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Corrective Measures Study Plan for Material Disposal Area H at Technical Area 54

Los Alamos
NATIONAL LABORATORY
Los Alamos, NM 87545

Produced by the Material Disposal Areas Focus Area

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1.0 INTRODUCTION

This corrective measures study (CMS) plan describes the regulatory basis and technical approach for the CMS for Material Disposal Area (MDA) H (Solid Waste Management Unit 54-004), a potential release site (PRS) located at Los Alamos National Laboratory's (the Laboratory's) Technical Area (TA) 54. TA-54 is situated in the east-central portion of the Laboratory on Mesita del Buey with Pajarito Canyon to the south and Cañada del Buey to the north. MDA H is a relatively small site (0.3 acre); the MDA consists of nine 60-ft-deep shafts. Between 1960 and 1986, the site was used for the disposal of classified solid-form waste (some of which may be hazardous or radionuclides) generated by the Laboratory.

The Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) for MDA H has been completed; it forms the basis for identifying corrective measure alternatives that will be effective in reducing potential impacts to human health and the environment to acceptable levels. This CMS plan describes the evaluation and decision approaches that will be used to demonstrate the need for and components of a corrective measure to protect human health and the environment.

This CMS, which will include supplemental sampling and analysis, will be conducted under the requirements of RCRA and the New Mexico Hazardous Waste Act. The Laboratory's Environmental Restoration (ER) Project is implementing this CMS for MDA H in accordance with requirements stipulated in the Laboratory's Hazardous Waste Facility Permit (Module VIII). MDA H, however, contains radioactive materials in addition to hazardous waste. Therefore, the alternatives analysis in this CMS will go beyond the traditional RCRA corrective action analysis of potential impacts from hazardous waste. An expanded analysis will ensure that the proposed corrective measure will protect human health and the environment against impacts from radioactive materials at the site. The regulatory basis for analyzing and addressing the impacts of radioactive materials is contained in Department of Energy (DOE) Orders 435.1, "Radioactive Waste Management," and 5400.5, "Radiation Protection of the Public and the Environment."

This plan will address the following CMS tasks:

- define the overall objectives of the study,
- describe current conditions at the facility,
- describe the general approach to the CMS and the selection of potential remedies,
- identify specific corrective measures to be studied that have a high likelihood of being effective in retarding future releases from the site,
- describe a process for detailed evaluation of corrective measure alternatives to ensure compliance with standards,
- identify additional data needs for the CMS,
- propose the schedule for conducting the CMS, and
- propose the format for the CMS report.

It is not anticipated at this time that bench-scale or pilot studies will be necessary.

Appendixes to this report provide additional information and are called out throughout the text. Appendix A presents acronyms, a glossary of terms, and metric conversion tables.

1.1 Statement of Problem

Section VIII.L of the Laboratory's Hazardous Waste Facility Permit requires that "(I)f the Administrative Authority has reason to believe that a SWMU has released concentrations of hazardous wastes, or if the Administrative Authority determines that contaminants present a threat to human health and the environment given site-specific exposure conditions, or may present a threat over the lifetime of wastes, the Administrative Authority may require a Corrective Measure Study (CMS) and shall notify the permittee in writing." New Mexico Environment Department (NMED) had made this determination for MDA H and informed the Laboratory in a letter dated December 27, 2000 (Appendix B). In the letter, NMED directed the Laboratory to prepare a CMS plan for MDA H. There are two key considerations involved in this determination.

1. During the RFI for MDA H (Environmental Restoration Project, in progress), the Laboratory found no evidence that MDA H has released concentrations of hazardous wastes or that hazardous wastes contained in MDA H present a threat to human health and the environment, given the current conditions at the site (e.g., restricted access, tuff and concrete covers, no erosion, current weather patterns). Preliminary assessments indicate that current risk to human health, the environment, and environmental media is acceptable under existing conditions at MDA H, according to US Environmental Protection Agency (EPA) and NMED criteria, and is expected to remain acceptable barring any major changes in site conditions. Therefore, the Laboratory understands that, at this time, NMED's requirement to proceed with a CMS under this permit provision is based on NMED's belief that hazardous wastes at MDA H may present a future threat over the lifetime of the hazardous wastes therein.
2. The members of the MDA High Performing Team (HPT), which includes representatives from NMED, DOE, and the Laboratory, identified the potential for future releases of radionuclides. The RFI for MDA H indicated a release of tritium, a radioactive but non-RCRA-regulated waste. The impact of the tritium release was assessed using approved methods and was small relative to EPA and DOE standards. The RFI concluded that the site does not pose an unacceptable risk to human health and the environment in its present state. Therefore, regarding the radionuclides at MDA H, the determination to proceed with a CMS, once again, is based on a potential for future adverse human health or environmental impacts, in accordance with DOE Orders 435.1, "Radioactive Waste Management," and 5400.5, "Radiation Protection of the Public and the Environment."

Assessments at a similar nearby site (MDA G) indicated that the primary factor having the potential to create an unacceptable risk at MDA H in the future is the potential for plant, animal, or human intrusion into the disposal units (Hollis et al. 1997, 63131). The 6 ft of backfill and/or concrete caps sealing the tops of the disposal shafts are likely to provide a sufficient barrier to plant and animal intrusion, but a more complete assessment of human intrusion and erosion is needed. Therefore, this CMS will be conducted to evaluate and recommend a corrective measure alternative that will mitigate these potential future risks at MDA H, as defined in Section 3.

1.2 CMS Purpose and Scope

The purposes of the CMS are to identify and evaluate corrective measure alternatives that address potential unacceptable future risks and to recommend one or more of those alternatives for implementation. Many of the alternatives to be considered will include a monitoring component to confirm whether or not the corrective measure is effective. Actions to be taken in the event that the corrective measure becomes ineffective will also be proposed. When the administrative authority approves the

corrective measure, the Laboratory's Hazardous Waste Facility permit will be modified to include the corrective measure and a schedule of implementation.

The scope and focus of the CMS are defined by the site information summarized in Section 2. Where data are insufficient to fully evaluate a corrective measure alternative, additional data will be collected as part of the CMS. Known data needs are identified in Section 2.8; however, additional data needs may be identified as the CMS progresses.

At its conclusion, the CMS will be fully documented in a report that will be available for public review and comment (Appendix C). In addition, the MDA HPT will participate in public outreach and communication activities throughout the study period to ensure that the evaluation of corrective measure alternatives and the justification for the proposed remedy (as described in the CMS report) addresses the spectrum of public concerns about the site.

1.3 Regulatory Context

The RCRA corrective action program at MDA H is being implemented in the following phases:

1. RCRA facility assessment, initial site assessment (1989)
2. RFI, site characterization (1994–1995)
3. CMS, evaluation of alternatives (2001–2002)
4. Corrective measure implementation (CMI), implementation of the selected alternative(s) (2003)

This CMS will be conducted in accordance with the requirements of RCRA. The ER Project is implementing the corrective action program in accordance with requirements in the Hazardous and Solid Wastes Amendments (HSWA) of 1984 and Module VIII of Laboratory's Hazardous Waste Facility Permit. However, the CMS will be designed to also meet the intent of DOE Order 5400.5, "Radiation Protection of the Public and the Environment."

Integration of Corrective Action and Closure Requirements

Shaft 9 is the only shaft at MDA H that intentionally received hazardous waste after 1986 (Section 2), making it subject to interim status provisions under RCRA and causing it to be included in the operating portion of the Laboratory's Hazardous Waste Facility Permit. Thus, shaft 9 is potentially subject to the Laboratory's Hazardous Waste Facility Permit closure provisions. However, the NMED Hazardous Waste Bureau (HWB) has indicated that they will include shaft 9 in a near-future permit modification to remove it from the interim status portion of the Laboratory's Hazardous Waste Facility Permit (Appendix B). The unit will remain subject to corrective action, in accordance with Module VIII, along with the other eight shafts. Care will be taken in the selection and implementation of the corrective measure to incorporate relevant and appropriate portions of the RCRA closure requirements, even though they will no longer be applicable to MDA H following approval of the permit modifications.

One of the potential migration and exposure pathways for waste disposed of in the subsurface that must be addressed either in a CMS or, as applicable, a closure plan is the impact of hazardous waste and radionuclides on groundwater. The conditions at MDA H (solid-form waste and thick, dry bedrock separating the waste and the regional water supply aquifer) and RFI sampling results indicate that movement of water-borne contaminants downward into the regional water supply aquifer is not likely to occur for hundreds or thousands of years, if at all. The ER Project is cumulatively assessing the potential additive impacts to groundwater of multiple sources of contamination from all sites in the vicinity of Mesita del Buey. For this reason, this CMS will only address the potential for contaminant migration into the

rock/tuff immediately surrounding the waste at MDA H, but it will also provide data to evaluate releases to the groundwater immediately beneath MDA H. The results of the CMS related to groundwater will be integrated into the larger-scale groundwater impacts assessment being conducted by the Laboratory.

1.4 Outreach Plan

In accordance with Chapter 7 of the installation work plan (LANL 2000, 66802), an outreach plan (Appendix D) has been developed for the MDA H CMS to encourage early public participation in providing input to help identify the corrective measure alternative. Input will be solicited from neighboring pueblos, local governments, NMED, EPA Region 6, and other community organizations to ensure a well-informed decision is made. Members of the public will have the opportunity to make comments during public meetings and to make written comments. ER Project staff conducting the CMS will provide written responses to public comments.

1.5 Plan Overview

This CMS plan addresses the following permit-required CMS tasks.

- Current site conditions
- Identification and development of the corrective measure alternative or alternatives (a preliminary evaluation of technologies that can be applied to MDA H)
- Establishment of the process and criteria for evaluating corrective measure alternatives (will incorporate public review and comments at various stages in the CMS process)
- Justification and recommendation of the corrective measure or measures
- Description of progress reports and the final CMS report to be prepared

2.0 BACKGROUND INFORMATION

The current conditions at MDA H are described in detail in the site-specific RFI report (Environmental Restoration Project, in progress). The RFI report describes the site in detail, including disposal units, wastes, characterization activities that have been conducted, analytical results of sampling, and assessments of potential current-day risks to human health and the environment. Brief summaries are provided in the following paragraphs.

2.1 PRS Description

MDA H is a 70-ft by 200-ft (0.3-acre) fenced area located on Mesita del Buey, a small mesa that lies between Pajarito Canyon and Cañada del Buey (Figure 2.1-1). The MDA consists of nine inactive vertical disposal shafts arranged in a line approximately 15 ft inside its southern fence (Figure 2.1-2). The borehole and sediment sampling locations are included on the figure. Each shaft is cylindrical with a diameter of 6 ft and a depth of 60 ft. The shafts are filled with solid-form waste to a depth of 6 ft below the ground surface. The wastes in shafts 1 through 8 are covered by a 3-ft layer of crushed tuff backfill capped with 3 ft of concrete. The waste in shaft 9 is covered by 6 ft of concrete. To protect against the possible impacts of mesa-edge instability, all MDA H disposal shafts were placed more than 50 ft back from the rim of Pajarito Canyon (the nearest canyon). The surface of MDA H is contoured to concentrate runoff into a single drainage to Pajarito Canyon.

