is seeking to license only a disposal facility, NRC's 10 C.F.R. Part 61 regulations also come into play with 10 C.F.R. Part 40. The EIS must address whether and how the differing regulatory requirements interface.

5. Surety Requirements. Another issue with economic and regulatory implications that is raised by Envirocare's application and complicated by the multiple disposal unit nature of its site is the potentially conflicting surety requirements for AEA and RCRA wastes. Surety requirements for 11e.(2) byproduct material and LLRW are most certainly different than those for hazardous waste, particularly considering the long time frames involved with radioactive waste disposal. The problems caused by these differences become especially acute where "mixed waste" is involved. Furthermore, where there is to be private ownership of certain portions of the site (including, under the terms of Utah's waiver, the LLRW portion) rather than mandated government ownership for the 11e.(2) waste, the surety requirement becomes an even more important factor in evaluating a proposed license application. In such a case, the surety must provide financial resources beyond those necessary to simply entomb any waste present at the site awaiting final disposal.

Utah's Safety Evaluation Report (SER) (see Attachment 2) on Envirocare's application for authority to dispose of LLRW states that a waiver of governmental ownership is in part justified because any such requirement is not directly related to public health and safety. The SER also states that

"indisputable", "sound" surety arrangements do provide for protection of public health and safety. (SER at 1-2).[1]

The internal logic of Utah's position is difficult to follow. Nonetheless, there can be no question that if the requirement for government ownership is to be waived, then surety arrangements become even more important. Thus, the EIS must address the following questions: What are the various surety arrangements and do they adequately protect the public interest? Do they conflict with one another? Does Utah's surety approval conform with applicable NRC standards?

5. Interstate Compacts. The various activities that have thus far been licensed at the site by the UBRC also raise a number of serious economic and public relations questions with respect to the functions of interstate compacts. For example, should Envirocare be required to make front-end capital investments which are commensurate with and comparable to those made and maintained by other disposers of LLRW for such things as surety and environmental assessment?

The UBRC's SER regarding Envirocare's application for LLRW disposal specifically recognized the incomplete

---

[1]Interestingly Envirocare's request for an exemption from the land ownership requirement specifically states that the requirement "supports the protection of public health and safety or property". Letter to Larry F. Anderson from Khosrow B. Semnani dated October 9, 1987 (Attachment 3).

groundwater characterization at the site and allowed incorporation by reference of portions of DOE's EIS for the Vitro pile, even though there was no explanation of its relevance while still granting the license application. Questions to be addressed in the EIS are: Does the regulatory regime in Utah and its relaxed criteria for licensing Envirocare's various activities raise questions for the Northwest Compact, in particular, and the Compact program as a whole, given the problems with public confidence in the LLRW disposal process throughout the country? Should Envirocare be allowed to maintain confidentiality of the names, amounts and isotopic values of LLRW brought to the site for disposal if some of those wastes would normally go to a sited regional Compact disposal facility?

In its original NORM disposal application, Envirocare claimed it would only be taking low level waste that would not be suitable for disposal in existing sited Compact facilities. Apparently, the amendment to that license to allow disposal of LLRW has changed the nature of the waste that Envirocare may take to include some LLRW that <u>would</u> require DOT labelling and would go to a sited Compact facility. This arrangement must be fully explored in the EIS.

6. <u>Need for Broad Scope to the EIS</u>. Given the broad range of complex regulatory, political, legal and economic

issues associated with the multi-cell disposal facility operations being proposed by Envirocare, NRC should incorporate the broadest possible scope into the EIS. It is necessary to: identify issues of conflicting regulatory authority; identify their impacts on public health and safety; and identify policy judgments that may determine which components of varying regulatory programs are most important and which therefore must take precedence. For example, NRC must discuss how important it considers the governmental ownership requirement to be in the mix of requirement. If NRC views government ownership as significant, then any exemption would need to be considered in accordance with the Commission's 10 C.F.R. Part 51 EIS requirements to justify an exception to UMTRCA's statutory government ownership requirement.

These scoping comments merely scratch the surface of the questions, issues and potential problems that need to be addressed because of the multi-facility nature of the site. A complete and thorough airing of these issues is necessary to assure that the long-term future of the LLRW disposal business is not jeopardized by conflicting policies and requirements.

Attachment 1

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

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 that you have requested additional information on environmental monitoring 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

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

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 presciptively 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 a humid 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 pose 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.

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF HEALTH SERVICES
714/744 P STREET
P.O. BOX 942732
SACRAMENTO, CA 94234-7320
(916) 445-0498

90 NOV 19 NOV 28 1990

Mr. Carlton C. Kammerer, Director
Office of State Programs
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Kammerer:

U. S. ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE CALIFORNIA LOW-LEVEL RADIOACTIVE WASTE PROJECT

The Department of Health Services (DHS) is requesting assistance from the U. S. Nuclear Regulatory Commission (NRC) in completing the Final Environmental Impact Report/Statement (EIR/S) for the State of California Indemnity Selection and Low-Level Radioactive Waste (LLRW) Facility. This request is prompted by comments received on the Draft EIR/S from the U. S. Environmental Protection Agency (EPA) Region 9 office. The Final EIR/S will support the Department's upcoming licensing decision on the proposed Ward Valley LLRW facility. The Final EIR/S will also support the Bureau of Land Management's (BLM) decision on the State's request to transfer ownership of the project site from federal to state ownership.

EPA Region 9 has recommended installation of a liner and a leachate collection system at the proposed site to provide a means for monitoring in the vadose zone. DHS' position is that EPA's recommended course of action is neither required under NRC's regulations in 10 CFR Part 61 nor necessary to meet the performance objectives of those regulations. DHS' view is the same regardless of whether EPA's proposed approach is primarily intended to perform as a liquid containment feature or as a vadose zone monitoring system. DHS would appreciate your views on whether or not DHS' interpretation of NRC's regulations in 10 CFR Part 61 is correct.

Enclosed are copies of EPA Region 9's September 28, 1990 comments, along with an August 30, 1990 letter and enclosures from DHS to the Colorado River Regional Water Quality Control Board in response to issues raised by the Regional Board's staff relative to liners.

Also enclosed is a copy of the June 1990 Draft EIR/S. US Ecology's license application is incorporated by reference into the Draft EIR/S and pertinent sections of the license application have been provided to EPA Region 9.

11/13...To Comm RF per GPA....Cpy provided fm GPA.....

The Department and BLM hope to complete and issue the final EIR/S by early December 1990. As a result of the tight schedule, NRC is asked to respond to this request no later than by the last week of November and sooner if possible. Please contact Project Director Reuben Junkert at (916) 323-3021 if you have specific questions regarding this request.

Sincerely,

Reuben Junkert for

Don J. Womeldorf, Chief
Low-Level Radioactive Waste

Enclosures

cc: Harold Denton, Director
Office of Governmental and Public Affairs
Robert Bernero, Director
Office of Nuclear Material Safety and Safeguards, NRC
Ed Hastey, BLM
Jacqueline Wyland, EPA
Daniel McGovern, EPA

bcc: Jack Horner
Dean Kunihiro
Walnut Creek Office

2

Attachment 2

UTAH BUREAU OF RADIATION CONTROL

SAFETY EVALUATION REPORT

In Consideration of the License Amendment Application
for Radioactive Materials License No. UT 2300249

Envirocare of Utah Inc.

March 1991

SAFETY EVALUATION REPORT
TABLE OF CONTENTS

SAFETY EVALUATION REPORT
TABLE OF CONTENTS

I. PROPOSED ACTION

By amendment application dated September 20, 1990, Envirocare of Utah, Inc., requested an amendment of Radioactive Materials License No. UT 2300249 authorizing additional types of radioactive waste for disposal at its Naturally Occurring Radioactive Materials (NORM) waste disposal site. The proposed amendment is to authorize the licensee to receive and dispose of certain byproduct, source, and special nuclear materials in specified limited concentrations.

II. BACKGROUND INFORMATION

In February 1988, a license (Radioactive Material License No. UT 2300249) was issued by the Utah Bureau of Radiation Control (UBRC) to Envirocare of Utah, Inc., (the licensee) authorizing the licensee to dispose of NORM by land burial at a desert location 85 miles west of Salt Lake City, Utah. (These are radioactive materials not regulated by the Federal Atomic Energy Act of 1954, as amended.) Conceptually, the radioactive wastes for disposal include:

1. Contaminated soils and structural debris from remedial action activities undertaken by various state or federal agencies.

2. Industrial processing wastes where enhancement of NORM had occurred to the point when it was desirable or mandated that it be placed in a regulated disposal facility; or

3. Other mill processing tailings, etc. as appropriate.

Physically the wastes are dry, i.e. no free standing water is permitted in the shipping container, and sandy soil like in texture. Also included for disposal are structural debris such as concrete, asphalt and other building materials. As previously mentioned, the radiologic constituents are those that are naturally occurring in the biosphere, the most abundant being primordial uranium and thorium and their decay products

The engineering design employed by the licensee is above grade embankment, anchored into the surrounding native soils by a seven (7) foot deep excavation. This design is a modification of a U.S. Department of Energy/State of Utah design used to permanently dispose of 3.2 million yards of uranium mill tailings for a Salt Lake City abandoned uranium mill site. The bottom of the excavation is scarified and compacted to form a leachate barrier (liner). The entire complex will be covered with native soils as a radon barrier and rock-riprap for an erosion as well as a human intrusion barrier.

In accordance with the licensee's application and the UBRC rules, the licensee has implemented personnel and environmental monitoring programs intended to demonstrate regulatory compliance and that neither the employees nor the local environs are affected in any adverse manner by the license activities. (Copies of the environmental monitoring reports and personnel monitoring data are available at the UBRC.) To date, no upward trends in occupational radiation doses or releases from the site, have been noted.

III. CURRENT STATUS OF DISPOSAL ACTIVITIES

As of December 31, 1990, the licensee has received and disposed of waste from industrial and governmental agency generators. The total volume of wastes involved is approximately 1.22×10^5 cubic yards.

IV. REGULATORY AUTHORITY

Public Law 86-373, dated September 23, 1959, amended the Atomic Energy Act of 1954 by the addition of a new Section 274, " Cooperation with States." The amended Act provides a role for the states in the regulation of nuclear materials and a statutory basis under which the U.S. Nuclear Regulatory Commission (NRC) would discontinue and the states could assume, through agreements, certain NRC regulatory authority. The mechanism by which a state assumes such responsibilities is an Agreement between the NRC and the Governor of the state. Before a state can become an "Agreement State," the Governor must certify that the state has a program for the control of radiation hazards adequate to protect the public health and safety. In addition, the NRC must determine that the state's program is in accord with the requirements of Subsection (o) of Section 27 and is in all other respects compatible with NRC's program for the regulation of the materials covered by the proposed agreement, and is adequate to protect the public health and safety with respect to such materials.

On March 29, 1984, the Governor of Utah signed an agreement with NRC for the assumption of regulatory authority for byproduct material, source material, and special nuclear material in quantities not sufficient to form a critical mass. At that time, the agreement between the State and NRC did not include the authority for Utah to regulate low-level waste disposal of materials listed above in permanent disposal facilities. The State agency which has the responsibility for regulating the use of radioactive materials is the Bureau of Radiation Control in the Division of Environmental Health of the Department of Health. In May 1990, an amended agreement was signed between the NRC and Governor of Utah, granting authority to the State for licensing land disposal of source, byproduct and certain quantities of special nuclear material.

In conjunction with the amended agreement, the State committed to conducting formal reviews of any application for low-level waste disposal by utilizing the guidance found in NRC publication NUREG 1200 "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility." The applicant would be asked to follow guidance in NUREG 1199 "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility."

Because the Envirocare amendment application request is for radioactive wastes containing byproduct or source material as contaminants, additional or different siting or design criteria and additional application of Utah Bureau of Radiation Control Rules is required beyond that which was necessary for the Envirocare NORM disposal operations. Specifically, the procedures, rules and criteria for "License Requirements for Land Disposal of Radioactive Waste", R447-25, are required as part of the application review process. Other less extensive, but none the less important rules would also be applied as part of the review process.

V. REVIEW SCOPE

The proposed amendment was evaluated against the Utah Radiation Control Rules in particular but, not limited to (1) "Standards for Protection Against Radiation" R447-15, and (2) " Licensing Requirements for Land Disposal of Radioactive Waste" R447-25. As mentioned, the reviews were conducted in accordance with NUREG-1200, Standard Review Plan (SRP) and it is referenced throughout the Safety Evaluations. Additionally, reviewers used other NUREG publications, NRC regulatory guides and industry wide reference materials.

Because the Envirocare facility is located on a section of land for which an Environmental Impact Statement had been prepared (USDOE/EIS-0099 F, Remedial Actions at the Former Vitro Chemical Company Site South Salt Lake County, Utah, July, 1984) and because the facility has been operational for approximately three years, the safety evaluation review emphasized hydrology, geology, and seismicity of the facility site, the engineering and design of the disposal embankments/cells, the potential radiologic impacts of waste disposal, and the licensee's radiation safety program.

