

DEVELOPMENT OF A MIXED WASTE MANAGEMENT FACILITY AT THE NEVADA TEST SITE

R. L. Dodge and E. W. Kendall
Reynolds Electrical & Engineering Co., Inc.
P.O. Box 98521
Las Vegas, NV 89193-8521

P.K. Fitzsimmons and Layton J. O'Neill
U.S. Department of Energy
P.O. Box 98518
Las Vegas, NV 89193-8518

Abstract

The U.S. Department of Energy (DOE) produces radioactive low-level wastes (LLW) which contain hazardous components as identified by 40 Code of Federal Regulations (CFR) 261. Management of those mixed wastes (MW) requires compliance with U.S. Environmental Protection Agency (EPA) and state of Nevada regulations for hazardous wastes and DOE regulations for LLW. In 1988, DOE's Nevada Operations Office (NV) began receiving specific MW at the Nevada Test Site (NTS) under interim status as authorized by the state of Nevada. MW operations are currently limited to receipt of pondcrete and saltcrete from Rocky Flats Plant and disposal in an existing pit while operating under interim status.

Preparations for operation of a separate Mixed Waste Management Unit (MWMU) by the end of 1989 are underway. The 167-acre MWMU will be a part of the 732-acre Area 5 Radioactive Waste Management Site (RWMS). The MWMU is being developed in response to DOE Office of Defense Waste and Transportation Management need to provide enhanced capabilities and facilities for safe, secure, and efficient disposal of defense-related MW in accordance with DOE, EPA, and state of Nevada requirements.

Planned activities relating to the development the MWMU include responding to any notices of deficiencies on the NTS Part B Permit application, conducting generator audits as part of the NTS MW certification program, optimizing the design and operation of the vadose zone monitoring system, completing all NEPA requirements, developing protocols for the sampling and analysis of MW, and facility construction.

INTRODUCTION

U.S. Department of Energy activities, in support of defense programs, result in the generation of MW which contain both radioactive and hazardous components. In further support of the defense programs, the DOE/NV is developing a facility at NTS which can receive and dispose of a portion of the MW generated by DOE defense operations. The MWMU is being developed in response to DOE Office of Defense Waste and Transportation Management need to provide enhanced capabilities and facilities for safe, secure, and efficient disposal of defense-related MW in accordance with DOE, EPA, and state of Nevada requirements.

This paper describes the permitting and design of a MWMU at the NTS. This 167-acre facility will be a part of the 732-acre Area 5 Radioactive Waste Management Site (RWMS).

SITE DESCRIPTION

The Area 5 RWMS is located in Frenchman Flat, an intermontane valley without external surface drainage or surface water resources. The RWMS is located on alluvial fan material derived from the Tertiary volcanics of the Massachusetts Mountains located to the northwest. The valley fill is poorly sorted and only loosely stratified. It contains clay- to boulder-sized materials and is composed

of tuff, limestone, dolomite, quartzite, granite, basalt, and other lithologic remnants in various proportions.

Annual estimated precipitation is calculated to be 5.5 in (14 cm); and the soil moisture content, to a depth of 20 ft (6 m), was found to be approximately eight percent. Potential evapotranspiration greatly exceeds the yearly precipitation. The Ash Meadows groundwater basin underlies the RWMS and is an interbasin flow system which occupies the lower portion of the Cenozoic alluvial fill and the basement Paleozoic carbonates. It is relatively independent of the topographic boundaries of Frenchman Flat. Depth to the water table at the waste site is approximately 787 ft (240 m) with the direction of flow generally south to southwest.

Pit 3, the existing disposal unit to be used for the disposal of MW during interim status, is located in the northeast corner of the Area 5 RWMS (Figure 1). Its dimensions are roughly 380 ft x 1080 ft (115.8 m x 329.2 m) and 30 ft (9 m) in depth. It has previously been used as a repository for LLW. However, the present quantity of LLW stored in Pit 3 is small in comparison to the pit dimensions, and this waste will not interfere with the disposal of MW.