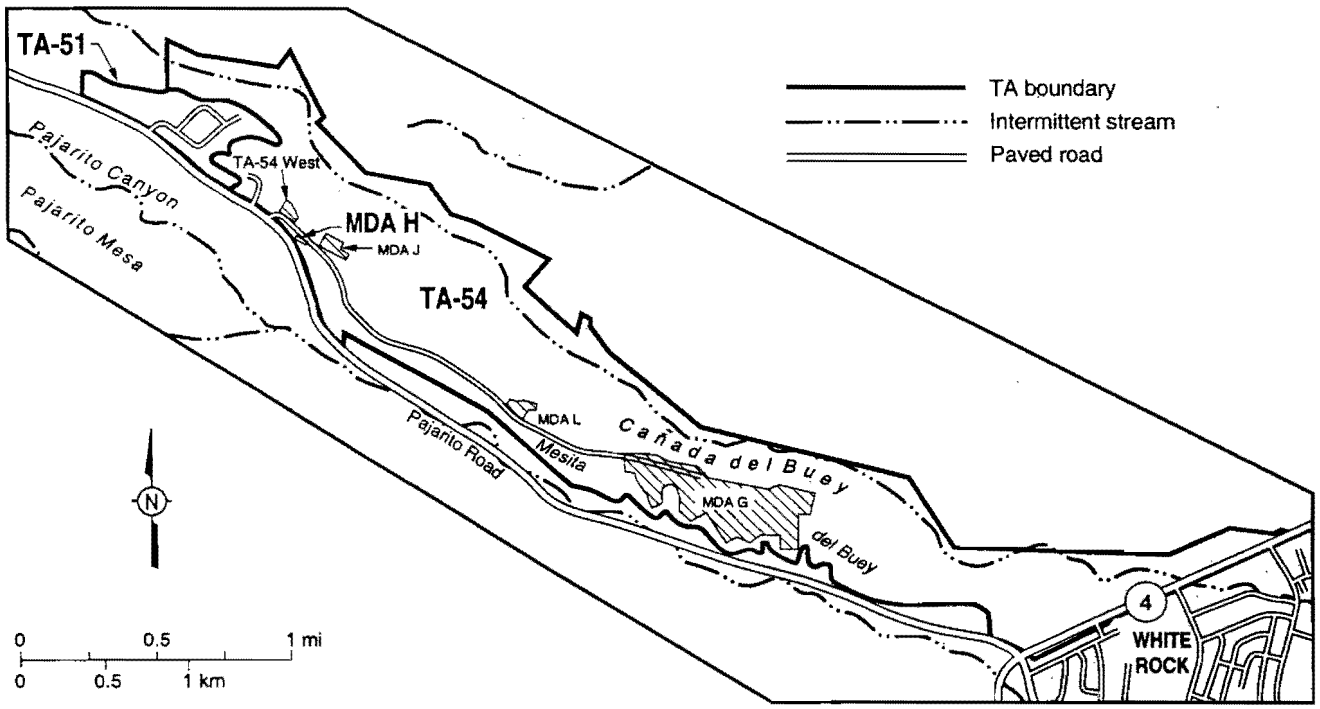


Figure 2.1-1. Location of MDA H in TA-54

2.2 Facility History and Background

From May 1960 until August 1986, MDA H was the Laboratory's primary disposal area for classified, solid-form waste. Disposals were recorded in logbooks, which contained a brief, unclassified description of the waste and an approximate weight. These descriptions include sufficient information to identify, with some degree of certainty, the *types* of hazardous waste and radionuclides in the inventory; however, the *amount* of waste cannot be absolutely quantified (because of impracticability and national security). It can, however, be estimated.

Disposal of waste materials at MDA H was restricted to items or materials that were determined by authorized personnel to be both classified and either excess or no longer required for their intended use. This determination was recorded on disposal request forms, which accompanied the waste to MDA H. All material disposed of required double packaging with an opaque outer material, such as plastic bags or drums. Light-weight wastes were dropped into the shafts, and heavier materials were lowered in by heavy equipment. Classified materials were in the form of solids (although solids could contain residues of liquids or gases). Between individual disposals, shafts were covered with a steel plate that was padlocked to prevent unauthorized access to classified materials. When filled to within about 6 ft of the surface, 3 ft of crushed tuff backfill was placed in the shaft followed by an additional 3-ft-thick concrete cap, except for shaft 9, which was covered with 6 ft of concrete.

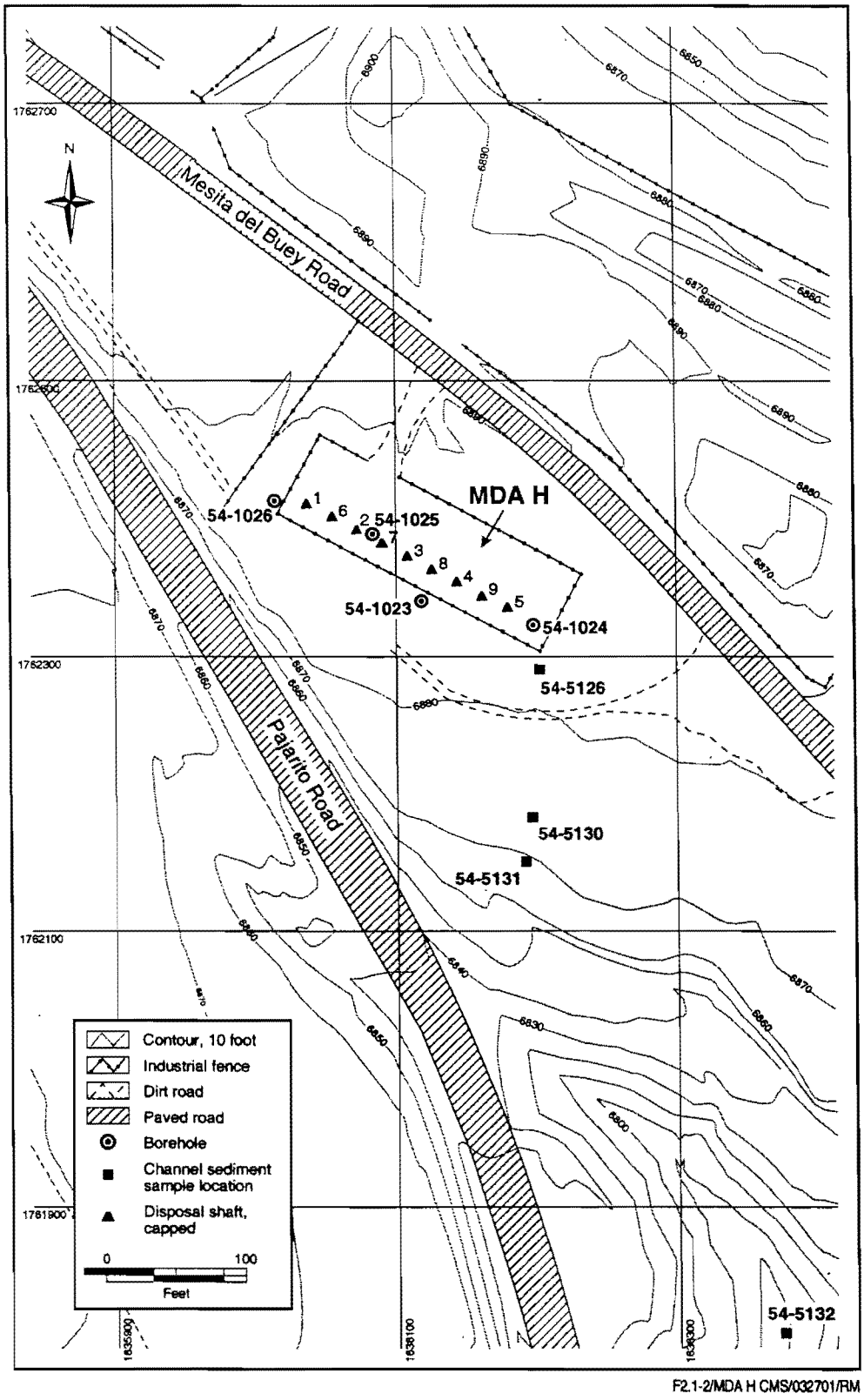


Figure 2.1-2. Locations of inactive disposal shafts, boreholes, and channel sediment samples at MDA H

The major contributor to the mass of the MDA H inventory (about 60%) is metal, of which most is either indicated as depleted uranium or assumed to be depleted uranium, based on process knowledge and interpretation of logbook entries. Approximately 10% of the mass is recording media (paper documents, film, slides, magnetic computer tapes). Graphite represents about 7% of the mass inventory, and unloaded fuel (consisting of various isotopes of uranium) accounts for approximately 5% of the inventory. The RCRA-regulated hazardous waste known to be in the MDA H inventory include several reactive lithium compounds (including lithium fluoride, lithium hydride, and lithium boride) and high explosives. In addition, pthalate-containing plastics are present. The primary radionuclides known to be in the MDA H inventory include tritium, uranium-235, and uranium-238. Records, process-knowledge, and scientific insight were applied to estimate the quantity of these radionuclides. Table 2-1 summarizes the MDA H waste inventory.

Table 2-1
Summary of Wastes at MDA H Disposal Shafts

Inventory Waste	Reported Waste Mass	Estimated COPC [a] Mass	Assumptions/Comments
Beryllium	300 lb (136 kg)	300 lb (136 kg)	Solid form
Lithium Lithium hydride Lithium fluoride Lithium boride	 400 lb (181 kg) 4408 lb (1997 kg) 10 lb (4.5 kg)	 133 lb (60 kg) 1322 lb (598 kg) 3 lb (1.35 kg)	Majority in solid form, not oxidized, and therefore still reactive; lithium compound is 30% of total mass of the lithium
High explosives PBX [b] RDX [c]	 4408 lb (1997 kg) 47,550 lb (21,540 kg)	 44 lb (20 kg) 476 lb (215kg)	Unless otherwise specified, high explosives assumed to be RDX based on mobility and toxicity; unless otherwise specified, assume *invisible* surface contamination, about 1% of the total waste mass
Silver	TBD [d]	TBD	Component of photographic film, therefore not leachable
Pthalates/plastics	Unknown	Unknown	Present in packaging and plastic explosives
Uranium Uranium-235 Uranium-238	 2.5 Ci (0.0005 mCi/m^3) 37 Ci (0.8 mCi/m^3)	 2.5 Ci (0.0005 mCi/m^3) 37 Ci (0.8 mCi/m^3)	Standard ratios apply for converting depleted uranium and fuel (enriched uranium) masses to isotopic abundances
Plutonium Plutonium-238 Plutonium-239 Plutonium-240	275 lb (125 kg)	TBD	Use detection limit from instruments in use at time of disposal
Tritium	240 Ci (5 mCi/m^3)	240 Ci (5 mCi/m^3)	Residual radioactivity in stainless steel canisters of known mass; base estimate on average MDA G high-activity tritium waste concentration (very conservative)

[a] COPC = chemical of potential concern.
[b] PBX = plastic-bonded explosives.
[c] RDX = 1,3,5-trinitro-1,3,5-triazacyclohexane (Cyclotrimethylenetrinitramine).
[d] TBD = to be determined.