CHAPTER 1

GENERAL INFORMATION

CHAPTER 1
GENERAL INFORMATION

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 1.1 Introduction

The general information supplied by the licensee has been reviewed by the staff in accordance with the guidance in the SRP Section 1.1. The applicant has previously provided similar generic information for the issuance of the current NORM disposal license. This material coupled with the UBRC's high level of active familiarity provides the basis for the conclusion that the technical, financial and institutional information required by R447-25 is available.

Section 1.2 General Facility Description

The general information necessary to evaluate the overall facility design and layout has been evaluated. The licensee has adequately described the facility and its various functions such that the reviewers have an overall understanding of the facility.

Section 1.3 Schedules

This review and safety evaluation is for an amendment to the existing license. The Envirocare facility has been operational for approximately three (3) years. Therefore, schedules for design and construction are not relevant.

Section 1.4 Institutional Information

In November 1987, the UBRC granted an exemption to a rule, URC-24-135 (currently R447-15-302) to S.K. Hart Engineering (currently Envirocare of Utah). The effect of the exemption was to permit the development of a NORM disposal site on privately owned property. This action was taken pursuant to the applicant's request for such an exemption. For the following reasons, the exemption was granted:

1. The Utah Code does not provide for State ownership of this type of facility and it would require legislative action to amend the Code.

2. The Utah Bureau of Solid and Hazardous Waste Management siting requirements stipulate private ownership. Therefore, a precedence factor was taken into account.

3. It is believed that the ownership issue does not necessarily relate to issues of protection of the public health and safety.

4. The recognition that, ultimately (upon failure of all other controls), the State would be responsible for any public health related problems that might occur.

5. The belief that an undisputable surety arrangement for long term monitoring and maintenance would provide for public safety and health.

The Envirocare request was pursuant to URC-12-125 (currently R447-12-54) which states that the UBRC can grant exemptions or exceptions to rules "as it determines are authorized by law and will not result in undue hazard to public health and safety or property". The exemption continues to be in effect.

In 1988, new radiation control rules went into effect relevant to the Envirocare amendment application. Specifically, R447-25-9(2) states:

> "Where the proposed disposal site is on land not owned by the federal or a state government the applicant shall submit evidence that arrangements have been made for assumption of ownership in fee by the federal or a state agency before the Bureau issues a license."

In March 1991, in accordance with R447-12-54, the UBRC granted an exemption, on its own initiative, to Envirocare regarding R447-25-9(2). The principle reasons for providing the exemption are: (1) the Utah Code does not provide for the "assumption of ownership" by the State; (2) the ownership issue does not directly relate to issues of public health and safety; and (3) there exists a sound surety arrangement which provides for monitoring and maintenance of any items relating to public health and safety. Therefore, Envirocare is in compliance with R447-25-9.

Section 1.5 Materials Incorporated by Reference

The staff has reviewed the materials, information or documentation that has been incorporated into the Safety Analysis Report (SAR) by reference. The materials have been evaluated as to their relevance within the intended context. These materials are generally acceptable or appropriate for the topic for which they were incorporated.

Section 1.6 Conformance to Regulatory Guides

As part of the detailed technical evaluations of various sections of the SAR, the staff has utilized various documents to provide guidance for the reviews. Likewise, the Envirocare staff has utilized some of the same guides to prepare the SAR. Accordingly the staff has evaluated the licensee's conformance to regulatory guidance or where, the guidance has been supplanted by an appropriate alternative, the alternative has been evaluated. The staff is not aware of any non-conformance with regulatory guidance.

Section 1.7 Summary of Principal Review Matters

The licensee has identified, in part, significant licensing issues for their amendment request. Other major licensing issues were identified by the staff reviewers. Envirocare has obtained technical assessments of these issues for submission and review by the UBRC. The applicant has in many instances resolved these matters or as a condition of the license will be required to resolve any open items as part of a compliance schedule.

In particular, significant review matters included those involving geotechnical and groundwater hydrologic issues. Other important but less significant issues included waste handling and storage and concentrations of radionuclides in waste for disposal.

CHAPTER 2

SITE CHARACTERISTICS

CHAPTER 2
SITE CHARACTERISTICS

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 2.1.1 Site Location and Description

The staff has reviewed the site location and description information submitted by the licensee in accordance with the requirements found in R447-2.5-5 and 6. The information is found to be adequate.

Section 2.1.2 Population Distribution

The staff has reviewed the data submitted relevant to population distribution. The staff concludes the data is acceptable and accurately reflects the current population distribution in the vicinity of the site. Similarly, data regarding population growth accurately reflects the expectation that any growth will occur at population centers 30-50 miles from the Envirocare site. Furthermore, recent actions taken by the Local County Commission have designated the Envirocare area as part of a hazardous waste industrial zone.

Section 2.2 Meteorology and Climatology

The staff has reviewed the information presented regarding site meteorology and climatology. (This data was derived from an Environmental Impact Statement performed by the U.S. Department of Energy for the siting of a uranium mill tailings remedial action disposal site. The mill tailings disposal site is within the section of land owned by Envirocare.) The reviewers conclude the data is accurate for the purposes of determining the effects of precipitation on "structure loadings" and are sufficient to meet the general requirement stated in R447-25-7.

CONCLUSIONS OF THE REVIEW/Utah Geo'-gical and Mineral Survey

Section 2.3.1 Geological Site Characterization

The geologic site characterization for the Envirocare low-level waste disposal facility has been reviewed according to SRP 2.3.1. The geology and seismology of the proposed site have been adequately characterized, modeled, and analyzed to ensure that the long-term performance objectives of R447-25-19 through 22 are met as required in R447-25-23(1)(a). The tectonic and geologic processes and seismic activity do not occur with such frequency and to such an extent that they significantly affect the ability of the disposal site to meet R447-25-19 through 22 as required in R447-25-23(1)(h) and (i).

Section 2.3.2 Seismic Investigation

The information on the seismic investigation for the Envirocare low-level waste disposal facility has been reviewed according to SRP 2.3.2. As a result of this review, the following conclusions are reached:

1. The seismologic information provided by the applicant is adequate, and no capable faults exist at the site that would adversely affect the safety of the site.

2. The design-basis earthquake is adequately defined, and the potential for amplification is addressed.

3. Adequate geophysical investigations have been carried out to characterize the site.

The applicant has met performance objectives in R447-25-19 through 22 and the technical requirements for land disposal facilities in R447-25-23(1)(h) and (i).

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Section 2.4.2 Groundwater Characterization

1. Quality Control Program - The quality control program focuses on both monitoring well construction and groundwater quality sampling. The staff is unable to draw any conclusions, at this time, regarding these issues. However, all monitoring wells used in the groundwater compliance monitoring network will be required to be constructed in accordance with the EPA RCRA Groundwater Technical Enforcement Guidance Document (TEGD), see license requirements in Appendix B, Part I E 2(g). An approved groundwater sampling quality assurance plan will also be required before construction of the disposal facility to assure quality control of all groundwater quality compliance monitoring data, see license requirements in Appendix B, Part I H 1.

2. Pre-operational Monitoring - The staff has concluded that pre-operational monitoring is incomplete at this time, and cannot be finished until the site hydrogeologic characterization is complete (as required in Appendix B, Part I H 3 of the license). Consequently, after the hydrogeologic report is complete and approved by the Executive Secretary, Envirocare will also complete a one-year period of groundwater sampling of the compliance monitoring wells to determine background groundwater quality (see Appendix B, Part I H 5 of the license). This one year sampling period will begin as soon as possible after the construction of each compliance monitoring well and before the receipt of any waste at the facility. As a result of this sampling, the groundwater protection levels found in Appendix B, Part I C of the license, may be later modified.

3. Groundwater Flow Modeling of the Saturated and Unsaturated Zones - The staff believes the site is capable of being characterized, modeled, analyzed, and monitored for groundwater flow, but is unable to confirm such until the site hydrogeology is fully characterized (see License, Appendix B, Part I H 3) and the flow models are submitted and verified, as per license conditions in Appendix B, Part I H 8.

4. Groundwater Contaminant Transport in the Unsaturated Zone - Unsaturated transport analysis has been conducted by the applicant and reviewed by the staff. Envirocare has estimated the vadose zone transport time of each of the contaminants to be disposed of in the LLRW Embankment by use of a subroutine in the EPA model PATHRAE (Low-Level and NARM Radioactive Wastes, Model Documentation PATHRAE-EPA Methodology and Users Manual, EPA 520-1-87-028, December, 1987). The staff have reviewed the portion of the PATHRAE code used in the analysis and found it to be a vertical, one dimensional analytical solution based primarily on the retardation of contaminant migration and the advective flow of groundwater. The model also assumes a uniform moisture content in the vadose zone both in space and time.

i.e., the model ignores permeability hysteresis. This assumption may be conservative if the moisture content is assigned to be relatively high. The model does not account for dispersion or diffusion of contaminants in the vadose zone, consequently the velocity of the predicted contaminant front is somewhat underestimated.

The staff reviewed the inputs used in the PATHRAE model, and found the distribution coefficient, Kd, used for each of the contaminants to be conservative, each being near the low end of the ranges reported in technical literature, thereby minimizing the retardation effect. For contaminants without literature values, a conservatively low value of 5 was selected for the PATHRAE model. However, one exception was noted, mercury, whose Kd was assigned as 10,000 in the model, though researchers at Clemson University have suggested values between 100 and 1,000 are more appropriate (draft interim report, Verification and Sensitivity of the Calculational Methodology Utilized in the PATHRAE Code to Predict Subsurface Contaminant Transport for Risk Assessments of SRP Waste Sites, R. A. Fjeld, et.al., Clemson University, June, 1986, p.32.). The other hydraulic inputs were also reviewed by the staff:

(a) A conservative value of soil bulk density, 1.6, was assumed in the PATHRAE model. A more reasonable value of 2.12 would increase the retardation factor and estimated travel time.

(b) Effective porosity was assumed by Envirocare to be 20% in the PATHRAE model, a value in the range of sand sized particles. This value may be somewhat low considering the combination of clay and sand strata reported in the subsurface at the site. Clays typically have porosities in the range of 40 to 70%. Consequently, to make the calculations more conservative, the staff recommends an overall estimate of 0.30 to 0.40 is probably more appropriate for effective porosity, considering the interbedded clays and sands at the site. This change results in a decrease in the retardation factor and an increase in the contaminant velocity.

(c) Moisture content assumed in the PATHRAE model was 23.9%, which is probably a realistic value considering the arid environment at the Clive site. However, for conservative purposes a small increase to 30% is recommended by the staff, which coincides with estimates made by Delta Geotechnical in their November 29, 1989 report. This change also results in a decrease in the retardation factor and an increase in the contaminant velocity.

(d) Vertical water velocity was assumed in the PATHRAE model to be 2 cm/yr (0.78 in/yr), based on calculations offered in the Delta Geotechnical report entitled "Attachment VI-5, Hydrogeologic Study, Mixed Waste Landfill Cell", dated November 29, 1989. Close review of this report shows Delta Geotechnical based the vertical velocity on:

(1) The assumption that only 1% of the estimated 4.88 in/yr mean annual precipitation rate resulted in water table aquifer recharge (see p.25-26 of the report), and

(2) Estimates of effective porosity and moisture content of the unsaturated zone of 20% and 30%, respectively.

Staff research indicates that the mean annual precipitation is expected to be approximately 6 in/yr, an increase of 1.2 in/yr over the Delta Geotechnical Report (J. S. Gates and S. A. Kruer, Utah Department of Natural Resources Technical Publication No. 71, 1981, Plate 2). As a part of a seepage analysis of the LLRW Embankment by use of the EPA HELP model, Bingham Environmental estimated the annual precipitation for the period of 1985 thru 1989 at the Clive site to be 5.94 in/yr (December 10, 1990 report). Bingham's HELP model analysis also predicted a seepage rate of 0.82 in/yr (0.32 cm/yr) from the bottom of the embankment. Though this model may conservatively overestimate the seepage rate, it is important to note that it considers several climatological factors and the effect of the rip-rap cover in reducing evapotranspiration and increasing infiltration. Based on this seepage rate and an assumed effective porosity of 0.30 and a moisture content of 0.30, the staff estimated the vertical water velocity to be approximately:

$$Vw = \frac{q}{n^e s} = \frac{0.32 cm/yr}{0.3 * 0.3} = 3.58 \text{ or } 4 \text{ cm/yr.}$$

This is twice the velocity used by Envirocare in their PATHRAE predictions.

No sensitivity analysis was conducted by Envirocare to evaluate the effect of variability of the hydraulic parameters on the output of their model. The staff did not have access to the PATHRAE model, but did build a simular model using the same one-dimensional equations and assumptions on an Excel spreadsheet. More conservative hydraulic inputs were entered for soil bulk density, effective porosity, moisture content, and vertical water velocity, and outputs were evaluated. Based on the more conservative inputs it was determined that all contaminants with a distribution coefficient of 5 or greater should take more than 19,000 years for the advective contaminant front to reach a water table located 6.4 m below the embankment.