REGULATORY REQUIREMENTS

Mixed waste contains both radioactive and hazardous components as defined respectively by the Atomic Energy Act (AEA) and the Resource Conservation and Recovery

Act (RCRA). Radioactive components of MW are regulated by DOE under the AEA. Hazardous components of MW are subject to RCRA regulations as enforced by the state of Nevada and approved by the EPA.

Resource Conservation and Recovery Act Requirements

The RCRA regulations govern facility development and operation, and prescribe a multitude of administrative and technical requirements. Compliance with these requirements must be demonstrated by documentation which specifically addresses each of the requirements. Permitted operations regulations are contained in 40 CFR Part 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," and include the following: General Facility Standards, Preparedness and Prevention, Contingency Plan and Emergency Procedures, Manifest System, Recordkeeping and Reporting, Releases from Solid Waste Management Units, Closure and Post-Closure, Financial Requirements, Use and Management of Containers, and Landfills.

The state of Nevada adopted the RCRA regulations and is an authorized state for hazardous waste regulation. As such, the state possesses regulations which are at least as stringent as the RCRA regulations. The state of Nevada is authorized to regulate in accordance with the pre-Hazardous & Solid Waste Act Amendments (HSWA) RCRA regulations. The state has applied for, but has not yet received, authority for enforcing the HSWA regulations for MW. EPA Region IX is reviewing the state applications and could issue a decision in 1989.

DOE Requirements

The MWMU will meet all DOE regulations relating to radiation safety, environmental compliance, and waste disposal. Those requirements include disposal site performance, waste analysis, and waste acceptance criteria. In support of those regulations, a radiological performance assessment of all activities conducted at the RWMS was conducted and is in the final review process. Based on that draft performance assessment, operation of the MWMU will meet all required radiological performance objectives. NVO-325 "Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements" contains the requirements for certifying mixed waste for acceptance at the NTS.

National Environmental Policy Act (NEPA) Requirements

An environmental assessment (EA) of the impact of MW disposal operations at the Area 5 RWMS was prepared in 1988. That assessment included the results of a radiological performance assessment of all radioactive waste management operations at the Area 5 RWMS. Based upon the results of the EA, operations at the Area 5 RWMS, including the disposal of mixed waste, will not have a significant environmental impact. The EA is currently being reviewed by DOE Headquarters and if approved

a Finding of No Significant Impact (FONSI) will be issued.

Waivers

Nevada Operations Office has requested a waiver on the use of disposal unit liners, leachate collection systems, and groundwater monitoring wells as required by RCRA. In accordance with 40 CFR 265.90(c) and 40 CFR 264.90(b)(4), documentation of the low potential for migration of hazardous components to groundwater was developed and included in the Part B Permit application. That determination was necessary to operate under interim status without groundwater monitoring. For permitted status operations, that document, in conjunction with the vadose zone monitoring system, will support the waivers for groundwater monitoring wells and trench liners. The state has verbally indicated their expected concurrence with this approach; however, the EPA has not offered a position on the waiver request.

FACILITY MONITORING

A monitoring system utilizing groundwater monitoring wells is inappropriate at the NTS. The travel time of a contaminant, from the near surface to the water table (calculated to take as long as 100,000 years) precludes the use of monitoring wells as a detection system. In addition, wells could create accelerated transport pathways for the migration of waste contaminants from the near surface to the water table. For those reasons, a system has been designed for monitoring the vadose zone beneath the MW disposal units.

The methods selected as most appropriate for monitoring MW at the NTS are (1) neutron logging, (2) soil air sampling (SAS), and (3) gamma logging. MW consists of both hazardous and radioactive components. Accordingly, both components should be included in the monitoring plan. Because water movement through the unsaturated zone is the major vehicle for the transport of waste components, neutron logging will provide long-term spatial monitoring of soil moisture conditions within and beneath the disposal unit. SAS will indicate the presence and concentration of volatile hydrocarbon components, while gamma logging will identify radioactive components in the soil.