2.3 COPC Identification

The RFI report for MDA H (Environmental Restoration Project, in progress) describes and presents the analytical results for channel sediment and subsurface rock (tuff) samples collected at the site. The assessment of the data began with a comparison of the inorganic chemical and radionuclide results to Laboratory-wide background or fallout values to determine if there were elevated concentrations in the surrounding environmental media. Organic chemicals were evaluated for detection status to determine if they were present. Lead was detected above background in channel sediments, and methoxychlor was detected in channel sediments. In addition, copper and selenium were detected above background in the subsurface tuff, tritium was detected in the tuff, and several organic chemicals [phthalates, volatile organic compounds (VOCs), semivolatile organic compounds, and endosulfan sulfate, a pesticide] were detected in one or more subsurface tuff samples. These chemicals were identified as COPCs and evaluated for potential risk to human and ecological receptors.

Although several inorganic chemicals were detected above background and the presence of several organic chemicals was detected, this does not necessarily equate to a release from the site. Methoxychlor is a pesticide that remains in the soil for a maximum of only 14 months (National Library of Medicine 1999, 64070). Therefore, this chemical is most likely present because it was recently applied to the area, and its presence is not related to disposal activities at MDA H. Lead was detected only in the channel sediment; this is not indicative of a release from the site and is not related to disposal activities because all of the waste is subsurface and was in the form of shielding. A contaminant release should be of sufficient magnitude that the contaminant is clearly detected in the surrounding media and detected in several samples at a given location. This was not the case for copper, selenium, and the organic chemicals detected in the subsurface tuff. Copper was detected in four samples at different locations but at the same depth, indicating a possible local and natural variability within the tuff. Selenium was detected in one sample just above background, and the organic chemicals were mostly detected near or below their estimated quantitation limits. Most were detected in one to three samples at different locations. The only contaminant that can clearly be identified as being released from MDA H is tritium, which was detected at elevated concentrations at various depths and locations in the tuff beneath MDA H (Environmental Restoration Project, in progress).

Gaps in the MDA H data for air, subsurface tuff, and sediment exist; these gaps will be filled during the CMS (Section 2.8).

2.4 Extent of Contamination

The available data from the RFI at MDA H indicates the extent of contamination in sediment and subsurface tuff. Methoxychlor and lead were detected in the drainage channel from the site and were present only at low concentrations, which are not indicative of a release. Copper and selenium decrease to below background around the detected concentrations, and organic chemicals decrease with depth within a few feet of where they were detected.

Tritium, which migrates in the vapor phase in the vadose zone, is much more widespread than the other contaminants and shows a definite vertical distribution in the subsurface. Concentrations increase at all locations to a depth of approximately 52 ft and then decrease below this depth to either less than the minimum detectable activity or at least by several orders of magnitude. Laterally, the concentrations appear to decrease from the source (i.e., the disposal shafts), but this trend is less clear than the vertical distribution. Data collected during the CMS will more clearly define the lateral extent of the tritium release and is discussed in Section 2.8.

2.5 Current-Day Risk

The COPCs discussed in Section 2.3 were evaluated to determine if they posed a potential risk to human and ecological receptors under current site conditions. The maximum concentration of each COPC was compared with the Laboratory's screening action level for each chemical to determine impacts to human health. The assessment of the tritium data was done using the maximum concentration that was within 10 ft of the surface, as this is the depth at which a basement may be built for a residence. The comparison found that none of the COPCs are present at concentrations that might cause an unacceptable risk to human health.

The maximum concentration of each COPC was also compared with the Laboratory's ecological screening levels for each chemical, if it was detected on the surface or within the upper 0 ft to 5 ft. Deeper contaminants were not assessed because below 5 ft no receptors are present and there are no pathways for transport to receptors at this site. The comparison found that none of the COPCs were present at concentrations that might cause an adverse impact to ecological receptors.

Based on the preliminary assessments conducted on the RFI data from MDA H, there is no potential for unacceptable risk to human health or the environment under current site conditions. Therefore, no immediate corrective action is needed at this site.

2.6 Proximate PRSs

To evaluate the potential future impact of MDA H on human health and the environment to make sound decisions regarding the need for and nature of effective corrective measures, it is important to understand, at least qualitatively, the potential impact of nearby PRSs. The most significant PRSs, in terms of contaminant inventory and physical size, near MDA H are MDAs G and L at TA-54 and several sites at TA-18.

MDA G is located near the eastern end of Mesita del Buey approximately 2.3 miles east of MDA H (Figure 2.1-1). This 100-acre site has been the Laboratory's primary radioactive waste disposal facility since 1959 and is likely to continue operating for the life of the Laboratory. Pits and shafts at MDA G that received waste before 1989 make up 24 PRSs. Investigations to date have revealed a diffuse plume of VOCs (likely associated with residual solvent contamination in radioactive waste) and a plume of tritium-containing water vapor. As an operating nuclear facility, MDA G is subject to intensive personnel safety and environmental protection and surveillance programs, and the VOC and tritium plumes are monitored regularly. Ongoing low-level radioactive waste disposals are authorized by the DOE, and ongoing solid low-level mixed-waste and transuranic mixed-waste management activities are authorized by the DOE and permitted, as necessary, by the NMED under agreement with the EPA. MDA G is within the Lower Pajarito Canyon aggregate of the Pajarito Watershed (LANL 2000, 66802).

MDA L is a 2.5-acre (10,000-m^2) site located on Mesita del Buey approximately 0.86 mi (1.4 km) east of MDA H (Figure 2.1-1). This site has been the Laboratory's primary chemical waste disposal and treatment facility since the early 1960s. Disposal of chemical waste ceased in the mid-1980s, and the ER Project is investigating 13 pits and shafts within the Lower Cañada del Buey aggregate of the Mortandad Watershed. Early disposal activities resulted in a subsurface volatile organic vapor plume, which has been and continues to be, extensively monitored since the mid-1980s.

TA-18, located approximately 1000 ft (300 m) south of MDA H in Pajarito Canyon, was established in 1943 and today continues its long history in nuclear criticality research, nuclear weapons safeguards and security, and treaty verification technology. TA-18 comprises 40 PRSs organized into five groups within the Lower Pajarito Canyon aggregrate of the Pajarito Watershed. Within the five groups are septic

systems and associated components, an underground storage tank, surface contamination from firing sites, storm sewer outfalls, and buried disposal areas (LANL 1993, 15310).

All of the proximate PRSs identified above and MDA H are located within the same groundwater aggregrate. The deep hydrogeologic system (including the regional aquifer), which for the purposes of this plan means the region below MDA H, is being investigated in accordance with the hydrogeologic work plan (LANL 1996, 55430) approved by NMED and the joint ER DP Monitoring Well Installation Program (LANL 1995, 50124).

2.7 Site Conceptual Model for MDA H

The site conceptual model of MDA H (Figure 2.7-1) integrates RFI data and scientific understanding to describe how contaminants may be released in the future. If a baseline impacts analysis determines a potential for adverse impacts in the future, a modified site conceptual model will be used to evaluate the effectiveness of corrective measure alternatives.

The site conceptual model describes the features, events, and processes that may contribute to

- a release of hazardous waste or radionuclides buried at MDA H and
- transport of released hazardous waste or radionuclides within air, surface soil, surface water, and groundwater.

These features, events, and processes may contribute to the accessibility of hazardous waste or radionuclides to living organisms and to adverse impacts to living organisms exposed to the waste.

The site conceptual model includes the following modes of contaminant release:

- leaching (dissolution) by liquids either within the waste or infiltrating from the surface, through the covers, and into the waste volume;
- volatilization or vaporization and diffusion of certain contaminants within waste;
- incorporation into plants whose roots grow into the waste;
- excavation by animals burrowing into the waste;
- erosional processes (wind, water, mass wasting); and
- human intrusion into waste.

Contaminants released from the disposed waste may be redistributed within and beyond the site by a number of transport mechanisms. The primary transport pathways include

- transport into the surrounding vadose zone with limited potential for transport to the regional aquifer,
- diffusion of gas-phase contaminants from the waste to the ground surface,
- atmospheric transport of gases and suspended particulates to off-site locations,
- lateral transport of contaminated surface soils into adjacent canyons by surface runoff, and
- biotic uptake of contamination.