It should be noted that this analysis, like the PATHRAE model, did not take into account dispersion or molecular diffusion in its predictions. To evaluate if dispersion was significant in the subject flow regime the staff calculated the Peclet Number for several of the proposed contaminants, as follows:

$$\text{Peclet Number}^* = \frac{Vw * d}{Do}$$ where: Vw = average linear velocity of the water
d = average particle diameter
Do = diffusion coefficient in free liquid.

* R. W. Gillaham & J. A. Cherry, Contaminant Migration in Saturated Unconsolidated Geologic Deposits. Geological Society of America, Special Paper 189, 1982, Figure 5.

Diffusion coefficients were extracted from "Physical and Chemical Hydrogeology, by P. A. Domenico & F. W. Schwartz, John Wiley & Sons, 1990, p.369. Average particle diameter was assumed to be silt sized, an average of clay and sand, and equal to 1/16 mm or 0.00625 cm. Average velocity of the water was assumed to be the 4 cm/yr (1.27 x 10-7 cm/sec), as derived above.

Contaminant	PATHRAE Distribution Coefficient, Kd(ml/gm)	Free Liquid Diffusion Coefficient, Do (10^{-6}cm^2/sec)	Peclet Number
Potassium-40	5	19.6	4.05 x 10-5
Strontium-90	8	7.94	1.00 x 10-4
Chromium-51	40	5.94	1.34 x 10-4
Radium-228	100	8.89	8.93 x 10-5
Cesium-134	500	20.7	3.83 x 10-5

Comparison of these values with data provided by Gillaham and Cherry indicates that at values of Peclet Number below 2.0 x 10-2 molecular diffusion dominates the transport of contaminan[illegible]sitivity analysis was conducted by the staff on these Peclet Number calculations. Based on this analysis it was determined that the Peclet Number only slightly exceeded the 2.0 x 10-2 limit only when the average linear velocity reached 20 cm/yr (1 order of magnitude higher), and particle size reached 2 mm (coarse sand). Both of these scenarios are very unlikely at the site. Therefore, based on this analysis mechanical dispersion is not considered a significant component of contaminant transport at the LLRW embankment. This even applies to those more mobile contaminants with a low distribution coefficient such as Strontium-90 and Chromium-51, as seen above.

Diffusion transport simulations were made by both Envirocare and the staff. One-dimensional simulations, based only on diffusion, were conducted by the staff by use of an Excel spreadsheet and a table of beta and the complimentary error function (Domenico & Schartz, 1990, p.637). Constraining assumptions included saturated conditions across the 6.4 m distance to the water table, a tortuosity of 0.67, Groundwater Quality Standard of 26.66 pCi/l, and an initial leachate concentration of 2400 pCi/l. This simulation showed that sole diffusive transport of Cesium-134, a nuclide with a high diffusion coefficient, would cause the water table at 6.4 m below the site to exceed the Groundwater Quality Standard after 72.3 years (C/Co = 27/2400 = 0.0111). However, when the model was modified to account for the apparent diffusion coefficient caused by retardation by dividing the effective diffusion coefficient by the retardation factor (Da = D'd/R = Do*T/R, where T = 0.67 and R = 16,800 [Kd = 500]), to account for retardation of the Cesium; the time necessary for the Cesium concentration at the water table to reach the Groundwater Quality Standard was in excess of 1,218,300 years.

The staff also conducted a one-dimensional diffusion transport simulation with retardation for a worse case nuclide. Potassium-40 was found to be a worst case nuclide because of its relatively high diffusion coefficient (19.6 x 10-6 cm2/sec) and low distribution coefficient, Kd = 5 ml/gm. In fact, of the five nuclides that shared the lowest Kd value for the permitted waste constituents, Potassium-40 had the longest half-life (1.3 x 109 years), and consequently could be considered as a stable nuclide for the time domain of the model, effectively negating any effect of radioactive decay. Using the

same controlling assumptions mentioned above, including a Groundwater Quality Standard of 48 pCi/l and an initial leachate concentration of 1,930,000 pCi/l, the model showed that Potassium-40 concentration at the water table below the site would exceed the Groundwater Quality Standard only after 4,687 years (C/Co = 48/1,930,000 = 0.00189). The staff considers these simulations to be conservative based on the following factors:

(1) The assumption of saturated conditions in the subject domain has over estimated the tortuosity factor. Unsaturated conditions would significantly decrease the tortuosity factor, possibly by more than an order of magnitude. Sensitivity analysis conducted by the staff on the one-dimensional model without retardation showed that this relationship was inversely proportional, i.e., a decrease in the tortuosity would increase the resulting time by a proportional amount.

(2) The models did not account for decay of the radionuclides. Such decay would significantly reduce the initial concentration at the source, and the concentration of the nuclides in the diffusive flux with the passage of time. This is a significant factor for short-lived radionuclides, which make up a majority of the waste disposal inventory.

In summary, both the PATHRAE model and the model used by the staff show that the advective contaminant front of the proposed contaminants should take in excess of 19,000 years to migrate to the water table below the LLRW Embankment, based on a water infiltration rate estimated by the EPA HELP model and estimates of average effective porosity and saturation. Based on these same hydraulic assumptions, it is apparent that molecular diffusion is the dominant mechanism of contaminant transport through the unsaturated zone. Diffusion transport analysis with retardation has shown that Potassium-40, a worse case radionuclide, will take in excess of 4,687 years for the contaminant front to cause the 6.4 m water table to exceed the Groundwater Quality Standards.

Saturated zone contaminant transport modeling was not conducted by either Envirocare or the staff. This modeling was found to be unnecessary in that the unsaturated zone contaminant transport analysis has demonstrated that the concentrations of the contaminants in the waste, as authorized by the license, will not cause the water table below the LLRW embankment to exceed the Groundwater Quality Standards for a period which exceeds the 500 year minimum time criteria specified in NUREG 1200. Any additional contaminant transport modeling of the saturated zone would show only that longer periods of time would be necessary for the contaminant front to exceed the Groundwater Quality Standards at a given horizontal location in the water table aquifer.

5. Groundwater Intrusion and Fluctuation - Water level monitoring in 13 existing wells (SC series) in Section 32, T.1S., R.11W. between September 22, 1981 and November 7, 1989 demonstrate the water table has risen an average of 1.65 ft., with a maximum rise in well SC-3 of 3.06 ft. Though regular quarterly or monthly data has not been consistently collected from these wells in a single water year to assess seasonal fluctuation, the staff believes that the randomness of the measurements and the long period of data collection over a time of high regional precipitation would make these values somewhat representative of the maximum seasonal fluctuation the water table would experience in a single water year.

Water level measurements made on December 13, 1990 in wells found closest to the proposed site (within approximately 800 ft. of the proposed embankment) place the water table at the following depths below ground surface:

Well/Piezometer	Ground Elevation (ft)	Water Level Depth (ft)
GW-2	4277.65	29.29
GW-11	4276.22	27.70
GW-12	4276.31	27.91
GW-13	4276.71	28.31
I-2(N)	4276.62	28.42
I-2(S)	4276.63	28.63
I-3-30	4277.24	29.71
Average	4276.77	28.57

As can be seen, the average depth to water table was below ground surface 28.57 feet. Based on the proposed design, the bottom of the lower clay liner will be located approximately 8 feet below grade. This results in a 20.57 foot separation between the base of the bottom clay liner and the average water table elevation of December 13, 1990.

The staff agrees with Envirocare's submittal of December 26, 1990 which predicted about a 4 foot rise in the local water table, provided regional climatic conditions maintained the level of the Great Salt Lake below 4217 ft. amsl. The lake has reached or exceeded this level at least twice in the last 3,000 years; once within the last 400 years, based on archeological evidence. The lake may have also approached the 4217 ft. level during the Little Ice Age (1670-1700 A.D.), based on paleoclimatic modeling (Currey, D.R., et al. 1984, Major Levels of Great Salt Lake and Lake Bonneville, UGMS Map 73). If the lake reaches or exceeds the 4217 ft. level, the shore of the lake will be located approximately 15 miles west of the site, or less. Under these conditions, it is difficult to predict the magnitude of the rise in water table, however, both the staff and Envirocare agree it will be greater than the 4 foot rise referenced above and may be as great as 10 to 12 ft. above normal water table conditions. Based on these estimates and assumptions it appears that the waste disposal is not in the zone of water table fluctuation and that groundwater intrusion into the waste at some future date should not occur.

6. Surface Discharge - based on low topographic and apparent groundwater hydraulic gradients in Section 32 (T.1S., R.11W.), and fence diagrams of subsurface stratigraphic units found in the vicinity, provided by Envirocare, the staff has concluded that the hydrogeologic units used for disposal will not discharge groundwater to the surface within the disposal site. However, if the in the unlikely event the level of the Great Salt Lake were to exceed 4217 ft amsl, and the local water table rises by 12 feet, groundwater beneath the disposal site may eventually discharge to the surface in an area located approximately 2 miles west of the disposal site in Section 36, T.1S. R. 12W., at an approximate elevation of 4260 ft.

CONCLUSIONS OF THE REVIEW/Utah Geological and Mineral Survey

Section 2.5 Geotechnical Characteristics

The geotechnical characteristics of the Envirocare low-level waste disposal facility have been reviewed according to SRP 2.5. The objectives of the review were to ensure that: (1) the scope of the geotechnical and geophysical field investigations and laboratory and field testing are adequate; (2) the interpretations of the data to develop typical soil layering, typical cross-sections, and design parameters used in the design are reasonable and conservative; and (3) the geotechnical characterization of the site meets the guidance and acceptance criteria in SRP 2.5.

The following information was determined during this review:

1. The geologic characterization of the site addresses the potential for surface or subsurface subsidence at the site, the instability of soil because of mineralogy, and the history of deposition and erosion of soil deposits.

2. The design-basis seismic event is adequately defined by parameters such as magnitude and acceleration.

3. The geotechnical and geophysical investigations conducted to characterize the site and borrow materials are adequate in scope.

4. The static and dynamic engineering properties of various materials used in the analysis and design of the facility are based on adequate field and laboratory testing and a reasonable and conservative interpretation of the test data.

5. The groundwater conditions such as the position of the groundwater table, the extent of its fluctuation, and the presence of artesian conditions have been defined on the basis of adequate investigation.

6. The selection of the properties of fill borrow material was based on an adequate exploration and testing program.

7. Site stratigraphy and design parameters used in the design are a reasonable and conservative interpretation of the data.

The geotechnical site characterizations in the license amendment application provide the basic data needed to determine if the disposal facility meets the performance objectives stipulated in the regulations, thereby satisfying the requirements of R447-25-7(1), R447-25-11(6), and R447-25-23(1).

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Section 2.5 Geotechnical Characteristics

Groundwater Conditions - the staff has determined that the position of the water table and the extent of its seasonal and potential long-term fluctuation have been adequately estimated by Envirocare and reviewed by the staff. Artesian conditions have not been discovered at the site, though two separate piezometer nests at sites I-1 and I-3, may have located a small upward vertical hydraulic gradient, based on measurements made on December 13, 1990 and January 2, 1991. At site I-1, located approximately 800 feet southeast of the proposed disposal site, the deeper (100 ft.) piezometer measured a head which averaged 0.84 feet higher than the shallow (30 ft.) piezometers. A site I-3, located approximately 400 feet north of the disposed site, the

deeper (100 ft.) piezometer recorded heads which averaged 0.63 feet above those measured in the shallow (30 ft.) piezometer. Though rather inconclusive at this time, further studies will more accurately define vertical hydraulic gradients at the site, see License, Appendix B, Part I H 3(d and e).

Section 2.6 Geochemical Characteristics

1. Groundwater Geochemistry - the staff has concluded that the description of local groundwater geochemistry is incomplete. As a result, the license will require Envirocare to provide addition data and detail, and interpretation to allow the staff to arrive at an understanding of the local groundwater quality and geochemistry. This study will be completed within one year of construction of each of the groundwater compliance monitoring wells, see License, Appendix B, Part I H 5.

2. Leachate Geochemistry - Envirocare has predicted the quality of the leachate that will leave the base of the LLRW Embankment. The staff has reviewed this information and found it to be based on conservative estimates of the distribution coefficient for each of the radionuclides and the conservative assumption that the solutes immediately go into solution with the leachates being instantaneously transported to the base of the embankment. Based on this data it has been concluded by the staff that this leachate will significantly exceed the Groundwater Quality Standards. Consequently, evaluation of contaminant transport issues was necessary before issuance of the license. These leachate concentrations were later used as initial concentrations for the unsaturated contaminant transport modeling.

