DESIGN AND REGULATORY BASIS FOR CLASS B AND C LLRW AND MIXED WASTE DISPOSAL CELL AT ENVIROCARE OF UTAH

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ABSTRACT

Envirocare of Utah operates a disposal facility at Clive, Utah, for several types of radioactive wastes. Currently the facility is licensed to receive naturally occurring radioactive material wastes (NORM), low-activity radioactive wastes (LARW), Class A low-level radioactive waste (LLRW), mixed radioactive and hazardous wastes (MW), and 11.e(2) byproduct wastes, also known as uranium mill tailings and similar materials. In November 1999, Envirocare applied to amend its license to allow disposal of all low-level radioactive waste materials, including Class A, B and C wastes (LLRW) as defined by R313-25, the Utah State equivalent of 10CFR61. The proposed activities include the disposal of mixed hazardous and Class A, B and C LLRW. This paper describes Envirocare's proposed facility, operations and the status of licensing and development of the facility.

The proposed facility design provides for disposal of all containerized LLRW and MW in the same disposal embankment. The MW will be separated from the LLRW by a 20-feet wide constructed clay barrier. Class B and C wastes will be segregated from unstable Class A wastes by compacted soil barriers. Additionally, for public confidence reasons only, Envirocare plans to use steel-reinforced, concrete overpacks to contain most Class B and C waste packages.

All containerized LLRW will be disposed of in the waste containers. There is no plan to open packages, sample wastes or remove wastes from their packages. Waste characterization, form and packaging are the responsibility of the generator; and reliance will be placed on the generator's certification and the regulatory program in the state of origin. Additionally, the Utah Division of Radiation Control plans to implement a site access permitting program that will be imposed on generators and shippers of waste to the site.

INTRODUCTION

Envirocare of Utah operates a disposal facility at Clive, Utah, for several types of radioactive wastes. First licensed for naturally-occurring radioactive material wastes (NORM) in 1988, the facility has expanded in size and capabilities over the years. Currently, in addition to NORM, the facility is licensed to receive low-activity radioactive wastes (LARW), mixed radioactive and hazardous wastes (MW), and 11e.(2) byproduct wastes, also known as uranium mill tailings and similar materials. The facility's latest expansion permitted disposal of all Class A LLRW in an embankment licensed in October 2000. Current licensing actions are expected to complete the facility's capabilities for land disposal of all low-level radioactive wastes.

In November 1999, Envirocare applied to amend its license to allow disposal of all low-level radioactive waste materials, including Class A, B and C wastes (LLRW) as defined by R313-25, the Utah State equivalent of 10 CFR 61. The proposed activities include the disposal of mixed hazardous waste in accordance with Envirocare's RCRA Permit and low-level radioactive, Class

A, B and C waste in accordance with Envirocare's Utah radioactive materials license. This paper describes Envirocare's proposed facility, operations and the status of licensing and development of the facility expansion.

HISTORY OF THE SITE

The location of the site was originally chosen by the U.S Department of Energy in collaboration with the State of Utah for relocation and permanent disposal of the uranium mill tailings from the Vitro facility located in Salt Lake City. The site was selected after a statewide screening study and detailed comparison of 23 candidate sites. The selection of the site was based on its superior waste isolation characteristics, including the following:

Distance to Population Center	30 miles
Population Within 15 Miles	0
Nearest Residence	15 miles
Primary Transportation Routes	Interstate Highway or Rail
Surface Water	None
Nearest Stream	15 miles to Great Salt Lake
Climate	Arid
Average Precipitation	8 inches per year
Surrounding Area	Desert
Ground Water Quality	Saline, Non-usable

The Vitro tailings were transferred to the site in a cleanup campaign conducted during the 1980's. After completion of the cleanup, 540 acres of the 640-acre site remained unused. The remaining area was then purchased by the owner of Envirocare of Utah, who then applied for a license to replicate the disposal operations for commercial disposal of similar waste materials. The original Envirocare disposal facility was licensed and began commercial operations for disposal of NORM wastes in 1988.

EXISTING FACILITIES

The facility has expanded over the years through various license amendments and physical developments until it now covers approximately 450 acres of the original 540 purchased from the State of Utah. The facility now includes the following features:

- LARW disposal embankment
- MW disposal embankment (jointly permitted by the Utah Division of Radiation Control and the Division of Solid and Hazardous Wastes)
- 11e.(2) disposal embankment (licensed by the U.S. Nuclear Regulatory Commission)
- Mixed Waste treatment facility
- Class A LLRW disposal embankment (licensed in October 2000)

The facility is capable of receiving containerized and bulk waste shipments by truck and rail.