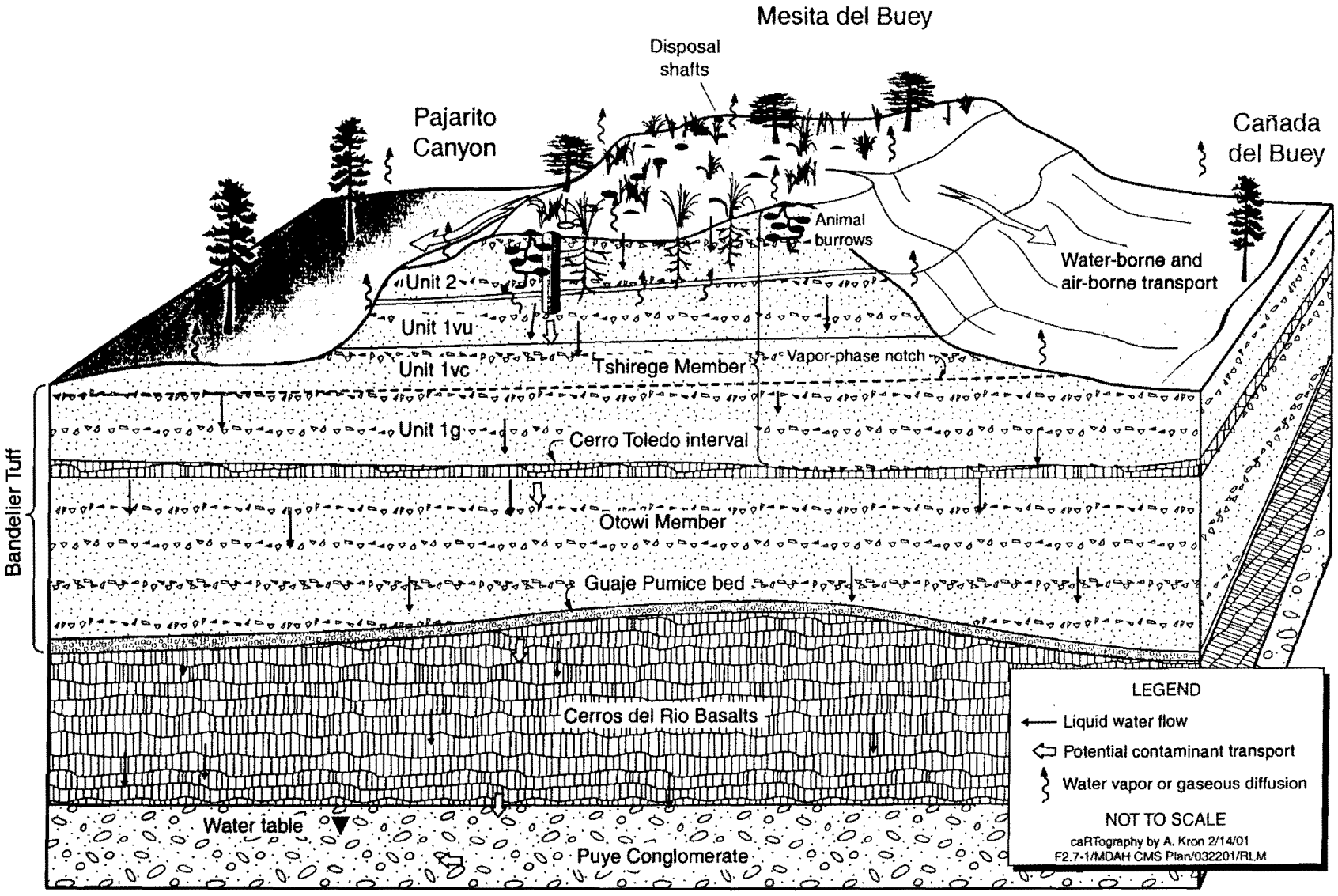


Figure 2.7-1. Site conceptual model for MDA H

2.8 Data Needs for the MDA H CMS

After reviewing the draft MDA H RFI report (Environmental Restoration Project, in progress), the NMED-HWB identified gaps in the data for air, groundwater, surface soils/sediments, and VOCs in the subsurface at MDA H. Therefore, the following activities are recommended to address the remaining data gaps, fully characterize the lateral and vertical extent of contaminant releases, bolster impact assessments, and address preliminary data needs for the CMS.

- Collection of additional subsurface samples from borehole 54-1023 and newly drilled boreholes to further define the lateral extent of tritium and organic chemical contamination
- Installation of an air-monitoring station adjacent to MDA H to monitor for tritium in air
- Collection of a sediment sample near sample location 54-5132 at the interface between the alluvial sediments and bedrock where sediment has accumulated over the years
- Evaluation and incorporation of groundwater data into the CMS from the unsaturated zone monitoring at MDA G, the regional saturated zone monitoring at R-22, and the ongoing TA-54 groundwater investigation.

NMED-HWB had already determined that a RCRA CMS was needed because this site presents a potential future risk to human health and the environment thereby requiring an evaluation of corrective measure alternatives in a CMS (Young 2000, 68569). NMED-HWB agreed that remaining data gaps could be filled during the CMS.

3.0 CMS OBJECTIVES AND SCOPE

3.1 CMS Objectives

The overall objective of the CMS is to provide stakeholders with an analysis of corrective measure alternatives to determine if corrective action is required at MDA H to ensure protection of human health and the environment in the future. To do this, the long-term performance of the site (i.e., the ability of the site to control the release of potentially harmful quantities of contaminants) will be assessed in accordance with EPA and DOE risk and dose assessment guidance. If an assessment determines that adverse conditions are likely to develop over time if no action is taken, then a range of alternatives, including excavation and enhanced containment, will be assessed. The containment alternatives will be evaluated to ensure that contaminant concentrations remaining in the shafts do not exceed action levels (Section 3.2-1) at points of compliance, if the material in the shafts is left in place. The benefits, costs, and implementation risks of the containment technologies will be compared to the no-action alternative and to alternatives for excavation of the material in the shafts. Preliminary action levels and regulatory points of compliance for the containment and no-action alternatives will be developed and negotiated with the NMED-HWB.

Target Corrective Action Objectives

Each corrective measure alternative will be evaluated in terms of how well it meets the following site-specific corrective action objectives:

- *Protect human health.* For RCRA hazardous wastes, the selected corrective measure will provide reasonable assurance that (1) the excess incremental cancer risk estimated according to EPA's reasonable maximum exposure (RME) approach does not exceed a range of 10^{-6} to 10^{-4} for the design life of the selected corrective measure and (2) the noncancer hazard does not exceed a

hazard index of 1. For radionuclides, the selected corrective measure will provide reasonable assurance that the total calculated RME dose does not exceed 15 mrem/yr for the design life of the measure.

- *Protect the environment.* The selected corrective measure alternative will provide reasonable assurance of protection of the environment as determined by ecological assessment guidance available at the time of the selection of the alternative.
- *Attain action levels.* The selected corrective measure alternative will provide reasonable assurance that migration of contaminants during the design life of the measure will not result in contaminant concentrations above action levels at the points of compliance.
- *Provide source control to reduce or eliminate releases that may pose a threat.* The selected corrective measure alternative will be designed to provide reasonable assurance that future releases will be minimized and that the impact of any potential release is within the risk/dose levels specified above.
- *Waste Management Compliance.* The corrective measure alternative will comply with standards for management of wastes generated by the CMS.

3.2 Scope of the CMS

The CMS will evaluate the future adverse human health and environmental impacts of contaminants at MDA H. Consistent with the site conceptual model presented in Section 2 of this plan, impacts may result from

- the release of potentially harmful amounts of specific contaminants and the resulting accessibility to those contaminants for human or ecological receptors and
- direct contact of humans, plants, or animals with harmful amounts of contaminants as a result of intrusion into the shafts.

Action levels and points of compliance for alternative assessments will be developed and negotiated with the NMED-HWB. The following subsections present the Laboratory's interpretation of these concepts in the context of the MDA H CMS.

3.2.1 Establishing Action Levels

Action levels will be developed for containment alternatives and the no-action alternative as part of the CMS and recommended to the NMED-HWB in the CMS report. Action levels are media-specific contaminant concentrations (radionuclides and RCRA constituents) determined to be protective of human health and the environment (61 FR 19432, "Corrective Action for Releases from Solid Waste Management Units at Hazardous Waste Management Facilities"). Although they are not cleanup goals, the action levels will serve as the triggering mechanism for additional monitoring or remediation that must be implemented if action levels are exceeded; a phased contingency plan for the additional monitoring or remediation will be developed during the CMS. After completion of the CMS, media-specific action levels may be included in the Laboratory permit modification as hazardous waste concentration levels in subsurface tuff and air. The long-term monitoring program that will be developed during the CMS will most likely include some combination of air monitoring at the facility boundary, moisture monitoring associated with the performance of the selected corrective measure alternative, and monitoring in the vadose zone for moisture and specific COPCs. The media-specific action levels for the COPCs at MDA H will be determined by contaminant transport modeling during the CMS and approved by the NMED-HWB.

3.2.2 Points of Compliance

Under 40 CFR 264.525(e)(1)(i)-(v) of proposed Subpart S, "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities," the point of compliance (POC) is the point(s) or area(s) at which a facility must demonstrate compliance with action levels. The POC is medium-specific and depends on factors such as the potential for exposure of human or ecological receptors, contaminant migration, impact to sensitive ecosystems, and overall accessibility. Because no corrective action regulations specifically address POCs, they are developed on a site-specific basis. It should be noted that a POC could be defined as an area with the potential for exposure to receptors [40 CFR 264, Subpart S, "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities"]. Within these areas, specific locations that are representative of the exposure to specific receptors are then selected as performance-monitoring locations to demonstrate compliance with action levels. Two preliminary POCs are proposed in this CMS plan: the vadose zone beneath the site and air at the site boundary. Each POC covers a different medium or system. The preliminary POCs will be further defined during the CMS as additional information is obtained and corrective measure alternatives are selected. Final POCs will be proposed to the NMED-HWB in the CMS report.

3.2.2.1 Vadose Zone

The preliminary POC for soils in the vadose zone is a specified location where a hazardous waste or radionuclide is monitored to determine if its concentration level meets or exceeds the specified action level, as detected by performance/long-term monitoring methodologies. Performance monitoring and sampling will be evaluated in the CMS.

3.2.2.2 Air at Site Boundary

The preliminary POC for air is a specified location where a hazardous waste or radionuclide is monitored to determine if its concentration level(s) meets or exceeds the specified action level, as detected by air-monitoring methodologies implemented at the site boundary. An air-monitoring program will be evaluated in the CMS for the containment alternative.

3.2.2.3 Groundwater

Groundwater data from the unsaturated zone monitoring at MDA G, the regional saturated zone future monitoring at R-22, and the ongoing TA-54 groundwater investigation will be evaluated and incorporated into the CMS as they become available.

3.2.3 Applicable Regulations and Requirements Evaluations

This section presents an overview of laws and regulations that may apply to the implementation of the CMS under Module VIII of the Laboratory's Hazardous Waste Facility Permit and 40 CFR Part 264, Subpart S, "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities." The medium (e.g., surface water or soil) that each relevant regulation applies to is also discussed.

Generator and Transporter Requirements. Any action resulting in the generation of hazardous and solid waste during the CMI will comply with the following regulations for hazardous waste management.

- 40 CFR Part 260, "Hazardous Waste Management System: General"
- 40 CFR Part 261, "Identification and Listing of Hazardous Waste"

- 40 CFR Part 262, "Standards Applicable to Generators of Hazardous Waste"
- 40 CFR Part 263, "Standards Applicable to Transporters of Hazardous Waste"

Land Disposal Restrictions. All MDA H activities that generate hazardous waste as part of the RCRA corrective action will comply with the land disposal restriction requirements of 40 CFR Part 268, "Land Disposal Restrictions."

Public Participation and Community Relations. Section 7004 of RCRA encourages public participation in the development, revision, implementation, and enforcement of any regulation, guideline, information, or program activity. The public participation and community relations regulation is currently implemented in the ER Project through community meetings and meetings with stakeholders in a community such as the Northern New Mexico pueblos, Los Alamos County, and officials of a community. The Laboratory presently complies with DOE public participation policy outlined in DOE Policy 1210.1, "Public Participation," and the installation work plan (LANL 2000, 66802). Public participation activities specific to this CMS are included in the CMS/CMI schedule found in Appendix E and in the PIP provided as Appendix D.