3. Subsurface Soil Geochemistry - Subsurface soils have been characterized at the site by Envirocare in terms gradation by the Unified Soils Classification System. The hydrostratigraphic units (subsurface strata) at the site consist primarily of an upper clay-silt, an upper silty sand, a middle clay-silt, and a lower sand, in descending order. Review of the distribution coefficients, Kd, used in the contaminant transport modeling of the unsaturated zone, show that the Kd values chosen for the modeling were sufficiently conservative to address minor variation in soil mineralogy that may be present at the site. For all of the contaminants modeled, Envirocare chose Kd values that were at or near the low end of the ranges reported in the technical literature. Staff review of the literature values showed that the Kd ranges were distributed among varying soil and rock types, with lower values dominated by rock and sand media (coarse grained media) and higher values typical of clay soils (fine grained media). Review of soil logs from nearby monitoring wells at the site shows the abundance of clay and silts in the unsaturated zone, as summarized below:

		Lineal Footage Reported in Soil Logs in the Upper 28 feet of the Soil Column			
Well No.	Relative Location To Site	Sand* ft. (%)	Silt ft. (%)	Clay ft. (%)	Total Silt + Clay ft. (%)
I-2	West Margin	10 (36%)	5 (18%)	13 (46%)	18 (64%)
I-3	North Margin	10 (36%)	2 (7%)	16 (57%)	18 (64%)
GW-2	East Margin	14 (50%)	0 (0%)	14 (50%)	14 (50%)
GW-12	South Margin	9 (32%)	5 (18%)	14 (50%)	19 (68%)

* Sand reported in soil logs were consistently described as silty and/or clayey. Clays and silts were similarly described as having minor amounts of sand, silt, or clay, respectively.

Consequently, the staff has determined that the Kd values used in the contaminant transport model were conservative in that they were indicative of rock and sand or coarse grained media, while finer grained clay and silt media predominate the unsaturated zone at the site. The staff concludes that abundance of clays and silts at the site will compensate for error that may arise from minor variations in the Kd due to variation of mineralogy of the materials in the unsaturated zone.

No surface expression has been observed of local undisturbed soils which would indicate solution failure or collapse. Consequently, the staff has concluded that the possibility of unstable soils under the LLRW Embankment is unlikely, especially after consideration that the facility will not significantly increase the rate of infiltration or seepage that would occur if the facility were used for disposal of liquids.

CONCLUSIONS OF THE REVIEW/Utah Geological and Mineral Survey

Section 2.7.1 Geologic Resources

The information on known geologic resources near the Envirocare low-level waste disposal facility has been reviewed according to SRP 2.7.1. The applicant has correctly and adequately identified known occurrences of sand and gravel near the proposed waste disposal facility. The applicant has shown that the deposits are at a location so that future exploitation of those deposits is unlikely and will not result in the failure of the proposed facility's performance objectives under R447-25-19 through 22 as required in R447-25-23(1)(c). No other known geologic resources occur in the proposed disposal area or region and attempts at future resource exploitation are unlikely.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Section 2.7.2 Water Resource

1. Future Pumpage of an On-Site Well - the staff has concluded that the evaluation of the effect of future pumpage of a well in Section 32, T.1S., R.11W. on local groundwater flow is incomplete. Consequently, it is unknown if such pumpage would result in failure or compliance with the performance objectives of UAC R447-25-7. As a result, the license will require Envirocare to make this assessment and receive approval before construction and use of the well (see License, Appendix B, Part I H 9). This work may be completed as a part of the groundwater flow modeling required for the facility (see License, Part I H 8), or may be completed by use of a separate flow modeling analysis.

2. Nearby Potential Use of Groundwater - the staff has concluded that due to poor groundwater quality of the uppermost water table aquifer, total dissolved solids in the range of 19,717 (well SC-1) to 50,130 (well SC-2) mg/l, that future use of untreated groundwater from the uppermost aquifer in the immediate vicinity of the disposal facility will be limited to industrial uses only. The staff has also concluded that as long as groundwater protection levels are met at the compliance monitoring wells that beneficial use of the groundwater will not be adversely impacted and that the performance objectives of UAC R447-25-7 will be met.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 2.8 Biotic Features

The data provided by the licensee regarding biotic features was derived from an Environmental Impact Statement performed by the U.S. Department of Energy for the siting of a uranium mill tailings remedial action project within the section presently owned by Envirocare. (The effects of the DOE project on avian, mammalian or reptilian species or vegetation thus precedes any induced effects by Envirocare's activities.) Thus, the staff concludes that the licensee's relevant information is adequate and meets the applicable requirement of R447-25.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Section 2.9 Site Characterization Monitoring

1. Groundwater Compliance Monitoring - the staff have concluded that Envirocare's groundwater compliance monitoring system has not been adequately justified. For this purpose, the license will require a full characterization of the local hydrogeology and description of the compliance monitoring system, see License, Appendix B, Part I E 2 and I H 3. These studies and reports will be required to identify the critical pathways of potential contaminant migration and the corresponding numbers and locations of wells, both horizontal and vertical, required to provide reliable warning of contaminant migration. Compliance monitoring wells will be located as close as practical to the disposal facility in order to allow independent monitoring of the LLRW Embankment from other facilities in the vicinity, and to comply with UAC R448-6-6.9 A. The compliance monitoring well system shall be complete and approved by the Executive Secretary before receipt of any waste at the disposal facility.

2. Groundwater Sampling Quality Assurance (QA) - the staff has determined that Envirocare's QA plan for groundwater sampling is incomplete. Consequently, the license will require the submittal of a groundwater sampling plan that complies with the RCRA TEGD. This plan will be approved by the Executive Secretary before any construction of the wells or the LLRW Embankment at the disposal facility, see License, Appendix B, Part I H 1.

3. Compliance Monitoring Well Construction - All wells used in the compliance monitoring well network shall confirm to the criteria found in the RCRA TEGD. After completion of the compliance monitoring well network Envirocare will be required to submit "As-Built" report and well construction diagram for each well, see License, Appendix B, Part I H 4. The "As-Built" reports shall be approved by the Executive Secretary before any construction at the disposal facility [License, Appendix B, Part I E 2(f)]. Failure to construct the well in accordance with the RCRA TEGD will be a failure to monitor, see License, Appendix B, Part I E 2(h).

CHAPTER 3

DESIGN AND CONSTRUCTION

CHAPTER 3
DESIGN AND CONSTRUCTION

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Section 3. Design and Construction

1. Final Engineering Drawings and Specifications - the staff has determined feasibility of design based on conceptual plans and preliminary drawings. However, final detailed construction engineering drawings and specifications must be submitted for staff and Executive Secretary review and approval before construction of the disposal facility, see License, Appendix B, Part I D 2.

2. Facility Location - the location of the facility has been established and restricted by the permit, see License, Appendix B, Part I D 3. This restriction has been placed on the licensee because:

   (1) the specified location is the only local where enough acceptable geotechnical data was available for the Utah Geological and Mineral Survey to complete a satisfactory evaluation of the geotechnical characteristics of the site,

   (2) the contaminant transport modeling was conducted based on depth to water table and subsurface materials data derived from the specified location, and

   (3) to move the LLRW Embankment to another local without reevaluation of the geotechnical and contaminant transport issues could result in a failure of the facility to comply with the performance objectives of UAC R447-25-7, or the requirements of the Ground Water Quality Protection Regulations.

   Consequently, any change of the location of the embankment, the size of the embankment, or number of embankments will require reapplication, the submittal of supporting technical documentation, and major modification of the Ground Water Quality Discharge Permit.

3. Waste Restrictions and Prohibitions - restrictions on the wastes to be received have been imposed to ensure that the facility is operated in accordance with approved design and procedures. The concentrations of radionuclides in the waste to be received will be limited by the license. Any disposal of radioactive waste in excess of these limits in the LLRW Embankment will require prior modification of the Ground Water Quality Discharge Permit. Envirocare will also be prohibited from disposal of hazardous wastes or hazardous constituents in the LLRW Embankment, since the design of the facility has not yet been shown to be compatible or feasible for the disposal of these materials (License, Appendix B, Part I D 5 and 6). Any disposal of hazardous wastes or hazardous constituents will require prior modification of the Ground Water Quality Discharge Permit

4. Site Monitoring (SRP Section 3.1.4.3.10) - the staff have reviewed Envirocare's proposal for site monitoring and the requirements of the Utah Ground Water Quality Protection Regulations, particularly UAC R448-6-6.1 and 6.4A and have determined that the proposed term of ground water monitoring is adequate. However, the license will require ground water quality monitoring from the compliance monitoring well network for as long as the facility requires a Ground Water Quality Discharge Permit, see License, Appendix B, Part I E 5. This would be expected to at least equal the active operational life of the facility and the required 30 year post-closure monitoring period.

5. Semi-Annual As-Built Report - the staff have determined that during the construction of the embankment Envirocare will submit semi-annual "As-Built" Reports to document construction of the disposal facility in compliance with conditions of the license (Appendix B, Part I G 10). Failure to construct the LLRW Embankment as per approved design or in a manner inconsistent with the Construction Quality Assurance Plan/Quality Control Plan will be cause for the Executive Secretary to conduct enforcement action against Envirocare, see License, Appendix B, Part I D 8.

6. Construction Equipment - the staff have determined that some proposed construction equipment and practices will be detrimental to performance of the design (e.g. use of a drum roller/compactor for clay liner or radon barrier compaction). As result, the license will require Envirocare to submit a CQA/QC Plan and receive Executive Secretary Approval before any construction of the LLRW Embankment, see License, Appendix B, Part I D 4.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 3.1.5 Principal Design Features

The staff has reviewed the principal design features for Envirocare's low-level waste disposal facility in accordance with SRP 3.1. The objective of the review was to verify that the applicant has presented sufficient descriptive information in an overall disposal facility plan to provide reasonable assurance that the principal design features will: (1) minimize infiltration of water into disposal units; (2) ensure the integrity of disposal unit covers; (3) ensure the structural stability of backfill, wastes, and covers; (4) minimize contact of waste with standing water; (5) provide adequate site drainage during operations and after closure; (6) facilitate site closure and stabilization; (7) minimize the need for long-term maintenance; (8) provide a barrier against inadvertent intrusion; (9) maintain occupational exposures as low as is reasonably achievable; (10) provide adequate monitoring of the disposal site; and (11) provide and adequate buffer zone for monitoring and potential mitigative action

The standard review objective has been met and is supported by the finding that the technical information required by R447-25-7(2) has been provided, the technical requirements in R447-25-24(1)(A) through (F) have been met, and the design information as required by other SRPs has been provided.

The site plans have clearly shown the site boundary, restricted zone, security area, buffer zone, operational area, and general layout of the disposal facility. The engineering drawings have provided the necessary information for the construction of the waste disposal facility at Envirocare. Construction specifications provided by the applicant are based on the function and design requirements of the land disposal facility. Compliance with the construction drawings and specifications will provide assurance that the land disposal facility will be properly constructed and will perform its intended safety function.

The applicant has provided the information identified in SRP 3.3.1 and in R447-25-7(5) and (6). The construction procedures and methods that will be used by the applicant conform with established criteria, codes, standards, specifications, and good engineering judgment and are acceptable to the UBRC staff. The use of these criteria, as defined by good engineering judgment and practice, and the applicable codes, standards, guides, and specifications (as noted below) provides reasonable assurance that, in the event of an occurrence of a design-basis event or of a postulated accident during construction and operation, the constructed facilities will withstand the specific design imposed loading conditions without impairment of structural integrity and stability.

The applicant has provided acceptable detailed descriptions of the construction methods and procedures for the disposal facility. Because these procedures and methods have been proven to be adequate, they provide assurance that the construction of the waste disposal facility will meet the design requirements.

The applicant has met R447-25-7(1) by providing a construction quality control program, which provides measures for implementing the guidelines related to construction inspection, material control, and audits.

The site plans provided by the applicant have clearly shown the location and boundary of the disposal site. General layout of the facilities and disposal units are also indicated on the plans.

Engineering drawings provided by the applicant have conveyed the design information correctly and adequately. The drawings have provided the necessary information for the construction of the disposal facility including the location, type, and details of the structures, systems, and components of the land disposal facility. The engineering drawings provided by the applicant ensure that the designed land disposal facility will be properly constructed and will conform to the required design standards. The engineering drawings are acceptable and have met the technical information requirements of R447-25-7(2), (5) and (6).

Construction specifications provided by the applicant are compatible and consistent with well-established industry codes, standards, and specifications and are acceptable to the staff. Provisions of the construction specifications provide reasonable assurance that the constructed disposal facility will conform to the specified design requirements and will meet R447-25-11(3), (5) and (6).

On the basis of the findings, the staff concludes that there is reasonable assurance that the procedures and methods proposed by the applicant for the construction of the waste disposal facility are acceptable and meet R447-25.

Section 3.3.2 Construction Equipment

The staff has reviewed the types of equipment, and their capabilities, that are to be used in the construction operation of the Envirocare low-level waste disposal facility according to SRP Section 3.3.2 to ensure that the equipment will meet the construction requirements and will safely perform its intended functions. Selection and use of the designated construction equipment is based on the construction function and capability of the equipment. The applicant has ensured that, with the use of the designated equipment, the construction and operation of the disposal facility will meet the performance objectives of R447-25-18 through 22.