CONTAINERIZED CLASS A/B/C LLRW AND MW

The proposed facility will be located in the northwestern corner of the site. The design provides for disposal of all containerized LLRW and MW in the same disposal embankment. The MW portion of the embankment differs from the LLRW portion, in that synthetic membranes with leachate detection and collection systems are required by the hazardous waste disposal regulations. The MW portion will be separated from the LLRW by a 20-feet thick clay curtain wall, which will allow a transition between the different liner and cover designs. Class B and C wastes will be segregated from unstable Class A wastes by compacted soil barriers. Additionally, for public confidence reasons only, Envirocare plans to use steel-reinforced, concrete overpacks to contain most Class B and C waste packages.

All containerized LLRW will be disposed of in the waste containers. There is no plan to open packages, sample wastes or remove wastes from their packages. Waste characterization, form and packaging are the responsibility of the generator; and reliance will be placed on the generator's certification and the regulatory program in the state of origin.

LICENSING CHALLENGES

Segregation of LLRW from MW

In an effort to conserve available disposal space at the site, the new embankment has been designed to accommodate both LLRW and MW. However, the liner and cover requirements for these wastes are substantially different. The LLRW disposal area must have a cover that limits infiltration from precipitation and resists erosion. No specific liner is required, except during operations to prevent contact of water with the wastes being disposed and to prevent runoff from the disposal area.

For MW disposal, multiple, synthetic membrane liners, drainage layers and sumps are required to provide leachate detection and collection capabilities. Synthetic membranes are required in the disposal unit cover, as well. Providing these conflicting designs in a single, monolithic embankment requires a transition zone between the two that will satisfy the regulatory requirements for each type of waste without compromising the performance of either.

Segregation of stable from unstable - differential settlement

The Envirocare facility can be described as a mostly above-grade facility. The cover of the facility is an engineered system consisting of compacted soil materials designed to minimize infiltration, encourage runoff, and resist degradation from erosion, frost and bio-intrusion. The infiltration-limiting feature is a compacted clay layer designed to have a permeability of 5 E–8 cm/sec. This feature must be protected from degradation due to slope instability and differential settlement. Slope stability analyses performed for the embankment have demonstrated suitable factors of safety against slope failures. Differential settlement concerns between the stable Class B & C wastes and the unstable Class A wastes, however, required certain design considerations to protect the integrity of the compacted clay layer in the cover.

All Class B & C wastes are required to be structurally stable for at least 300 years. This means they must be in a stable waste form, or be packaged in a High Integrity Container (HIC). Further, Envirocare plans to place these waste packages in steel-reinforced, concrete overpacks stacked in the disposal embankment. Very little settlement is anticipated within the area of the embankment containing these overpacks. Conversely, substantial settlement must be assumed, over the long term, for unstable Class A wastes. The regulators have required the following assumptions relative to unstable Class A wastes for long-term analyses:

- Steel containers will corrode and disappear.
- Voids within containers will be completely filled by surrounding backfill materials when the containers corrode
- Compressible waste components will be consolidated in a similar fashion to ordinary sanitary landfill contents

Based on geotechnical evaluations of the compacted clay layer in the cover, a distortion of 0.02 (dimensionless number obtained by dividing differential settlement by horizontal distance) was identified as the maximum desirable for the long-term performance of the cover. In order to achieve this low distortion level, a design was established where Class B & C waste containers will be segregated from unstable Class A containers in a "staggered" fashion. The segregation distance at the bottom of the embankment contents will be 50-75 feet, depending on the type of packages (drums or boxes). The intervening space must be backfilled with compacted soil. Each layer of waste above the bottom layer will be successively closer until the top layer of waste in the embankment, where the separation distance need be only five feet. This configuration will spread the total differential settlement out over a greater distance allowing the embankment to satisfy the 0.02 distortion limitation for the long-term analysis.

Concrete Overpacks

For the initial licensing of the containerized Class A, B & C facility, a rectangular overpack was designed. This overpack is nine feet wide, eleven feet long and eleven feet tall. The bottom of each overpack has recesses to accommodate the lifting loops of an underlying overpack, allowing the bottom of an overpack to serve as the lid of the underlying overpack. These overpacks can accommodate up to thirty-six 55-gallon drums or four B-25 boxes.