The vadose zone monitoring system has been installed in the dedicated portion of Pit 3 for use during interim status operations. Refinements to the vadose zone monitoring system will continue to be made during interim status in order to improve specificity and sensitivity of the system. During permitted operations, the vadose zone monitoring system will be used as an alternative to conventional groundwater monitoring.

FACILITY OPERATIONS

Interim Status

On November 8, 1985, the Nevada Operations Office (NV) provided the NTS RCRA Part B Permit application for the RWMS to EPA Region IX and the state of Nevada in support of developing an MWMU. On September 17,

1987, the state of Nevada Department of Conservation and Natural Resources granted NV interim status for the receipt and disposal of hazardous waste. Subsequent discussions with the state confirmed that interim status authorized the NTS to accept MW which can only be disposed in the existing LLW disposal unit, Pit 3. The state of Nevada has RCRA authority and has applied for authority to regulate MW. In anticipation of the state receiving MW authority, a revised Part B Permit application was submitted to the state of Nevada in October 1988.

The MWMU will be operated in four phases which coincide with the permitting process. Phases I and II (retrievable storage and disposal, respectively) occur under interim status authorization. Phases III and IV (construction and operation of the MWMF, respectively) occur under permitted status authorization. The operations corresponding with each of these phases follow:

Phase I Retrievable Storage: Although interim status has been granted to NV, current operations under Phase I only include the receipt and placement of RFP pondcrete and saltcrete into retrievable storage in Pit 3. Disposal will not occur until the FONSI is issued to satisfy NEPA requirements. NEPA requirements for retrievable storage are covered by the DOE memorandum to file, "Temporary Storage of Rocky Flats Waste at NTS." Upon issuance of the FONSI, operations will shift from storage to disposal (Phase II).

In accordance with NVO-325, all waste generators must operate under a Waste Certification Program Plan which address the elements described in NVO-325. Initial approval and annual audits of generators' certification programs will be conducted jointly by NV/Reynolds Electrical & Engineering Co., Inc. (REECo) audit teams. Upon demonstration of satisfactory compliance with the audit findings and observations, a generator would be approved for a specific MW stream. Each MW stream will be subject to the audit process. In order to receive RFP pondcrete under Phase I, an audit of the the RFP waste certification program was conducted at the RFP in December 1987 and follow up meetings held during 1988.

Phase II Disposal Under Interim Status: Once NEPA requirements have been satisfied with the issuance of the FONSI, disposal of the RFP waste streams in Pit 3

will commence. In addition, waste streams from other generators will be eligible for disposal providing all waste certification requirements, including generator audits, have been satisfied. All waste disposal operations will be conducted in accordance with the requirements of 40 CFR Part 265. Review of the Part B Permit application by the state of Nevada, and responses to any notices of deficiencies, will be completed during Phase II.

Permitted Status

Phase III Procurement and Construction: Once the state of Nevada issues the Part B Permit, MWMU construction activities will commence. Site construction activities include construction of the flood control dike, completion of new road work, excavation of the first disposal unit, installation of onsite utilities and fire protection systems, and installation of the vadose zone monitoring system. Disposal cells in the MWMU will be 100'X300'X20'. Average disposal life of each cell will be under 5 years.

Until the construction of the MWMU is complete, waste operations will continue in Pit 3. This transitional period includes state reviews of "as-builts" and verification inspections at the site. Upon approval by the state, placement of MW in the new disposal unit (Phase IV) will proceed.

Phase IV Permitted Disposal: Upon completion of the MWMU, disposal of MW from approved generators will commence in accordance with the conditions of the Part B Permit. Generators' waste certification activities will be audited for conformance with the MW acceptance criteria outlined in NVO-325. No generator waste streams will be authorized for disposal until compliance with NVO-325 is demonstrated.

In addition to the waste certification program, random examination of package contents will be conducted at a Waste Examination Facility (WEF) which should become operational at approximately the same time as the MWMU. Initially the WEF only will utilize real-time radiography to verify compliance with the waste acceptance criteria of NVO-325. Future waste verification activities will include intrusive sampling and analysis of package contents.