The staff has reviewed the information on the construction equipment provided by the applicant and has concluded that the equipment is acceptable because reasonable assurance has been provided that it: (1) will perform its intended function; (2) is in conformance with the construction requirements, and (3) will permit safe construction and operation of the disposal facility.

The applicant has met SRP 3.3.2 and R447-25-7(5) (6) and (11) and has provided adequate information on the types of equipment and on equipment specifications and capabilities that will provide assurance of the safe performance of the equipment. The land disposal facility constructed and operated by the use of this equipment will meet the required safety function and will fulfill the performance objectives of R447-25-18 through 22.

The applicant has provided acceptable documentation on the quality assurance/quality control program for the equipment that will be used in the construction and operation of the land disposal facility. The documentation provides evidence and assurance that the selected equipment will reliably perform its intended function without impairing the quality and integrity of the disposal facility and that the applicable portions of R447-25-7(10) will be met.

The applicant's procedures for the purchase, replacement, maintenance, and inspection of equipment are adequate, and the use of these procedures will ensure that there will be no unacceptable breakdown, interruption, or delay in the construction and operation of the land disposal facility.

Section 3.4.1 Utility Systems

The staff has reviewed the utility systems for Envirocare's low-level waste disposal facility according to SRP Section 3.4.1 to verify that sufficient information has been provided for each utility system that is required by the facility design; that each utility system has been designed and will be constructed to provide the supporting functions required by the principal design features, construction, and safe operation of the facility; and that the design and construction of the utility system will not adversely affect facility performance.

The applicant has accurately described the required functions of the communication system, including all the materials and components that are necessary so that it will function as required and at the capacity required. The staff has evaluated the adequacy of the applicant's proposed design criteria and bases for the communication system and the requirements for facility operations. The staff has determined that the applicant's proposed design of the communication system is consistent with the principal design criteria and bases. The system's design does not interfere with the design of the principal design features or the safe operation of the facility. Therefore, there is reasonable assurance that the communication system, which the staff has found meets R447-25-7(2) through (6), R447-25-11(1) through (7), and R447-25-24, will provide adequate support for the principal design features.

The applicant has accurately described the required functions of the electric and lighting system, including all the materials and components that are necessary so that it will function as required and at the capacity required. The staff has evaluated the adequacy of the applicant's proposed design criteria and bases for the electric and lighting system and the requirements for facility operations. The staff has determined that the applicant's proposed design of the electric and lighting system is consistent with the principal design criteria and bases. The system's design does not interfere with the design of the principal design features or the safe operation of the facility. Therefore, there is reasonable assurance that the electric and lighting system, which the staff has found meets R447-25-7(2) through (6), R447-25-11(1) through (7), and R447-25-24, will provide adequate support for the principal design features. On the basis of its review, the staff concludes that the design of the electric and lighting system conforms to all applicable regulations and industry standards and is acceptable.

The applicant has accurately described the required functions of the water and waste water systems, including all the materials and components that are necessary so that it will function as required and at the capacity required. The staff has evaluated the adequacy of the applicant's proposed design criteria and bases for the water and waste water systems and the requirements for facility operations. The staff has determined that the applicant's proposed design of the water and waste water systems is consistent with the principal design criteria and bases. The system's design does not interfere with the design of the principal design features or the safe operation of the facility. Therefore, there is reasonable assurance that the water and waste water systems, which the staff has found meets R447-25-7(2) through (6), R447-25-11(1) through (7), and R447-25-24 will provide adequate support for the principal design features.

Section 3.4.2 Auxiliary Facilities

The staff has reviewed the auxiliary facilities for Envirocare's low-level waste disposal facility according to SRP Section 3.4.2 to verify that sufficient information has been provided by the applicant for each auxiliary facility that is required by the facility design; that each auxiliary facility has been designed to provide the supporting functions required by the principal design features, construction, and safe operation of the facility; and that the design and construction of the auxiliary facilities will not adversely affect the disposal facility performance.

The staff concludes that the objectives of the review have been met and that the review supports the following conclusions for the auxiliary facilities.

The applicant has accurately described the required functions of each auxiliary facility, including all buildings and roadways necessary to function as required by the disposal facility design, construction, and operation. The staff has determined the adequacy of the applicant's proposed design criteria and bases for each auxiliary facility. The staff has determined that each auxiliary facility conforms to the design criteria and bases and that the design does not interfere with the design of the principal design features, construction, or operation of the disposal facility. Therefore, there is reasonable assurance that the auxiliary facilities which the staff has found meet R447-25-7(2) through (6) and R447-25-24, will provide adequate support for the principal design features.

On the basis of its review, the staff concludes that the design of each auxiliary facility conforms to all applicable regulations and industry standards and is acceptable.

Section 3.4.3 Fire Protection System

The staff has reviewed the fire protection system for the Envirocare low-level waste disposal facility according to SRP Section 3.4.3. The staff concludes that the fire protection system has been designed: (1) to maintain occupational exposures as low as is reasonably achievable if an accidental fire should occur; and (2) to be compatible with the facility's radiation safety and emergency planning programs. The applicant has provided provisions for an adequate training program for personnel in fire prevention and protection. The fire protection system, therefore, meets R447-25-6(2)(c) and (d), R447-25-7(11) and R447-25-21, as they relate to fire protection.

In meeting these requirements, the applicant has used the recommended methods in the following national fire codes published by the National Fire Protection Association (NFPA):

1. NFPA 801-1986, "Recommended Fire Protection Practice for Facilities Handling Radioactive Materials"

2. NFPA 901-1981, "Uniform Coding for Fire Protection"

On the basis of its review the staff concludes that the proposed fire protection system is reasonable and acceptable.

Section 3.4.4 Erosion and Flood Control System

The staff has reviewed the erosion and flood system for Envirocare's low-level waste disposal facility according to SRP Section 3.4.4.

During the operation of the facility, diversion channels and flood embankments will be constructed to protect the site from the effects of on-site flooding. The diversion ditches will eventually become part of the long-term design against flooding.

For both off-site and on-site local flooding, the UBRC staff independently estimated peak flood flows and velocities to determine the adequacy of the design features. These features were analyzed in accordance with the hydrologic procedures discussed in SRP 6.3.1. On the basis of these independent analyses, the staff concludes that the design of the facility meets the requirements of R447-25-24(1)(e) and (f), so that site hydrologic features, when enhanced with the proposed design features, will prevent erosion and flooding of the disposal units during operation. Additional details related to the staff analysis are found in SRP 6.3.1, particularly for those features that will become part of the long-term design.

CHAPTER 4

FACILITY OPERATIONS

CHAPTER 4
FACILITY OPERATIONS

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 4.1.2 On-Site Acceptance Review

The staff has reviewed the applicant's procedure for the receipt and inspection of incoming wastes at the Envirocare facility according to SRP Section 4.1 of NUREG 1200.

The applicant's procedures and the conditions written into the license will result in inspections that provide reasonable assurance that waste entering the disposal facility meets all appropriate rules or regulations. The applicant's procedure and license conditions will result in the identification of waste class, chemical and physical content, the shipper identification and assurance that the waste meets the requirements for waste form and classification in accordance with R447-15-307.

Section 4.1.5 Receipt and Inspection of Waste

The staff reviewed the applicant's procedures for the receipt and inspection of waste entering the Envirocare low-level waste disposal facility according to SRP Section 4.1 and finds that the information is as recommended in NUREG-1199, Section 4.1.

The applicant's procedures will result in routine inspections that provide reasonable assurance that waste entering the disposal facility meets the packaging, labeling, placarding, and survey requirements of the U.S. Department of Transportation and R447-19-100.

The applicant's procedures will result in verification of the waste manifest requirements of R447-15-311, including identification of the waste class, chemical and physical contents, identification of the person shipping the waste, and probable assurance that the waste meets the requirements for waste classification as required by R447-15-307 and 308

The applicant's procedures provide for adequate and reasonable measures to ensure that the waste does not contain hazardous constituents, as defined by the U.S. Environmental Protection Agency's regulation in 40 CFR 261.

The applicant's procedures help to ensure that the performance objectives of R447-25-18 through 22, will be met with regard to the following:

1. Protection of the general population from releases of radioactivity and the maintaining of any releases as low as is reasonably achievable as requir by R447-25-19.

2. Protection of individuals from inadvertent intrusion as required for certain waste classes that are identified and verified by the applicant's inspection procedures and as required by R447-25-20.

3. Protection of individuals during operations as determined by a comparison of exposures against R447-15 as it applies to occupational exposures and as required by R447-25-21.

2. Temporary Storage of Wastes - the staff have determined that Envirocare's plans for the temporary storage of wastes must be revised in order to prevent the release of contaminant to local soils and ground water. Consequently, the license will require that Envirocare submit detailed description and engineering plans and specifications for temporary waste storage facilities and operations, and receive Executive Secretary approval before the receipt of any waste, see License, Appendix B, Part I D 7 and Part I H 12. However, temporary storage of LLRW materials will be allowed for a brief period if the wastes are stored in water-tight containers, while Envirocare is in the process of securing approval of the permanent temporary waste storage area.

3. Waste Disposal Operations - the staff have determined that Envirocare's description of waste disposal operations does not provide sufficient detail to allow the staff to determine if is meets the criteria of NUREG 1200, SRP Section 4.3. As a result, the license will require Envirocare to submit a detailed description and receive staff approval before any construction at the disposal facility, see License, Appendix B, Part I D 4 and 7, and H 12. This plan will adequately address all the elements in Section 4.3 of the SRP, except the filling of void spaces.

4. Buffer Zone - the staff are unable to determine if the 50 foot zone proposed between the "edge of the embankment and the fence" is enough distance for environmental monitoring and mitigative measures. This can only be determined after: 1) final engineering design and embankment location are verified, 2) the hydrogeologic characteristics of the site are fully known, including hydraulic gradient, flow direction, average linear velocity, etc., 3) Ground water compliance monitoring wells are located relative to the disposal facility, and 4) Potential ground water mitigative/remedial measures are identified in the Contingency Plan. Consequently, the license requires said evaluation and inclusion of the necessary information into the final design of the LLRW Embankment, see License, Appendix B, Part I H 10 and D 2.

5. Other Sources of Potential Discharge to Ground Water - the staff are unable to determine if the following related facilities have adequate design and operation to prevent the release of contaminants to soil or ground water:

   a. Railcar Rollover
   b. Secondary railcar unloading area
   c. Railcar wash down area
   d. Truck wash at the administration building
   e. Temporary truck wash at the disposal facility
   f. Evaporation pond

   As a result, the license will require Envirocare to submit detailed engineering plans and descriptions and receive Executive Secretary approval before receipt of waste at the disposal facility, see License, Appendix B, Part I H 12. However, Envirocare will be allowed to receive and temporarily store wastes if they arrive on site and are maintained in water-tight containers.

6. Reuse of Decontamination Water - the staff have determined that water used to decontaminate vehicles or equipment must be discharged only to an Executive Secretary approved facility in order to prevent contamination of ground water. This may include reuse of the water for dust depressing or moisture control on the low-level radioactive waste embankment, if this reuse does not cause the embankment to surpass them moisture content criteria as determined in the Construction QA/QC Plan (License, Appendix B, Part I D 4). As a result, the license will require prior Executive Secretary approval of any disposal or reuse of water used for decontamination purposes, see License, Appendix B, Part I D 9.

7. Operational Ground Water Monitoring - the staff have determined that Envirocare's description of operational ground water monitoring is incomplete, and consequently cannot determine if the measures satisfy the requirements of UAC R447-15 and R447-25. As a result, the license will require Envirocare to complete the following activities before construction of the disposal facility:

   a. Characterization of local hydrogeology, including ground water flow modeling, see License, Appendix B, Part I H 3 and 8.

   b. Completion of a compliance monitoring well network, see License, Appendix B, Part I E 2.

   c. Demonstration that the compliance monitoring well network will provide early warning and sufficient warning to evaluate the need for mitigative/remedial measures and implement the preferred measure while the contaminant remains in the buffer zone, see License, Appendix B, Part I H 3, 8 and 10.

8. Waste Characterization Monitoring - in order to ensure that the LLRW Embankment performs in accordance with approved design, a waste characterization and control plan has been required (License, Appendix B, Part I H 13). The purpose of this plan is to ensure that: 1) only allowable concentrations of low-level radioactive wastes are received for disposal, and 2) that hazardous waste and hazardous constituents are denied disposal in the LLRW Embankment, in accordance with the requirements of the license, Appendix B, Part I D 5 and 6. Regular monitoring and reporting of the waste characteristics will also be required, see license, Appendix B, Part I E 8.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 4.4 Operational Environmental Monitoring and Surveillance

The staff has reviewed the operational environmental monitoring program as proposed by Envirocare according to SRP 4.4. The reviewer(s) concludes the program provides for compliance with R447-15 and R447-25. The applicant's environmental monitoring program includes evaluation of radiological and/or chemical constituents as potential contaminants in air, soil, surface water, groundwater, and vegetation. This includes surveillance of controlled access areas and nearby site environs. The licensee has available the resources to conduct the environmental monitoring program. License conditions number 22, 25 and 28 address issues relevant to the licensee's environmental monitoring program.