It is acknowledged that many Class B & C wastes will not be in 55-gallon drums or B-25 boxes. Oversized or odd-shaped components will be disposed outside the overpacks if they can be justified as strong-tight containers which meet the stability requirements for Class B & C wastes. Envirocare also plans to design and get approval for additional overpacks which are more conveniently shaped and configured to accommodate typical Class B & C waste packages.

Resins

Since total and differential settlements have been a significant licensing issue, the settlement characteristics of Class A ion exchange resins had to be considered. Technical information on compressibility and long-term deformation for these materials are not readily available. As a result, Envirocare agreed to require all Class A resins to be solidified for disposal at the

containerized Class A, B & C facility. This is also expected to apply at the existing Class A disposal embankment; however, low activity resins may still be disposed in bulk when blended with soil materials at the site.

It should be noted that solidification of the resins could be accomplished using any approved solidification media or process. These solidified resins do not need to meet the stringent stability standards for Class B & C wastes, nor must they be stabilized using certified stabilization methods.

WASTE ACCEPTANCE CRITERIA

The first item that a generator will need to accomplish for disposing of waste at the Class A/B/C facility will be to apply for and receive a Generator Site Access Permit from the Utah Division of Radiation Control (UDRC). This will require a review of a generator's radioactive waste program, including items such as, their quality assurance program, sample analysis of waste and classification. This program was initiated, in part, because of the inability to sample the waste at Envirocare for ALARA reasons.

All waste will need to be classified in accordance with Utah Radiation Control Rule R313-15-1008, Classification and Characteristics of Low-Level Radioactive Waste. This rule is equivalent to the U.S. Nuclear Regulatory Commission's 10 CFR 61 with the exception that Utah has added radium-226 to Table I.

In addition to the classification tables, Envirocare will follow the U.S. Nuclear Regulatory Commission's Final Waste Classification and Waste Form Technical Position Paper, dated May 11, 1983 and revision 1, dated January 24, 1991; also, the Final Branch Technical Position on Concentration Averaging and Encapsulation, dated January 17, 1995.

Envirocare has proposed that all solidification media, stabilization media, absorbents and high integrity containers (HICs) that have been approved for use by the U.S. Nuclear Regulatory Commission or an Agreement State will be approved for use at Envirocare's Class A/B/C facility.

STATUS AND SCHEDULE

The Division of Radiation Control completed its technical review and published the tentative licensing decision on January 2, 2001. The Secretary's notice included the Draft Safety Evaluation Report (SER) and the draft license for the disposal facility. During the 60-day public comment period, five public hearings will be held.

After the close of the public comment period, the Secretary must issue a response to all public comments and publish his final decision and the Final SER. After that time, his decision is subject to appeal to the Radiation Control Board within 30 days. If appealed, the Radiation Control Board will hold a public hearing and make a determination to reject the appeal or require further consideration of the licensing decision. Once the Radiation Control Board's decision is

finalized, it is subject to judicial appeal. Envirocare hopes that all appeals will be successfully concluded allowing construction and startup of the facility by the end of 2001.

For any Class B & C disposal facility in the State of Utah, specific approval from the State Legislature and the Governor is required. This approval cannot be granted, under the current wording of the law, until the Radiation Control Board Secretary has issued the final regulatory decision for the facility. The Utah Legislature meets from mid-January until early March each year. Unfortunately, the regulatory process was not advanced enough to allow the Legislature to act in 2001 without an amendment to the law itself.

Envirocare has decided not to pursue approval legislation until the regulatory process is fully completed. Although legislative and gubernatorial approval for the Class B & C portions of the wastes may not be received until the 2002 legislative session, this should not prevent construction and startup of the facility for containerized Class A wastes only.

SUMMARY

Envirocare has submitted a license application to dispose of Class A/B/C low-level and mixed radioactive wastes. The facility has been designed to meet the performance objectives of 10 CFR 61 to ensure safe operation to the workers, public and the environment. The location of the site was chosen due to its superior waste isolation characteristics.

The Utah Division of Radiation Control has issued its tentative approval and is completing the public review process. Once this process is completed, legislative and gubernatorial approval is required before Class B and C waste may be accepted. For more information and updates on the Class A/B/C facility, please contact Mark Ledoux at mledoux@envirocareutah.com for registration on Envirocare's B/C Interactive Forum.