The National Environmental Policy Act. Section 102(2)(c) of the National Environmental Policy Act (NEPA) requires that all federal agencies prepare an environmental impact statement for all federal actions significantly affecting the quality of the human environment. The DOE has established a procedure for compliance with NEPA; it is defined in the following documents:

- 10 CFR Part 1021, "National Environmental Policy Act Implementing Procedures"
- 40 CFR Part 1500, "Purpose, Policy, and Mandate"
- 40 CFR Part 1501, "NEPA and Agency Planning"
- 40 CFR Part 1502, "Environmental Impact Statement"
- 40 CFR Part 1503, "Commenting"
- 40 CFR Part 1504, "Predecision Referrals to the Council of Proposed Federal Actions Determined to be Environmentally Unsatisfactory"
- 40 CFR Part 1505, "NEPA and Agency Decisionmaking"
- 40 CFR Part 1506, "Other Requirements of NEPA"
- 40 CFR Part 1507, "Agency Compliance"
- 40 CFR Part 1508, "Terminology and Index"

Before the CMS is implemented, all NEPA procedures will be completed. The environment, safety, and health (ESH) questionnaire will be completed and reviewed by the Laboratory Environmental Assessments and Resource Evaluations Group, ESH-20, NEPA team. All NEPA concerns will be addressed before implementing intrusive activities.

The Clean Water Act. The Clean Water Act requirements apply to the CMS if impacts to stormwater result from implementing the CMS.

The Clean Air Act. The Clean Air Act is not anticipated to be applicable to the CMS because there are no anticipated air releases during the CMI. Dust will be mitigated for health and safety reasons during field activities, and the air will be continuously monitored with Miniram personal air monitors.

The Toxic Substances Control Act. The Toxic Substances Control Act (TSCA) is not applicable to the CMS because no TSCA constituents will be released or removed from any soil or water.

3.3 Institutional Considerations

3.3.1 Land Use

MDA H is located on DOE property that has historically been used for industrial purposes, specifically, the management of Laboratory wastes. Continued operation is planned for MDA G and for surface waste management areas at MDA L. As a result, the area within the administrative boundary of TA-54, which includes MDA H, is subject to controlled access. Because of the sensitive nature of the material disposed of at MDA H and other disposal areas at TA-54, continued governmental control of this area is an extremely high priority. Therefore, it is anticipated that this area will remain under DOE institutional control for the remaining period of operation for the facility (LANL 1995, 57224). These security measures effectively eliminate possible inadvertent site intrusion by humans.

3.3.2 Risk-Based Decision Approach

The conceptual approach to conducting the CMS for MDA H is consistent with NMED-HWB's risk-based decision tree; EPA's 40 CFR Part 264.525, Subpart S, Part V, "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities"; and DOE Order 5400.1, "General Environmental Protection Program," which includes the Comprehensive Environmental Response, Compensation, and Liability Act and RCRA by reference for environmental remediation of hazardous wastes. The technical approach draws from both EPA and DOE guidance on risk assessment of exposures to hazardous waste and dose assessment of exposures to radioactive chemicals, respectively (EPA 1989, 8021; DOE Orders 435.1, "Radioactive Waste Management" and 5400.5, "Radiation Protection of the Public and the Environment."). Because the reason for conducting the CMS is the concern about the potential for future exposures and adverse impacts, computational models that simulate the natural processes that may result in contaminant releases are used to support the risk and dose assessments (together referred to as *impacts assessment*) for no action and containment alternatives. Impact assessments for times in the future must, of necessity, be conducted in the face of uncertainties. The approach to be implemented for the CMS will address uncertainties in an explicit and quantitative manner that describes the nature of uncertainties, how they are treated in the no-action and alternatives assessments, and how they affect the results (and interpretation of results) of the assessments.

3.3.3 Long-Term Stewardship

The process for evaluating corrective measure alternatives and recommending a corrective measure will consider long-term stewardship issues identified in the National Research Council's Committee on the Remediation of Buried and Tank Wastes discussed in "Long-Term Institutional Management of U.S. DOE Legacy Waste Sites" (National Research Council 2000, 69681). In particular, the recommended corrective measure(s) will be evaluated for consistency with the following recommendations:

- plan for uncertainty,
- plan for fallibility; and
- plan to maximize follow-through on phased, iterative and adaptive, long-term approaches.

4.0 SCREENING OF TECHNOLOGIES AND IDENTIFICATION OF CORRECTIVE MEASURE ALTERNATIVES

The inventory and characterization data in the MDA H RFI report (Environmental Restoration Project, in progress) will be reviewed, and a list of technologies will be developed that would be applicable for the following corrective actions:

- No further action
- Institutional controls
- Containment
- In situ treatment
- Removal
- Ex situ treatment

The technologies will be screened to eliminate those that may not prove feasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably over time, or that do not achieve the target corrective measure objectives within a reasonable time period. A list of corrective measure alternatives will then be developed and the alternatives evaluated.

Based on specific information on site conditions at MDA H, including the contaminant inventory, the design of the disposal units, and the environmental setting, the following preliminary list of corrective measure alternatives was developed. This list of alternatives represents a workable number of options that did pass initial screening and meet the corrective action objectives. This list may expand or contract based on further technology screening and public input.

- Alternative 1. Monitoring only, no action
- Alternative 2. Maintenance of existing cover and monitoring
- Alternative 3. Control of tritium vapors
- Alternative 4. Near-surface stabilization
- Alternative 5. Engineered cover
- Alternative 6. Partial excavation, wastes replaced in MDA H
- Alternative 7. Complete excavation, wastes disposed of off site
- Alternative 8. Combination of alternatives

4.1 Identification and Description of Corrective Measure Alternatives

Because there are no unacceptable present-day risks at MDA H, the need for corrective action is based on the potential for releases in the future that might create risks to human health or the environment. Thus, the alternatives below emphasize confirmation of continuing absence of releases, controlling the sources that could contribute to releases, and providing continuing containment that will limit the magnitude of future releases within acceptable risk levels.

4.1.1 Alternative 1. Monitoring Only, No Action

Except for tritium, existing backfill and concrete caps on the nine shafts at MDA H have provided effective containment to date. Assessment of the existing containment features may indicate that they will continue to be sufficient. Thus, an alternative of monitoring current containment performance will be evaluated. For

this alternative, it is assumed that no effort will be made to maintain the containment systems or to control any releases that occur. The control of site access and Laboratory administrative requirements for the site will remain as they are.

4.1.2 Alternative 2. Maintenance of Existing Cover and Monitoring

Maintenance activities can extend the containment effectiveness and operational lifetime for the existing cover and concrete shaft caps at MDA H. This alternative incorporates the monitoring described for Alternative 1 and provides for upkeep of the existing containment systems during the institutional control period. Any releases identified by site monitoring will also be addressed through maintenance activities, including small-scale improvements to the existing containment systems. The control of access to the site and Laboratory administrative requirements for the site will remain as they are.

4.1.3 Alternative 3. Control of Tritium Vapors

Releases of tritium in water vapor have been identified at MDA H; the vapor moves from emplaced wastes into the tuff bedrock and migrates in the vapor phase through rock and soil to the atmosphere and plants. At present, tritium releases to the environment are not sufficient to constitute a risk to human health or the environment.

If no action is taken relative to tritium migration, continued slow releases are expected to occur. If tritium vapors could be confined to the subsurface, they would decay; tritium has a half-life of 12.3 yr. If the tritium vapors could be more quickly vented to the atmosphere where they would be diluted and dispersed (and the releases could be monitored as needed) during the institutional control period, concerns over long-term releases would be reduced.

No technologies that can effectively eliminate, control, or reduce the migration of tritium through the vadose zone are known, and none are proposed for evaluation for MDA H. However, soil-venting techniques that may provide more rapid release of tritium to the atmosphere are available, and the benefits that may be obtained through early venting of tritium vapors are addressed in this alternative. In this alternative, the conditions for Alternative 2 will be maintained, and a design for a tritium-venting system and a plan for any associated tritium monitoring will be considered.

4.1.4 Alternative 4. Near-Surface Stabilization

Site or waste stabilization activities such as in situ vitrification or jet grouting may be desirable components of a containment system for MDA H. The stabilization activity will enhance the resistance of the shaft cap to subsidence or loss of its perimeter seal against the tuff and will enhance the cap as a barrier against erosion and plant, animal, or human intrusion. In addition, these stabilization methods could reduce contaminant mobility. In this alternative, the conditions for Alternative 2 will be maintained, and one or more stabilization options will be considered.

4.1.5 Alternative 5. Engineered Cover

One of the primary containment alternatives for subsurface waste disposal units, such as landfills, is an engineered cover to reduce water infiltration and provide a barrier to erosion and intrusion. Although MDA H consists of a series of shafts rather than a landfill, and thick concrete plugs already provide substantial containment, an engineered cover alternative will be assessed to identify additional benefits.

The engineered cover alternative focuses on designing a site-specific evapotranspiration cover, which has been shown to be effective in limiting percolation through landfills/disposal areas in semiarid regions (Davenport et al. 1998, 69674; Dwyer et al. 2000, 69673) An effectively designed evapotranspiration cover enhances moisture infiltration control, protects against soil erosion, deters plant and animal intrusion, and inhibits human intrusion. Several cover designs will be evaluated. These designs will include erosion protection with gravel surface treatments, varying depths of enriched soil to enhance plant growth, varying depths of the main crushed tuff evapotranspiration layer, and designs with or without biointrusion barriers such as chainlink fencing or a pea gravel layer. In this alternative, the conditions for Alternative 2 will be maintained, and one or more cover designs will be considered.

4.1.6 Alternative 6. Partial Excavation, Wastes Replaced in MDA H

Long-term risk assessments conducted for MDA G indicated that the most likely future risks would be associated with the loss of containment at the ground surface (due, for example, to biointrusion) (Hollis et al. 1997, 63131). To address this issue, the high-risk wastes nearest the surface would be excavated and moved to a deeper depth in a new disposal shaft to provide additional isolation of the buried materials from surface release processes. In this alternative, the conditions for Alternative 2 will be maintained, and partial excavation, handling, and replacing of the wastes on site will be considered.

4.1.7 Alternative 7. Complete Excavation, Wastes Disposed of Off Site

Future potential risk concerns at MDA H can be eliminated by excavating all wastes and disposing them at an off-site facility, if there is a facility that will accept these wastes. Increased short-term risks to workers, the environment, and the community will be considered along with the risk to the community where the waste would be transported to and disposed of. This alternative alone offers the possibility of clean closure of the site but transfers the risk to another site. Recycling of waste materials will also be reviewed. No maintenance or monitoring activities are included in this corrective measure.