CHAPTER 5

SITE CLOSURE AND INSTITUTIONAL CONTROLS

CHAPTER 5
SITE CLOSURE AND INSTTITUTIONAL CONTROLS

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 5.1.1 Surface Design and Erosion Protection

The areas have been addressed and the staff conclusions are found in Section 3.1.5 and Section 6.3.1 of this Safety Evaluation Review.

CONCLUSIONS OF THE REVIEW/Utah Geological and Mineral Survey

Section 5.1.2 Geotechnical Stability

The geotechnical stability aspects of the proposed site closure plan for the Envirocare low-level waste disposal facility has been reviewed according to SRP 5.1.2. The objectives of the review are to ensure that: (1) the overall site grading plan provides for adequate cover on all the disposal unit excavation caps and for appropriate grading to direct the flow of surface water away from the excavations, taking into consideration the anticipated long-term settlement and/or subsidence at the site; (2) all the natural and artificial slopes of dikes and ditches at the disposal site will be stable in the long term and the disposal site will require minimal care and maintenance during the institutional control period; (3) the monitoring programs to evaluate the performance of the disposal excavations are adequate in scope so that the needed data can be collected; and (4) the applicant has committed to use all the data collected during the operational phase of the facility to revise and/or improve the final site closure plan that will be submitted before site closure.

The information in the license amendment application has been reviewed to determine if:

1. The applicant has adequately described how the excavation will be backfilled, how the excavation cap will be constructed, and how the performance of the excavation will be monitored.

2. The applicant has committed to analyze the monitoring program data, either to validate the predicted performance of the excavation cap or to change, if necessary, the design and/or construction procedures to enhance the performance of the backfill and cap.

3. The applicant's proposal for final grading of the site provides for a cover of adequate thickness on all excavations and appropriate grading to direct the flow of surface water away from, the excavations.

4. All artificial and natural slopes of the dikes and ditches within the disposal site will be stable in the long term.

5. The long-term monitoring program to evaluate the performance of the geotechnical aspects of the disposal site is adequate in scope and presented in appropriate detail.

6. The applicant has committed to use the data and experience gained during the operational phase and to revise and/or improve the site closure plan that will be submitted for review during the final stage of the operational phase.

The information on the geotechnical stability aspects of the site closure plan in the license amendment application is adequate to satisfy the objectives of this review. On the basis of information provided for this review, there is reasonable assurance that the disposal facility, if closed according to the site closure plan, will satisfy the long-term performance objectives of R447-25-7(7), R447-25-11(6), R447-25-22, and R447-25-25(1)(j).

The geotechnical stability aspects of the site closure plan in the license amendment application meet all applicable regulations and are acceptable.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 5.2 Decontamination and Decommissioning

The staff has reviewed the decontamination and decommissioning plan for the Envirocare radioactive waste disposal facility according to the SRP Section 5.2.

The staff has verified that sufficient information exists to: (1) meet the requirements of R447-25-15; (2) substantiate fixed and removable contamination levels for facilities, equipment or other items for unrestricted release will be below those specified by license condition 26; and (3) wastes generated during decontamination will be disposed of on-site.

Furthermore, the staff concludes the site will be capable of meeting the performance objectives of R447-25 after decommissioning. License Condition 60 addresses these performance criteria during the post-closure period.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Section 5.3 Post-operational Environmental Monitoring

Ground Water Monitoring - the staff have determined that Envirocare's postclosure ground water monitoring plan is incomplete. As a result, the license will require Envirocare to submit a plan for postclosure ground water monitoring and receive Executive Secretary approval before any construction of the disposal facility, see License, Appendix B, Part I H 6.

CHAPTER 6

SAFETY ASSESSMENT

CHAPTER 6
SAFETY ASSESSMENT

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Section 6.1.3 Radionuclide Release/Normal Conditions

Ground Water Pathway - the staff have determined that based on the waste concentration limits specified in the license and the contaminant transport modeling information submitted, that the radionuclides released as leachates from the base of the LLRW Embankment will be attenuated during both advective flow to the water table and diffusive transport in the unsaturated zone. The staff have also determined that the concentration of each of the radionuclides in the ground water at the water table will be maintained at or below the Ground Water Quality Standards for a period of time in excess of 500 years.

Section 6.1.5 Transfer Mechanism - Groundwater

The staff have carefully reviewed the input parameters and the code used for simulation of the unsaturated zone transport of the radionuclides allowed for disposal by the license. Though site specific information was limited, the assumed values for distribution coefficients, retardation factors, diffusion coefficients and hydraulic inputs to the model were sufficiently conservative to overcome the data limitations and adequately simulate conditions expected at the site. The contaminant transport modeling demonstrated that the concentrations of the radionuclides at the water table will not exceed the Ground Water Quality Standards for a period of time in excess of 500 years. Longer periods of time would be required for horizontal transport of the radionuclides to a location where ground water could be withdrawn for consumptive purposes.

In addition, the Groundwater Quality Standards have been established for the protection of ground water for purposes of human consumption, primarily on the basis of EPA drinking water MCLs (maximum concentration limits). Consequently, these standards represent acceptable concentrations of radionuclides with respect to dosage. Therefore, the contaminant transport evaluation has shown satisfactory dosage assessment relative to the ground water pathway. This assessment also includes an extra built-in margin of safety in that though the water table aquifer is unfit for drinking water uses without significant pretreatment (Class IV aquifer), Envirocare has been required to demonstrate that the concentration of the radionuclides will not exceed drinking water MCLs at the water table for at least a 500 year period.

CONCLUSIONS OF REVIEW/Utah Bureau of Radiation Control

Section 6.1 Through 6.1.6 Release of Radioactivity

The general purpose of the sections of this portion of the SRP is to demonstrate that Envirocare has provided reasonable assurance that the following Utah Bureau of Radiation Control Rules (as performance objectives) will be met.

1. R447-15 "Standards for Protection Against Radiation"
2. R447-25-19 "Protection of the General Population from Releases of Radioactivity"

The two regulations limit radioactive releases to off-site areas. Furthermore, R447-25 limits doses such that the following annual doses to the public will not be exceeded:

A. 25 millirem to the whole body
B. 75 millirem to the thyroid gland
C. 25 millirem to any other organ

Additionally, R447-15 stipulates the occupational radiation standards to be met by Envirocare, i.e., 1,250 millirem per quarter to an on-site worker during disposal operations.

In order to evaluate the various pathways for exposure to radiation, the UBRC and later, the applicant, contracted with Rogers and Associates Engineering, Inc., Salt Lake City, Utah, to perform the appropriate pathways analyses. The model, PATHRAE, models off-site and on-site pathways through which persons may come in contact with contaminated wastes.

The off-site pathways include groundwater transport to a surface river or a well, surface (wind or water) erosion, facility overflow, and atmospheric transport. The on-site pathways include direct gamma exposure, dust inhalation, food grown on the waste site, biointrusion, and radioactive gas inhalation. On-site pathways of concern arise principally from worker doses during operations and from post-closure site reclamation (intruder) activities such as constructing a house and living on-site, growing edible vegetation on-site, and drilling wells for irrigation or drinking water.

Exposures to individuals were calculated based on unit concentrations (1 pCi/g) of each radionuclide postulated to be present in waste disposed at the Clive facility. The unit concentration dose results were then combined with applicable dose criteria to infer proposed concentration limits for the safe disposal of waste at the Clive facility. The quotients of the applicable dose criteria divided by the unit concentration dose results provided scaling factors by which the unit concentrations were multiplied to determine the maximum permissible concentrations of radionuclides in the waste.

Any "inferred concentration limit" or a fraction thereof provides reasonable assurance that if an individual were exposed to any of the licensed radionuclides, the resultant exposure would not exceed the appropriate annual exposure standards under postulated conditions. The "inferred concentration limits" for each isotope or a lesser value (as requested by the applicant) is a condition of the license. (See Draft License appended).

The information provided by the applicant and also generated contractually for the UBRC demonstrates that:

1. Potential impacts for on-site individuals, conducting routine activities during the facility operational period, will be controlled so that they will not exceed the limits specified in R447-15.

2. Potential off-site release will be controlled so that impacts on individuals through any combination of exposure pathways will not exceed the limits specified in R447-25-19.

Section 6.2 Intruder Protection

The staff has reviewed the intruder protection systems according to Section 6.2 of the SRP. The staff concludes that the engineered intruder barriers will provide reasonable assurance that an inadvertent intruder will be adequately protected. This is for the period after active control is discontinued. Class C wastes will not be authorized for disposal therefore, the requirement of R447-25-25 is not relevant. The staff concludes that the requirements in R447-25-8, 11 and 20 are met by the facility design.

Section 6.3.1 Long-Term Stability

The SRP Section 6.3, concerns itself with the following parameters: site erosion and maximum probable flooding and precipitation, slope failure and liquefaction and differential settlement.

The staff have reviewed the information submitted by the applicant regarding, flooding and erosional effects on long-term stability including: maximum probable flood and maximum probable precipitation and those erosion design features which should mitigate the effects of those probabilist events. Accordingly, the staff concludes that on-site drainage channels, erosion protection for perimeter ditches, and erosion protection for the embankment are adequate and meets the relevant requirements in R447-25-7.

CONCLUSIONS OF THE REVIEW/Utah Geological and Mineral Survey

Section 6.3.2 Stability of Slopes

The long term stability of the slopes at the Envirocare low-level waste disposal facility has been reviewed according to SRP 6.3.2. The objectives of this review were to ensure that: (1) critical slopes at the disposal site have been identified for evaluation; (2) the information on the geotechnical characterization of the slope area and borrow material is adequate; (3) slope characteristics have been described in appropriate detail; (4) the design and analysis of slope stability were presented in appropriate detail; (5) there are provisions for quality control during construction; and (6) information in the license amendment application meets SRP 6.3.2.

The information in the license amendment application have been reviewed to determine if:

1. The applicant has identified both engineered and natural slopes at, or in, the general vicinity of the disposal facility that should satisfy the long-term stability requirement of the regulations.

2. The information in Section 2.6 is adequate to enable the reviewer to independently judge the applicant's interpretation of the stratigraphy and design parameters used in the slope stability analyses.

3. The applicant's description of the slope characteristics, cross-sections, the soil and foundation conditions at the slope, the summary and description of both the static and dynamic properties of the soil, and the phreatic surface and seepage forces used in the analysis are a reasonable and conservative interpretation of the available data.

4. In the static and dynamic analyses performed by the applicant, reasonable and conservative design assumptions were used and uncertainties were considered with regard to the shape of the slope, the boundaries of several types of soil within the slope, forces acting on the slope, pore-water pressure within the slope, failure surface corresponding to the lowest factor of safety, the effect of assumptions inherent in the method of analyses, and adverse environmental conditions.

5. The applicant has definite plans for applicable quality control actions pertaining to both the selection and excavation of borrow materials and the compaction phase of earthwork.

The information on both short-term and long-term slope stability in the license amendment application is adequate to satisfy the objectives of this review. On the basis of data and analyses provided for this review, the applicant has proven that the factors of safety against short-term and long-term failure of engineered slopes and natural slopes at the site are greater than the acceptable minimum of 1.30 for short-term and 1.50 for long-term static stability and greater than 1.0 for dynamic stability for both cases. Therefore, there is reasonable assurance that the slopes at the disposal facility are stable in the long term and that the slope stability requirements of R447 25-8(4), R447-11(6), R447-25-22, R447-25-23(1)(i), R447-25-24(1)(a), and R447-25-24(1)(b) are met.

On the basis of this review, it has been determined that the long-term slope stability aspects of the license amendment application meet all the requirements of the applicable regulations.

Section 6.3.3 Settlement and Subsidence

The long-term settlement and/or subsidence aspects for the Envirocare low-level waste disposal facility were reviewed according to SRP 6.3.3. The objective of the review was to ensure that: (1) information on the site characteristics, construction of the facility, waste disposal operations, and disposal excavation caps is adequate; (2) the areas that are potentially susceptible to long-term settlement have been identified and their modeling (characterization of the problem) is reasonable and conservative; (3) the uncertainties have been considered and addressed appropriately in the settlement analyses; (4) the applicant has committed to perform remedial actions if long-term settlement should be a potential problem; and (5) the information presented meets the guidance and acceptable criteria in SRP 6.3.3.

The information in the license amendment application has been reviewed to determine if:

1. The information on site characteristics, the excavation and backfilling of disposal excavations during the operations phase, and disposal excavation cap design and construction was adequate to justify the applicant's interpretation of stratigraphy, the typical section of disposal excavations, and the parameters used in the settlement analyses.

2. Both the general areas within the disposal site and the excavation cover areas that are potentially susceptible to long-term settlement are identified, and the applicant's description of the typical sections, the long-term condition of the backfill and buried waste were within the excavation, the parameters used in estimating the settlement, and the assumptions on groundwater conditions were a reasonable and conservative interpretation of the available data.

3. The uncertainties such as severe events or conditions resulting in settlement, the extent and boundaries of the various materials within the sections being analyzed, and the effect of assumptions inherent in the method of analysis were considered by the applicant in the settlement analyses.

4. The applicant has provided definite proposals for remedial actions if excessive settlement and/or settlement-induced cracks should occur in the disposal excavation cover, and evaluated the slope and feasibility of such proposals.

The information on long-term settlement and its safety implications is adequate to satisfy the objectives of this review. On the basis of the review of information provided by the applicant and the commitment for remedial action during the operational phase and initial 5 years or longer, if necessary, of the institutional control phase, the applicant has satisfactorily demonstrated that the potential for long-term settlement and/or cracking of the disposal excavation cover is minimal and thereby the settlement and/or subsidence aspects of R447-25-8(4), R447-25-11(6), R447-25-22, R447-25-24(1)(a), and R447-25-24(1)(b) are satisfied.

On the basis of this review it has been determined that the adverse effect of long-term settlement and/or subsidence on the performance of the disposal facility is minimal. The information on the settlement and/or subsidence aspects meets all the applicable regulations, contingent on the commitment by the applicant to perform remedial actions, if necessary, to mitigate the adverse effects of settlement and/or subsidence on the performance of the disposal facility.

CHAPTER 7

OCCUPATIONAL RADIATION EXPOSURE

CHAPTER 7
OCCUPATIONAL RADIATION EXPOSURE

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 7.1 Occupational Radiation Exposure

The staff has reviewed the information on occupational radiation exposure in relation to the as low as is reasonably achievable (ALARA) principle for the Envirocare low-level waste disposal facility according to SRP Section 7.1.

The staff concludes that the ALARA policy, facility design, and operational considerations are acceptable because the applicant has met the training requirements of R447-18-12 and the ALARA provisions of R447-15-10.

The applicant has provided a management commitment to ensure that Envirocare will be designed, constructed, and operated in a manner consistent with the above criteria.

The objective of the facility radiation protection program is to maintain individual doses and total person-rem doses to facility workers and to members of the general public within the ALARA concept and to maintain individual doses within the limits of R447-15-101. Within restricted areas, sources of direct radiation and airborne radioactive contamination were considered in the review.

Section 7.2 Radiation Sources

The staff has reviewed the radiation sources for the Envirocare facility according to the SRP Section 7.2. During operation, the greatest potential for personnel radiation dose is direct gamma. Otherwise, the primary source(s) of personnel exposure is dust inhalation. A complete description of the routine operation source term evaluations are contained in "Evaluation of the Potential Public Health Impacts Associated With Radioactive Waste Disposal at a Site Near Clive, Utah", Rogers and Associates Engineering Corporation, Salt Lake City, Utah. The applicant has described a facility that can meet the standards found in R447-15.

Section 7.3 Radiation Protection Design Features

The staff has reviewed the information submitted in accordance with Section 7.3 of the SRP. This section deals with radiation protection design features such as equipment and facilities, shielding, ventilation and air monitoring instrumentation.

Due to the nature of the materials for disposal, much of these reviews are not relevant. Specifically, unique shielding is not necessary, nor is special ventilation since activities are conducted out of doors.

The applicant has provided documentation designating radiation control or limited access areas. The applicant has provided data regarding fixed area radiation monitoring and continuous airborne radioactivity monitoring instrumentation and monitoring methods.

On the basis of the examination of these materials, the staff concludes the radiation protection design features are adequate and the applicant can meet the relevant sections of R447-15 and R447-25. In order to emphasize the importance of these items in the facility safety procedures and program, license conditions 19, 22, 24 and 25 were included.

Section 7.4 Radiation Protection Program

The staff has reviewed the following areas of the applicant's radiation protection program: (1) organization; (2) equipment, instrumentation and facilities; and (3) radiation protection procedures. These reviews were conducted utilizing 7.4 of the SRP.

On the basis of the review, it is concluded that the program is acceptable and generally meets the requirements stated in R447-15 and R447-25.

The duties, responsibilities and qualifications of the applicant's radiation program staff provides reasonable assurances of experienced and knowledgeable senior personnel. The organization provides for accountability and internal checks and balances for the radiation protection program. The applicant's training program for new hires or non-radiation personnel is adequate and includes basic radiation science and radiological health procedures as well as facility policies and procedures for the radiation control program.

The radiation protection features include a radiochemistry laboratory, personnel decontamination areas, access control points, office, and laundry and locker room facilities. These facilities are sufficient to maintain occupational radiation exposures ALARA.

Equipment to be used for radiation protection purposes includes portable radiation survey instruments, personnel monitoring equipment, fixed and portable area and airborne radioactivity monitors, laboratory equipment, air samplers, respiratory protective equipment, and protective clothing. The number and types of equipment to be used are adequate, and provide reasonable assurance that the applicant will be able to maintain occupational exposures ALARA.

All permanent and temporary facility personnel will be assigned beta-gamma thermoluminescent dosimeter badges. These badges will be processed quarterly, and more frequently if significant exposures are suspected. The applicant has provided policies and procedures for monitoring radiation exposures to visitors.

Appropriate caution signs, labels, and signals will be provided in accordance with R447-15-203 and R447-15-204. Bioassays will be provided when deemed necessary by the radiation protection manager or directed by the UBRC. Records of surveys, personnel monitoring, and bioassays will be maintained in accordance with R447-15-401.

Procedures have been developed to insure that exposure limits are not exceeded by on-site personnel; to control the radiation work areas; to post radiation areas; to control all radioactive materials on vehicles; equipment or personnel leaving the radiation control areas; to monitor and control contamination of facilities; to monitor airborne contaminants; and to provide for access and use, by qualified personnel, of appropriate radiation detection and monitoring instrumentation.

CHAPTER 8

ORGANIZATIONAL STRUCTURE

CHAPTER 8
ORGANIZATIONAL STRUCTURE

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 8.1 Organizational Structure

The staff has reviewed the information provided in regards to the organizational structure. This includes the management structure and its resources available to support on going construction activities, staffing and other technical support necessary for safe facility operation. This information provides sufficient assurances that the operations can be conducted in accordance with licensee commitments and the Utah Radiation Control Rules. In order to emphasize the importance of this factor, license condition 31 has been included.

Section 8.2 Qualification of the Applicants

Utah Radiation Control Rule, R447-25-11(2) requires an applicant to demonstrate "the applicant is qualified by reason of training and experience to carry out disposal operations in a manner that protects health and minimizes danger to life or property".

The applicant has described the staff positions within the organization structure, the reporting chain of command up to the corporate chief executive officer, staff size for various positions and their responsibilities. The applicant has provided a description of the qualifications for each position and the resumes for key personnel currently employed. On this basis, the staff concludes the licensee's operating organization is acceptable and can met the requirements of R447-25-11(2). To emphasize the importance of this element of facility operations, license condition 32 is included.

Section 8.3 Staff Training Program

The licensee has provided information regarding the staff training program for the Envirocare facility to include the curriculium for each category of instruction and a schedule for refresher training. The UBRC staff has reviewed this information and finds it adequate and meets the goals of R447-18-12 and R447-25-11(2). To emphasize the importance of continued training, license condition 29 has been included.

Section 8.4 Emergency Planning

The staff has reviewed the information on emergency planning for the Envirocare low-level radioactive waste disposal facility. The licensee has established plans for responding to on-site emergencies of all types including those involving radioactivity. The licensee includes in these plans, procedures that include interaction with local governments and locally available medical treatment. The emergency response plans are judged to be adequate.

Section 8.5 Reviews and Audits

The UBRC staff has reviewed the information provided by the licensee relevant to internal reviews and audits of operational activities. The Envirocare program includes independent third-party audits of their engineering and safety related programs. The review and audit procedures include a frequency of audit schedule, a listing of subject matter to be reviewed and the qualifications of the individuals performing the audits. The licensee also provided information regarding senior staff reviews of operating programs. The UBRC concludes these programs are adequate.

Section 8.6 Facility Administrative and Operating Procedures

The licensee has provided information regarding the policies and procedures implemented in order to provide control over activities that are important to safe facility operations. The UBRC staff has reviewed these policies and procedures and finds that major safety related procedures and site operating policies have been addressed.

Section 8.7 Physical Security

The staff has reviewed the licensee's information relevant to physical security for the site. The licensee's program is comprehensive and should provide for adequate protection against theft or vandalism. License conditions 48 and 49 address aspects of the physical security plan.

CHAPTER 9

QUALITY ASSURANCE

CHAPTER 9
QUALITY ASSURANCE

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 9.1 Quality Assurance During the Design and Construction Phase

The staff has reviewed the quality assurance (QA) program during the design and construction phase for Envirocare's low-level waste disposal facility according to SRP Section 9.1.

The organizations and persons performing QA functions have the required independence and authority to effectively carry out the QA program without undue influence from those directly responsible for costs and schedules.

The quality assurance requirements outlined in the SAR are applicable to both the design and construction phase as well as the operation phase of the project. The majority of the construction for this project has already been completed.

During the design phase of this project, the major objective has been to design a disposal embankment that will afford environmental protection, safety, and stability to at least the same degree as the Vitro disposal embankment at South Clive. The design criteria as presented in Section 3 of the SAR has been approved by the UBRC. Any design changes must be submitted for review and approval by the UBRC before implementation by Envirocare.

It was not the intent of this section to specify the number, model, weights, etc., of construction equipment to be used by the construction contractor during the project. The construction contractor is to be given the design/construction specifications, and required to meet them.

This section itemizes the specific tests and frequencies that must be performed on each type of construction material, calibration and control of measuring equipment, and records to be maintained.

This section also discusses corrective actions to be taken when non-conformance items are encountered.

During the operation of the waste disposal facility, Envirocare will assure that all activities affecting structures, systems, or components important to safety will be subject to the applicable controls of the QA program, and that specific equipment, environmental conditions, skills or processes will be provided as necessary.

The QA program covers activities affecting structures, systems, and components important to safety as identified in the SAR.

Accordingly, the staff concludes that the applicant's description of the QA program complies with applicable Utah Bureau of Radiation Control Rules and industry standards and can be implemented for the pre-operational, operational and post operational phases of the Clive facility.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Section 9.1 Quality Assurance

Construction Quality Assurance - the staff have determine that the construction quality assurance/quality control (CQA/QC) procedures are in need of major revision in order to comply with recent EPA construction guidance. As a result, Envirocare will be required to submit and receive staff and Executive Secretary approval of a revised CQA/QC Plan before construction of the disposal facility, see License, Appendix B, Part I D 4. This plan will comply with the guidance found in the EPA document entitled "Construction Quality Assurance for Hazardous Waste Land Disposal Facilities", July, 1986, EPA/530-SW-86-031, and address related comments found in Notice of Deficiency No. 6 issued to Envirocare on November 26, 1990.

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 9.2 Quality Assurance During the Operations Phase

The staff has reviewed the quality assurance (QA) program during the operations phase for Envirocare's low-level waste disposal facility according to SRP Section 17.2.

The organizations and persons performing QA functions have the required independence and authority to effectively carry out the QA program without undue influence from those directly responsible for costs and schedules.

The QA program describes the requirements, procedures, and controls that, when properly implemented, comply with Appendix B to 10 CFR 50, 10 CFR 50.55a and 50.55e.

The quality assurance requirements outlined in the SAR are applicable to both the design and construction phase as well as the operational phase of the project. The majority of the construction for this project has already been completed.

During the design phase of this project, the major objective has been to design a disposal embankment that will afford environmental protection, safety, and stability to at least the same degree as the Vitro disposal embankment at South Clive. The design criteria as presented in Section 3 of the SAR has been approved by the UBRC. Any design changes must be submitted for review and approval by the UBRC before implementation by Envirocare.

It was not the intent of this section to specify the number, model, weights, etc., of construction equipment to be used by the construction contractor during the project. The construction contractor is to be given the design/construction specifications, and required to meet them.

This section itemizes the specific tests and frequencies that must be performed on each type of construction material, calibration and control of measuring equipment, and records to be maintained.

This section also discusses corrective actions to be taken when non-conformance items are encountered.

During the operation of the waste disposal facility, Envirocare will assure that all activities affecting structures, systems, or components important to safety will be subject to the applicable controls of the QA program, and that specific equipment, environmental conditions, skills or processes will be provided as necessary.

The QA program covers activities affecting structures, systems, and components important to safety as identified in the SAR.

Accordingly, the staff concludes that the applicant's description of the QA program complies with applicable Utah Bureau of Radiation Control Rules and industry standards and can be implemented for the pre-operational, operational and post operational phases of the Clive facility.

CHAPTER 10

FINANCIAL ASSURANCE

CHAPTER 10
FINANCIAL ASSURANCE

CONCLUSIONS OF THE REVIEW/Utah Bureau of Radiation Control

Section 10.1 Financial Assurance

Utah Radiation Control Rules requires certain licensees to provide financial surety arrangements for the decontamination, decommissioning and reclamation of the licensee's grounds and facilities. This is an integral part of the licensing process and ultimately the license. The purpose of these rules is to ensure the protection of the public health and safety in the event of abandonment, default, or other inability of the licensee to meet the requirements of the rules or conditions of the license.