4.1.8 Alternative 8. Combination of Alternatives

Combinations of alternatives 1 through 7 will also be evaluated.

4.2 Initial Screening of Alternatives

An initial screening of alternatives will be conducted to reduce the number of alternatives that will be evaluated in detail. This screening will be qualitative and will eliminate those alternatives that may not prove feasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the target corrective measure objectives within a reasonable period of time. This screening process is defined in Module VIII of the Laboratory's Hazardous Waste Facility Permit and will eliminate those technologies that have severe limitations for a given set of waste- and site-specific conditions. The screening process will examine the following:

Site Characteristics. Site data will be reviewed to identify conditions that may limit or promote the use of certain technologies; these technologies will be eliminated from further consideration.

Waste Characteristics. Waste characteristics may limit the effectiveness or feasibility of technologies, e.g., waste characteristics may particularly affect the feasibility of in situ methods, direct treatment methods, and land disposal (on/off site).

Technology Limitations. The level of technological development, the performance record, and the construction, operation, and maintenance problems will be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated will be eliminated in the screening process.

A technical memorandum will be developed that summarizes the initial screening of alternatives and submitted to the NMED-HWB for review.

5.0 PROCESS AND CRITERIA FOR EVALUATION OF ALTERNATIVES

5.1 Technical Approach

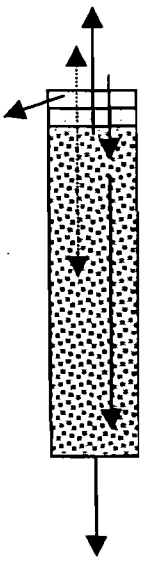
Preliminary engineering designs for the alternatives that passed the screening will address the following:

- Cover thickness. Covers will be designed for the containment alternatives to determine required cover thickness based on accepted landfill process models.
- Required spacing for tritium venting. Calculations will be performed to determine the required spacing for tritium venting (cover alternative).
- Requirements and costs. Technology vendors will be consulted to define requirements and costs for stabilization technologies.
- Excavation requirements and waste acceptance criteria. A preliminary cut and fill design will be done to determine excavation requirements and waste acceptance criteria and to determine potential on-site/off-site disposal options.

After the preliminary engineering designs have been completed and reviewed, the potential future impacts for the containment corrective measure alternatives will be evaluated. Mathematical models will be used to simulate natural processes that may result in the release of contamination from the subsurface at MDA H. Process models will simulate such things as

- erosion of surface materials covering the waste,
- infiltration of surface water through the cover material and into and through the waste,
- dissolution of contaminants into water percolating through the waste, and
- downward migration of solutes through the rock beneath the site.

The results will include data for contaminant concentrations on the surface and in the subsurface rock beneath the site at various times (Figure 5.1-1). Using these calculated concentrations, impact assessments will be conducted to estimate the risk, hazard, or dose to (hypothetical) humans or other biota coming into contact with the contaminants. If adverse impacts are identified in the analysis, then corrective measures that are likely to reduce either the impact or the likelihood of those adverse conditions will be identified. For example, if the assessment identifies that erosion of the cover over the waste at MDA H has the potential to create unacceptable impacts by exposing the waste, then erosion-resistant cap designs would be evaluated.



Erosion of cover materials (tuff and concrete) using, e.g., CREAMS, 2D

Diffusion of vapor-phase contaminants in subsurface using, e.g., FEHM, 3D

Infiltration of precipitation, run-on, snowmelt using, e.g., HYDRUS, 2D

Percolation of liquid water through waste and dissolution of contaminants using, e.g., FEHM, 2D, or 3D

Transport of dissolved contaminants through vadose zone using FEHM (3D)

Input variables include quantitative and qualitative site-specific data described in the RFI report (Environmental Restoration Project, in progress) include

- Rooting and burrowing depths of native plants and animals
- Shaft dimensions
- Cover design
- COPCs
- Porosity of tuff
- Residual moisture of tuff

Contaminant concentrations potentially released from the inventory are calculated as a function of time in surface soil, runoff water, air, vadose zone, groundwater, and biota. Variables and processes that result in significant differences in calculated contaminant concentrations (sensitivity analysis) are identified.

Figure 5.1-1. Containment alternatives design

After the cut and fill design has been completed and reviewed for the excavation alternatives, waste disposal alternatives will be identified for each of the waste streams, and waste disposal sites will be identified. Then worker and transportation risk will be assessed for excavation and on-site and off-site transportation of MDA H material. If there are no facilities that will accept these wastes then the excavation and off-site disposal alternative will be dropped from further consideration. The long-term risk will be assessed for the community near the final disposal site for each of the waste streams.

The information developed above will then be used in the comparative evaluation of alternatives specified in the Module VIII of the Laboratory's Hazardous Waste Facility Permit and reviewed in Section 5.2. The comparative evaluation of alternatives will also include an uncertainty analysis, as discussed in Section 5.3.

5.2 Evaluation Criteria

A description of each alternative will be prepared that includes preliminary process flow sheets, preliminary sizing, the type of construction for buildings and structures, and rough quantities of utilities required. Each alternative will receive a technical, environmental, human health, institutional, and cost assessment. The results of these assessments will be analyzed in a cost-benefit analysis (Section 6.2).

5.2.1 Technical

The technical assessment will focus on performance, reliability, implementability, and safety. During the assessment of performance, the effectiveness and useful life of the corrective measure will be evaluated. Effectiveness can be defined as the degree to which a release is retarded and can be determined through design specifications and performance monitoring. Any specific waste or site characteristics that could potentially impede effectiveness and the effectiveness of combinations of technologies will be considered. Useful life is defined as the length of time the level of effectiveness can be maintained.

During the assessment of reliability of each corrective measure, operation and maintenance requirements and demonstrated performance at other sites will be evaluated. Technologies requiring frequent or complex operation and maintenance activities will be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The evaluation will consider whether the technologies have been used effectively under analogous conditions, whether the combination of technologies have been used together effectively, whether failure of any one technology has an immediate impact on receptors, and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

During the assessment of implementability of each corrective measure, the relative ease of construction and the total time required to achieve a given level of response will be evaluated.

5.2.2 Environmental

The environmental assessment for each alternative will focus on facility conditions and pathways of contamination actually addressed by each alternative. An evaluation of the short- and long-term beneficial and adverse effects of the response alternative, any adverse effects on environmentally sensitive areas, and an analysis of measures to mitigate adverse impacts will be included.

5.2.3 Human Health

The human health assessment will focus on the extent to which each alternative mitigates short- and long-term potential exposure to any residual contamination and the extent to which it protects human health both during and after implementation. Known levels and characterizations of contaminants on site, potential exposure routes, and potentially affected populations will be included in the assessment process. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction of that exposure over time. The relative reduction of exposure will be determined by comparing residual levels of each alternative with existing criteria, standards, or regulations acceptable to the NMED-HWB. The increased worker and transportation risks for the excavation and off-site disposal alternative(s) will be assessed versus the long-term risk of leaving material in place for the containment and no-action alternatives.

5.2.4 Institutional

The effects of federal, state, and local environmental and public health standards, DOE orders, regulations, guidance, advisories, ordinances, land use, and community relations on the design, operation, and timing of each alternative will be assessed.

5.2.5 Cost Estimate

The cost estimate will include capital costs and operation and maintenance costs. Capital costs consist of direct (construction) and indirect (nonconstruction and overhead) costs. Operation and maintenance costs are postconstruction costs necessary to ensure continued effectiveness of a corrective measure. In addition to the total cost of the corrective measure, the cost per year and cumulative cost per year will also be calculated.

5.3 Risk/Impact Assessment Approach

Uncertainties that are inherent when evaluating performance and risk for the containment and no-action alternatives will be assessed over time. There is uncertainty in the contaminant transport models used to simulate environmental processes, and there is uncertainty regarding future conditions at the site. In addition, there is considerable uncertainty regarding the types and amounts of materials disposed of at the site. Disposal records are incomplete, which is characteristic of that time period, and some of the waste was (and in some cases still is) classified. The technical approach used to assess potential impacts associated with contaminants released from MDA H over time and to evaluate the performance of corrective measure alternatives will be specifically designed to account for these uncertainties. The approach will reveal the nature of the uncertainties and identify the effect that these uncertainties have on interpreting and applying the results of the models.

The simulation models developed for the uncertainty analysis will identify what features, events, and/or processes associated with the site have a potential to present adverse impacts. (An example of such a disruptive process might be degradation of the concrete caps followed by transport of contamination to the surface by animals burrowing into the shafts.) The models will compute contaminant concentrations as a function of location and time, providing an estimate of future nature and extent of contaminant releases. These calculated concentrations will be used to assess future potential impacts in the same way that field data are used to assess imminent impacts. The calculated concentrations can then be scaled to identify action levels that will ensure protectiveness in the future.

The results of the uncertainty of the effectiveness of each corrective measure alternative over time will be represented graphically to provide decision makers additional information on selecting a recommended corrective measure.

Figure 5.3-1 shows how the hypothetical results of these contaminant transport calculations might be presented and interpreted in the context of the evaluation criteria. The figure shows that the hypothetical corrective measure alternative under consideration maintains protectiveness in the context of the hazard index criterion for about 150 yr, in the context of cancer risk for about 240 yr, and in the context of radiological dose for about 325 yr.

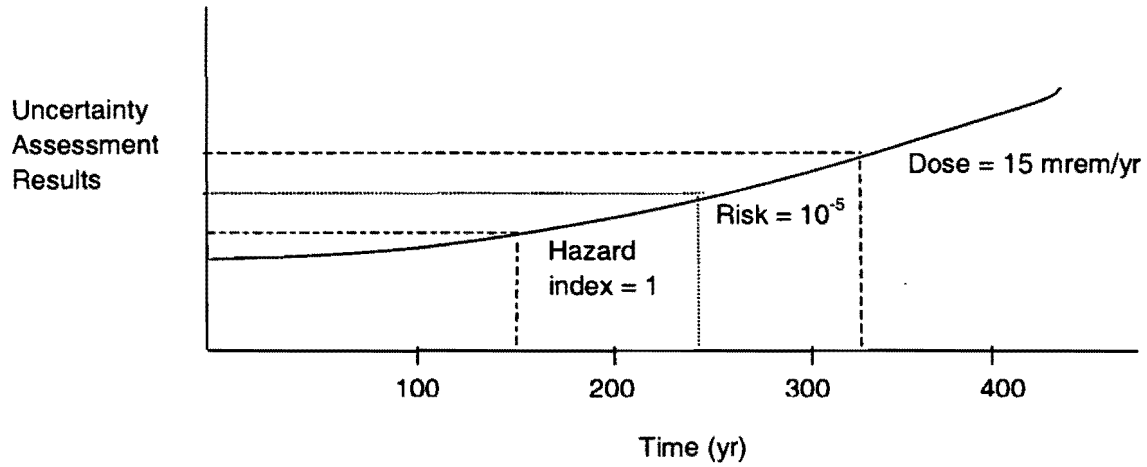


Figure 5.3-1. Uncertainty assessment example

6.0 PROCESS AND CRITERIA FOR JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURE

A corrective measure alternative will be selected, justified, and recommended as the selected remedy for MDA H using the following technical, human health, environmental, and cost criteria specified in the HSWA module and discussed in Section 5.