Envirocare was required to provide such surety for the NORM license and has, in fact, implemented the necessary financial surety. During the licensing process, Envirocare provided operation, closure, and post-closure plans (including long-term monitoring and maintenance) and associated costs to the UBRC for review and approval by the UBRC staff and engineers. Based on those plans and costs, a surety amount was established and approved by the UBRC, the Utah Attorney General's Office, and Envirocare's legal and financial consultants.

Currently, the type of financial surety arrangement accepted by the UBRC is a Trust Agreement with a cash bond in the amount of $779,000.00 plus interest. Essentially, the surety provides money to the Trustee, Key Bank of Utah, for reimbursements of costs to properly place a maximum of 300,000 cubic yards of contaminated material into the disposal cell; to complete all phases of the disposal cell embankment to the required design specifications; to decontaminate the grounds, equipment and facilities; and to monitor the site for thirty (30) years after its closure. The Trustee shall make payments from the surety fund as the Department of Health, UBRC shall direct. There are provisions in license condition 58 for the surety arrangement to be reviewed and updated annually.

The staff has again reviewed this plan and finds the applicant has submitted a comprehensive and acceptable financial assurance plan to cover estimated costs for decontamination, decommissioning and site reclamation. In particular, it complies with the UBRC rules including R447-25-30, R447-25-31, and R447-25-32.

The staff has reviewed the financial assurance plan for Envirocare low-level waste disposal facility.

The applicant has submitted a comprehensive financial assurance plan to cover the estimated costs of conducting all licensed activities over the planned operating life of the project, including costs of construction and disposal.

The staff has reviewed this plan and finds that it contains all the features considered essential for such a program and is, therefore, acceptable. In particular, it complies with the Utah Bureau of Radiation Control Rules including R447-25-30, R447-25-31 and R447-25-32.

GENERAL COMMENTS

GENERAL COMMENTS

CONCLUSIONS OF THE REVIEW/Utah Bureau of Water Pollution Control

Groundwater Permit Issues, Basis for Specific Groundwater Conditions

1. Ground Water Classification (License, Appendix B, Part I A) - 24 ground water quality samples from wells SC-1 through SC-5 which are located nearby the low-level radioactive waste (LLRW) embankment in Section 32, T. 1S. R. 11W., indicates that ground water has an average total dissolved solids (TDS) content of 34,914 mg/l. These five wells which are completed both in the shallow and deeper apparently confined aquifer, demonstrate similar TDS concentrations.

2. Background Ground Water Quality (License, Appendix B, Part I B) - background quality has been determined based on the same 24 samples from wells SC-1 through SC-5, collected as a part of the Vitro Embankment Environmental Impact Studies during September, 1981 through August, 1982, with partial radiochemistry data from April, 1987. Unfortunately many radionuclides proposed for disposal have gone unsampled in the existing ground water quality data. Notwithstanding, the Executive Secretary has set the ground water protection levels at the same concentrations as the Ground Water Quality Standards. Future sampling will yield information at a later date, before receipt of waste at the facility, which will allow the Executive Secretary to determine background values. Based on the new data the protection levels may be modified if the it is shown that background concentrations exceed the Ground Water Quality Standards, see Part I H 5.

3. Ground Water Protection Levels (License, Appendix B, Part I C) - protection levels have been set at the highest of the following two values:

   a. Ground Water Quality Standards (GWQS) - as defined in UAC R448-6-2, Table 1, for Beta and/or Gamma emitting man-made radionuclides, GWQS have been calculated from National Bureau of Standards (NSB) Handbook 69. For conservative purposes, the lowest concentration causing the equivalent 4 millirem/year dosage limit was selected from the criteria for the total body or any internal organ as found in NSB Handbook 69.

   b. Background Ground Water Quality - as determined from wells SC-1 through SC-5, as mentioned above.

   As more background ground water quality becomes available, especially site specific data, the protection levels may be modified by the Executive Secretary (License, Appendix B, Part I C 2).

   For those radionuclides without a value in NSB Handbook 69, an analog value was determined by the Bureau of Radiation Control using values from Table 1.b of "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion", Federal Guidance Report No. 11 (EPA document EPA-520/1-88-020). The analog value was calculated from a ratio of the Annual Limit of Intake (ALI) values for ingestion from Federal Guidance Document No. 11 and the Maximum Permissible Concentrations for Water (168 hr week) from NSB Handbook 69 as follows:

5. Compliance Monitoring (License, Appendix B, Part I E) - Envirocare will use statistical methods provided by EPA to determine compliance of ground water quality at the compliance monitoring wells with the ground water protection levels.

   Because the compliance monitoring wells have not yet been constructed, specific requirements have been provided to ensure the wells are adequate for the purpose. Envirocare will be required to construct the compliance monitoring well network and secure Executive Secretary approval before any construction of the LLRW Embankment.

   If at any time in the future, the Executive Secretary determines, after review of any compliance monitoring or other data, that the compliance monitoring well network needs to be modified, Envirocare will be notified to submit a plan and compliance schedule to complete the needed changes.

   Ground water monitoring will be quarterly and will include all the protection level parameters, including all the radionuclides proposed for disposal and their indicator decay products as to be determined in Part I H 7.

   Compliance monitoring will also include liquid moisture content testing and control of the waste in accordance with the plan approved by the Executive Secretary, pursuant to Part I H (11).

   Post closure monitoring has not yet been defined, consequently Envirocare will secure approval for such a plan.

6. Non-Compliance and Out-of-Compliance Status (License, Appendix B, Part I F) - these requirements recapitulate those found in UAC R-448-6-6.16 through 6.18.

7. Reporting Requirements (License, Appendix B, Part I G) - these parallel the compliance monitoring requirements to ensure reporting of the sa[illegible]e. The notice of clay bottom liner and cover construction are to provide th[illegible] Executive Secretary opportunity to inspect said construction. The semi-annual "As-built" report is to document construction as per approved design.

8. Hydrogeologic Report (License, Appendix B, Part I H 3) - so[illegible] investigation has been completed in the area relevant to the nearb[illegible] V[illegible] Emb[illegible]nkment and the Mixed Waste Facility. However, site spe[illegible]logic [illegible]ata is necessary to support the compliance monitoring [illegible]. Conseq[illegible]ntly, hydrogeologic studies will be completed before any [illegible] of [illegible] LLRW Embankment. These will form the basis for [illegible] w[illegible]ter flow modeling. Characterization of the unsaturated zone ha[illegible] included here in order to evaluate any perching of leachates under the facility in the vadose zone and ensure adequate ground water compliance monitoring.

9. Determination of Indicator Radionuclide and Decay Products (License, Appendix B, Part I H 7) - because the radionuclides decay into distinctly different daughter products, it will be critical to identify all these daughters, and ensure they have established monitoring parameters in the permit, particularly for short-lived radionuclides. More mobile radionuclides must also be identified with the intent of focusing on those as lead indicators of ground water contamination. As a result, the extensive list of monitoring parameters found in the permit today may be modified at a later date to include a two phase approach, where a short list of mobile indicator parameters are monitored first, on a regular basis; an exceedance of which would trigger monitoring of a second phase comprehensive list of parameters.

10. Related Facilities Which Require Executive Secretary Approval (License, Appendix B, Part I H 12) - very little information, in terms of engineering design, has been submitted on various facilities related to receipt, handling, and temporary storage of wastes. In order to ensure these facilities meet the spill containment requirements of Part I D 7 of the permit, Envirocare will submit detailed engineering plans and secure Executive Secretary approval before receipt of any low-level radioactive waste not received and maintained in water-tight containers at the facility.

11. Contingency Plan (License, Appendix B, Part I H 2) - because the application omitted a Contingency Plan, the license will require Envirocare to submit and receive Executive Secretary approval of a Contingency Plan before construction of the disposal facility, see License, Appendix B, Part I H 2. This Contingency Plan will address all the comments found in Utah Bureau of Radiation Control Notice of Deficiency No. 6, Comment WPC-13, dated November 26, 1990. Satisfactory response to all these issues should also help satisfy Buffer Zone requirements, see License, Appendix B, Part I H 10.

Liquid Restrictions and Control of Waste - In addition to the requirements above, Envirocare will be prohibited from receiving free liquid wastes (License, Condition 15), and will implement testing and control of the liquid content of the waste at the time of receipt, as required in License, Appendix B, Part I D 6, and Part I E 9, respectively.

Spill Containment - Envirocare will ensure that all waste handling and temporary storage facilities will prevent releases to soil and ground water by submitting detailed engineering plans and description and securing Executive Secretary approval of said facilities (see License, Appendix B, Part I D 7 and H 12).

LICENSE CONDITIONS

Attachment 3

ENVIRONMENTAL

S. K. HART

October 8, 1987

RECEIVED
OCT 8 1987
BUREAU OF RADIATION CONTROL

Larry F. Anderson, M.P.S.
Director
Bureau of Radiation Control
288 North 1460 West
P.O. Box 16700
Salt Lake City, Utah 84116-0690

Dear Mr. Anderson:

This request for exemption or exception from the land ownership requirement of URC-24-135 is filed pursuant to URC-12-125 on behalf of S. K. Hart Engineering ("Hart").

Hart has obtained from the State of Utah, a parcel of land located at Clive, Tooele county, Utah, and more particularly described as follows: Section 32 of Township 1 South, Range 11 West, Salt Lake Base and Meridian containing 640 acres except for:

> Beginning at a point located 1120.32 feet N89 59' West along the section line and 329.49 feet South from the Northeast corner of Section 32, Township 1 South, Range 11 West, SLB&M, and running thence N89 56'32" W 1503.72 feet; thence S0 03'28" W 2880.50 feet thence S89 56'32" E 1503.72 feet; thence N0 03'28" E 2880.50 feet to the point of beginning. Containing 99.437 acres, more or less.

Hart intends to use the said parcel for the commercial disposal or waste (e.g., contaminated soil and dry sludge) which contains very low levels of naturally occurring radioactive material that was present in raw ores and has passed through industrial processes. Hart is presently preparing, for submission to the Bureau, its application pursuant to URC-24-135

for authorization to engage in the operations described above. That application will be filed on or about October 14, 1987.

URC-24-135 states, in part, that: "The Bureau will not approve any material from other persons for disposal on land not owned by a State or the Federal Government." The regulation does not distinguish between the very low level radioactive waste proposed to be handled by Hart and other types of waste which contain far greater concentrations of radioactivity in the material. However, URC-12-125 provides that the Bureau may grant "such exemptions or exceptions from the requirements of these regulations as it determines are authorized by law and will not result in undue hazard to public health and safety or property."

The land ownership requirement of URC-24-135 supports the protection of public health and safety or property. The requirement provides for monitoring, control, and any necessary clean up of radioactive waste sites through government ownership of the land. In the alternative, however, reasonably comparable protection could be provided through surety and/or escrow arrangements which could be required by and incorporated into site licenses. This alternative could provide for the funding and infrastructure necessary to protect public health and safety or property both during active operation of the sites and after they are closed.

The Colorado Radiation Control Regulations offer another alternative. Those regulations contain specific provision for a "uranium or thorium milling license or tailings license" which call for the ownership by the State or Federal Government of land on which such waste will be placed "prior to termination of the license" (Colorado Department of Health, Rules and REgulations PErtaining to Radiation Control, Part III, Schedule E, Criterion 8).

The waste material described in Criterion 8 of the Colorado Regulations is comparable to the material proposed to be handled by Hart. The Colorado approach provides protection through the licensing process during the operation of disposal sites. It goes on to provide additional protection through government ownership of the land after the sites are closed.

However, neither the State of Utah nor the Federal Government have indicated that they would be interested in and/or willing to own the land described above. In this regard, it is important to recognize that the owner of land is absolutely liable for damage to others or their property caused by the storage of hazardous materials on his premises, and that the land owner's liability extends to punitive damages and damages for mental suffering (see Branch v. Western Petroleum, 657 P.2d, 267

(Utah 1982). The Colorado approach clearly would subject the State or Federal Government to greater risk than would a simple exemption or exception from the land ownership requirement of URC-24-135.

Furthermore, current thinking with regard to hazardous wastes require siting on privately owned land. Regulating concerns are directed towards proper site operation, closure and long term (30 years) monitoring. Recently released joint NRC/EPA guidelines for mixed waste also require use of the foregoing rationale.

The application of Hart will provide for the surety and/or escrow arrangements necessary to protect against undue hazard to public health and safety or property and to support abatement of future problems, if any. We submit that an exemption or exception from the land ownership requirement of URC-24-135 based on such surety and/or escrow arrangements is wholly consistent with the public health and safety and current thinking in the field of hazardous waste siting and should be granted. The public would be protected by regulation under the licensing process during the period of active waste storage operations, and by the surety and/or escrow arrangements during such operations and thereafter. Accordingly, we hereby request

that Hart be granted an exemption or exception from the land ownership requirement of LRC-24-135.

Very truly yours,

Khosrow B. Semnani