Technical

Performance. The corrective measure that is most effective at executing its intended functions and maintaining those functions over extended periods of time will be given preference.

Reliability. The corrective measure that does not require frequent or complex operation and maintenance activities and has been proven effective under waste and facility conditions similar to those anticipated will be given preference.

Implementability. The corrective measure that can be constructed and operated to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time will be preferred.

Safety. The corrective measure that poses the least threat to the safety of the nearby residents, environments, and workers during implementation will be preferred.

Human Health

The corrective measure must comply with existing EPA criteria, DOE orders, Occupational Safety and Health Administration standards, and regulations for the protection of human health. Corrective measures that provide maximum reduction in exposure with time are preferred.

Environmental

The corrective measure posing the least adverse impact on the environment over the shortest time period will be favored.

Cost

Cost will be the last of the criteria evaluated and will play an important role when two feasible alternatives provide similar protection to human health and the environment within the same amount of time.

Summary

The relative performance of each of the alternatives with respect to each other will be presented, and a cost-benefit analysis will be performed. Tradeoffs between the evaluation criteria will be stated explicitly. A multiattribute analysis for weighting each of the criteria used for selecting an alternative will be proposed to the NMED-HWB before completion of the corrective measure selection.

7.0 REPORTS

7.1 Progress Reports

The Laboratory will provide monthly management status reports to NMED; these reports will include

- a description and estimate of the completed work,
- summaries of public involvement activities during the reporting period,
- summaries of any problems or potential problems relevant to the CMS and actions taken to rectify problems,
- changes in key personnel, and
- projected work for the subsequent reporting period.

In addition, the Laboratory will submit quarterly progress reports summarizing relevant environmental data collected during the previous quarter.

7.2 CMS Report

A proposed CMS report outline is provided in Appendix C. A draft CMS report will be submitted to NMED, and comments received will be incorporated into the final report.

8.0 REFERENCES

The following list includes all references cited in this document. Parenthetical information following each reference provides the author, publication date, and the ER record identification (ER ID) number. This information also is included in the citations in the text. ER ID numbers are assigned by the Laboratory's ER Project to track records. These numbers can be used to locate copies of the actual documents at the ER Project's Records Processing Facility and, where applicable, with the ER Project reference library titled "Reference Set for Material Disposal Areas, Technical Area 54."

Copies of the reference library are maintained at the NMED-HWB; the DOE Los Alamos Area Office; United States EPA, Region VI; and the ER Project Material Disposal Areas Focus Area. This library is a living collection of documents that was developed to ensure that the administrative authority has all the necessary material to review the decisions and actions proposed in this document. However, documents previously submitted to the administrative authority are not included.

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Young, J., December 27, 2000. "Status of the RFI Report for MDAs G, H, and L at TA-54 Los Alamos National Laboratory," State of New Mexico Environment Department memorandum to J. Browne and T. Taylor, Santa Fe, New Mexico. (Young 2000, 68569)

Appendix A

Acronyms and Glossary

APPENDIX A ACRONYMS, GLOSSARY, AND METRIC CONVERSION TABLES

A-1.0 ACRONYMS

CFR	Code of Federal Regulations
CMI	corrective measures implementation
CMS	corrective measures study
COPC	chemical of potential concern
DOE	Department of Energy
EPA	US Environmental Protection Agency
ER	environmental restoration
ESH	environment, safety, and health
FR	Federal Register
HPT	High Performing Team
HSWA	Hazardous and Solid Waste Amendments of 1984
HWB	Hazardous Waste Bureau
Laboratory	Los Alamos National Laboratory
MDA	material disposal area
NEPA	National Environmental Policy Act
NMED	New Mexico Environment Department
PBX	plastic-bonded explosives
POC	point of compliance
PRS	potential release site
RCRA	Resource Conservation and Recovery Act
RDX	1,3,5-trinitro-1,3,5-triazacyclohexane (Cyclotrimethylenetrinitramine)
RFI	RCRA facility investigation
RME	reasonable maximum exposure
TA	technical area
TBD	to be determined
TSCA	Toxic Substances Control Act
VOC	volatile organic compound

A-2.0 GLOSSARY

Action level. Health- and environmental-based concentrations derived using *chemical*-specific toxicity information and standardized exposure assumptions. Action levels can be developed on a facility-specific basis or can be taken from standardized lists (61 Federal Register 19446). Contamination found in a particular *medium* below an appropriate action level would not generally be subject to *remediation* or further study.

Administrative authority. The Director of the New Mexico Environment Department, or his/her designee, or the U.S. Environmental Protection Agency.

Alluvial. Relating to geologic deposits or features formed by running water.

Assessment. (1) The act of reviewing, inspecting, testing, checking, conducting surveillance, auditing, or otherwise determining and documenting whether items, processes, or services meet specified requirements. (2) An evaluation process used to measure the performance or effectiveness of a system and its elements. In this document, assessment is an all-inclusive term used to denote any of the following: audit, performance evaluation, management system review, peer review, inspection, and surveillance.

Chemical of potential concern (COPC). A *chemical*, detected at a site, that has the potential to adversely affect human *receptors* due to its concentration, distribution, and mechanism of toxicity. A COPC remains a concern until *exposure pathways* and *receptors* are evaluated in a site-specific human health *risk assessment*.

Corrective action. Action to rectify conditions adverse to human health or the environment.

Corrective measures study (CMS). A formal process to identify and evaluate remedy alternatives for *releases* at the facility (55 Federal Register 30798).

Detection limit. Minimum concentration that can be determined by a single measurement by an instrument; implies a specified statistical confidence that the analytical concentration is greater than zero.

Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any *solid waste* or *hazardous waste* into or on any land or water so that such *solid waste* or *hazardous waste* or any constituent thereof may enter the environment or be emitted into the air or *discharged* into any waters, including *groundwaters*. (40 CFR Part 260.10)

Ecological screening level. An organism's exposure-response threshold for a given *chemical* constituent. The concentration of a substance in a particular *medium* corresponds to a *hazard quotient* (HQ) of 1.0 for a given organism below which no *risk* is indicated.

Environmental impact statement. Detailed report, required by federal law, on the significant environmental impacts that proposed major federal projects would have on the environment.

Evapotranspiration. The combined *discharge* of water from the earth's surface to the atmosphere by evaporation from lakes, streams, and soil surfaces, and by transpiration from plants.

Hazard index (HI). The sum of *hazard quotients* for multiple *contaminants* to which a *receptor* (j) is determined to be exposed, i.e., $HI_j = \sum_i HQ_{ij}$.

HSWA module. Module VIII of the Laboratory's Hazardous Waste Facility Permit. This permit allows the Laboratory to operate as a *treatment, storage, and disposal facility*.

Hydrogeologic Workplan. The document that describes activities planned by the Laboratory to characterize the hydrologic setting beneath the Laboratory and to enhance the Laboratory's *groundwater* monitoring program.

Mixed waste. Waste that contains both *hazardous waste* (as defined by *RCRA*) and *radioactive waste* (as defined by the Atomic Energy Act [AEA] and its amendments).

Model. A mathematical approximation of a physical, biological, or social system.

Potential release site (PRS). Refers to potentially contaminated sites at the Laboratory that are identified either as *solid waste management units (SWMUs)* or *areas of concern* (AOCs). PRS refers to *SWMUs* and AOCs collectively.

RCRA facility assessment. Usually the first step in the RCRA corrective action process, to identify potential and actual releases from solid waste management units and make preliminary determinations about releases, the need for corrective action, and stabilization measures.

RCRA facility investigation (RFI). The investigation that determines if a release has occurred and the nature and extent of the contamination at a hazardous waste facility. The RFI is generally equivalent to the remedial investigation portion of the Comprehensive Environment Response, Compensation, and Liability Act (CERCLA) process.

Regional aquifer. Geologic material(s) or unit(s) of regional extent whose saturated portion yields significant quantities of water to wells, contains the regional zone of saturation, and is characterized by the regional water table or potentiometric surface.

Remediation. The process of reducing the concentration of a *contaminant* (or *contaminants*) in air, water, or soil media to a level that poses an acceptable *risk* to human health and the environment; the act of restoring a contaminated area to a usable condition based on specified standards.

Resource Conservation and Recovery Act (RCRA). The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976. (40 CFR 270.2)

Risk. A measure of a negative or undesirable impact associated with an event.

Screening action level. *Medium*-specific concentration level for a *chemical* derived using conservative criteria below for which it is generally assumed that there is no potential for unacceptable *risk* to human health. The derivation of a SAL is based on conservative exposure and land-use assumptions. However, if an applicable *regulatory standard* exists that is less than the value derived by *risk*-based computations, it will be used for the SAL.

Site conceptual model. A qualitative or quantitative description of sources of contamination, environmental *transport* pathways for contamination, and biota that may be impacted by contamination (called *receptors*) and whose relationships describe qualitatively or quantitatively the *release* of contamination from the sources, the movement of contamination along the pathways to the exposure points, and the uptake of *contaminant* by the *receptors*.

Solid waste management unit (SWMU). Any discernible unit at which *solid wastes* have been placed at any time, irrespective of whether the unit was intended for the management of *solid or hazardous waste*. Such units include any area at a facility at which *solid wastes* have been routinely and systematically *released*. This definition includes regulated units (i.e., landfills, surface impoundments, waste piles, and land *treatment* units) but does not include passive leakage or one-time spills from production areas and units in which wastes have not been managed (e.g., product storage areas).

Vadose zone. The unsaturated zone. Portion of the subsurface above the regional *water table* in which pores are not fully saturated.

Watershed. The region drained by, or contributing waters to, a stream, lake or other body of water and separated from adjacent drainage areas by a divides such as a ridge or summit of high ground.

Metric to English Conversions

Multiply SI (Metric) Unit	by	To Obtain US Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
millimeters (mm)	0.0394	inches (in.)
micrometers or microns (μm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (μg/g)	1	parts per million (ppm)
liters (l)	0.26	gallons (gal.)
milligrams per liter (mg/l)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

Metric Prefixes

Term	Power of 10	Symbol
mega-	10^6	M
kilo-	10^3	k
deci-	10^{-1}	d
centi-	10^{-2}	c
milli-	10^{-3}	m
micro-	10^{-6}	μ
nano-	10^{-9}	n
pico-	10^{-12}	p

Appendix B

Letter from New Mexico Environment Department
Requesting Corrective Measures Study

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2044 A Galisteo Street
P.O. Box 26110
Santa Fe, New Mexico 87502-6110
Telephone (505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

PAUL R. RITZMA
DEPUTY SECRETARY

RCVD
01/02/01

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

December 27, 2000

Dr. John Browne, Director
Los Alamos National Laboratory
P.O. Box 1663, Mail Stop A100
Los Alamos, New Mexico 87545

Mr. Theodore Taylor, Project Manager
Los Alamos Area Office
Department of Energy
528 35th Street, Mail Stop A316
Los Alamos, New Mexico 87544

RE: STATUS OF THE RFI REPORT FOR MDAs G, H AND L AT TA 54
LOS ALAMOS NATIONAL LABORATORY
NM 0890010515
HWB-LANL-00-005

Dear Dr. Browne and Mr. Taylor:

The New Mexico Environment Department Hazardous Waste Bureau (HWB) received the RCRA Facility Investigation (RFI) Report for Material Disposal Areas (MDAs) G, H and L at Technical Area (TA) 54 submitted by Los Alamos National Laboratory (LANL) to HWB in March 2000 (referenced by ER19990003 and LA-UR-00-1140). The MDA High Performing Team (HPT) was formed in January 2000 to work on the TA 54 RFI Report and develop a MDA core document that would streamline remediation for a group of MDAs. The HPT consists of staff from HWB, LANL and the Department of Energy (DOE). The MDA core document evolved into the Draft Mesa-Top MDA Implementation Plan which LANL submitted with a cover letter dated August 31, 2000 (referenced by ER2000-0469). Due to a change in direction from senior management, the HPT has agreed that it will not review the MDA Implementation Plan at this time. The Implementation Plan is outside the current, more focused scope of the MDA HPT.

In September 2000, the HPT received direction from senior management to expedite the implementation of a preferred remedy at one MDA. The HPT has selected MDA H and narrowed the scope of its effort to accommodate the change. The HPT has agreed that HWB will not continue its review of the RFI Report for MDAs G, H and L at TA 54. The reporting of the RFI for MDA H will be separated from the RFI for MDAs G and L in order to expedite the implementation of a preferred remedy at MDA H. LANL will submit a revised RFI report that

Dr. Browne and Mr. Taylor
December 27, 2000
Page 2 of 2

addresses only MDA H and any comments and concerns raised to date by HWB. HWB anticipates the submittal of the RFI Report for MDA H around March 30, 2000, while the RFI Report for MDAs G and L will be submitted at a later date.

Currently, only eight of the nine shafts at MDA H are on the Hazardous and Solid Waste Amendments (HSWA) module of the permit; however, all nine disposal shafts will be addressed under corrective action as per 20.4.1.500 NMAC (incorporating 40 CFR 264.101). The HPT has agreed to conduct a Corrective Measures Study (CMS) at MDA H. A CMS is needed because contaminants at the site may present a threat to human health and the environment over the lifetime of the waste. This letter is notification to LANL and DOE to submit the CMS Plan. The CMS Plan for MDA H shall be submitted to HWB within 90 days of this notification.

We look forward to continuing a dialogue with LANL and DOE to expedite a remedy at MDA H. If you have any questions regarding this letter, please contact Neelam Dhawan at (505) 827-1558 extension 1018 or Eliza Frank at extension 1048.

Sincerely,

Eliza Allie Frank

for John Young
LANL Corrective Action Project Leader
Permits Management Program

JRY:eaf

cc: P. Allen, NMED HWB
J. Bearzi, NMED HWB
N. Dhawan, NMED HWB
R. Dinwiddie, NMED HWB
E. Frank, NMED HWB
J. Kieling, NMED HWB
C. Will, NMED HWB
J. Davis, NMED SWQB
M. Leavitt, NMED GWQB
J. Parker, NMED DOE OB
S. Yanicak, NMED DOE OB, MS J993
D. Neleigh, EPA 6PD-N
J. Vozella, DOE LAAO, MS A316
J. Canepa, LANL EM/ER, MS M992
M. Kirsch, LANL EM/ER, MS M992
D. McInroy, LANL EM/ER, MS M992
File: Reading, G/M/S '00 and HSWA LANL 5/1148/54/MDA H

Appendix C

Outline for the Corrective Measures Study Report

APPENDIX C OUTLINE FOR THE CORRECTIVE MEASURES STUDY REPORT

The following outline will be used for the corrective measures study report.

EXECUTIVE SUMMARY

1.0 INTRODUCTION

2.0 IDENTIFICATION AND DEVELOPMENT OF THE CORRECTIVE MEASURE ALTERNATIVES

- 2.1 Description of Current Situation
- 2.2 Establishment of Corrective Action Objectives
- 2.3 Screening of Corrective Measure Technologies
- 2.4 Identification of Corrective Measure Alternatives

3.0 EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVES

- 3.1 Technical/Environmental/Human Health Institutional
  - 3.1.1 Technical
  - 3.1.2 Environmental
  - 3.1.3 Human Health
  - 3.1.4 Institutional
- 3.2 Cost Estimate

4.0 JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURE

- 4.1 Technical
- 4.2 Human Health
- 4.3 Environmental

5.0 RECOMMENDED CORRECTIVE MEASURE

- 5.1 Summary of the Corrective Measure and Rationale
  - 5.1.1 Description of the Corrective Measure and Rationale for selection
  - 5.1.2 Performance Expectations
  - 5.1.3 Preliminary Design Criteria and Rationale
  - 5.1.4 General Operation and Maintenance Requirements
  - 5.1.5 Long-Term Monitoring Requirements
- 5.2 Design and Implementation Precautions
  - 5.2.1 Special Technical Problems;
  - 5.2.2 Additional Engineering Data Required
  - 5.2.3 Permits and Regulatory Requirements
  - 5.2.4 Access, Easements, Right-of-Way
  - 5.2.5 Health and Safety Requirements
  - 5.2.6 Community Relations Activities
- 5.3 Cost Estimates and Schedules
  - 5.3.1 Capital Cost Estimate
  - 5.3.2 Operation and Maintenance Cost Estimate
  - 5.3.3 Project Schedule (Design, Construction, Operation)

6.0 REFERENCES

APPENDIXES

Appendix D

Environmental Restoration Project Outreach Plan
Material Disposal Area H Corrective Measures Study

APPENDIX D ENVIRONMENTAL RESTORATION PROJECT OUTREACH PLAN FOR MATERIAL DISPOSAL AREA H CORRECTIVE MEASURES STUDY

The Los Alamos National Laboratory (the Laboratory) Environmental Restoration (ER) Project is involved in a national effort initiated by the US Department of Energy (DOE) to clean up facilities that were historically involved in weapons production. The goal of the ER Project is to ensure that DOE's past operations do not threaten human health, safety, or the environment in and around Los Alamos County, New Mexico. To achieve that goal, the ER Project is currently investigating potentially contaminated sites.

In January 2000, a Material Disposal Area (MDA) High Performing Team was formed; it consists of representatives from DOE, the Laboratory, and the New Mexico Environment Department Hazardous Waste Bureau. The team has been tasked with implementing the Resource Conservation and Recovery Act (RCRA) corrective action process by developing and carrying out a decision process to investigate and perform corrective actions for each of the 10 mesa-top MDAs.

MDA H was selected as the first mesa-top corrective action site because of the volume and nature of the material disposed of there. The MDA is a 0.3-acre site located at Technical Area 54 and was used for the disposal of classified, solid-form waste between 1960 and 1986. The waste was placed in nine vertical disposal shafts. Shafts 1 through 8 are covered with crushed tuff and concrete; shaft 9 is covered only by a thicker layer of concrete. When a decision process has been identified and approved, MDA H could serve as the pilot for selecting potential corrective actions at the nine remaining mesa-top MDAs.

The MDA High Performing Team has developed this outreach plan to facilitate communications with the public. The public includes all individuals, organizations, or public agencies potentially affected by the corrective measures study (CMS). This plan proposes processes and a schedule for delivering information to and receiving information from the public on the MDA H CMS. The plan is a work in progress; some of the processes and the schedule may change. The objectives of the plan are to

- provide the public with objective information to assist them in understanding the problem, remediation alternatives, and solutions;
- provide interpretations of data;
- ensure that public concerns are consistently understood and considered in the decision-making process;
- provide the surrounding communities with public access to ER Project technical staff; and
- increase contact with the public in ways that encourage interaction and involve them in the CMS.

The ER Project is accountable to

- anyone who resides in the communities surrounding the Laboratory or has an interest in the activities of the ER Project corrective action process,
- organizations representing or protecting specific groups or interests in our region, and
- government agencies including local, state, federal, and tribal governments.

Surrounding communities potentially affected by the CMS include Los Alamos County, San Ildefonso Pueblo, Santa Clara Pueblo, Santa Fe, and Espanola.

Proposed Schedule

Public Involvement Tool	Purpose	Date
5½ x 8½ mailer to Laboratory's mailing list (1200 people) composed of individuals, organizations, and government and tribal officials in northern New Mexico	Introduce the ER Project, the MDA High Performing Team, the corrective action process, and the CMS	March 12, 2001
Two information sheets available online and modified into a mailer and distributed to mailing list	Highlight the history and current activities at MDA H and highlight the RCRA corrective action process	March 15, 2001
Briefings for the Northern New Mexico Citizen's Advisory Board, the League of Woman Voters in Santa Fe, and other organizations as a focal point for citizen input	Short informal discussions that inform, engage, and solicit feedback from the following key players: • DOE Headquarters/San Ildefonso, Santa Clara, Jemez, Cochiti • Northern New Mexico Citizens Advisory Board (and future monthly meetings) • San Ildefonso Pueblo • League of Women Voters • Other community organizations (TBD*)	February 8, 2001 February 12, 2001 March 1, 2001 March 7, 2001 TBD
Newspaper display advertisements informing the public about MDA H activities	Newspaper display advertisements will be placed in the local newspapers (Journal North, New Mexican, Rio Grande Sun, and the Los Alamos Monitor)	TBD
Open house hosted at the Los Alamos Area Office	Invite the public through a mailer to attend an overview of MDA H CMS; include a poster session, documents, interact with staff most of 1½-hour open house	April __, 2001
Two workshops: first workshop planned internally, second workshop engage services of a professional company	Consult key individuals through focus groups to obtain feedback on proposed corrective measures Host workshops for key individuals or organizations interested in the entire process. Individuals will be identified by way of a mailing list solicitation through mailers and online. Key individuals may include pueblos, community leaders, government officials, and community organizations such as the Northern New Mexico Citizen's Advisory Board, Concerned Citizens for Nuclear Safety, and Los Alamos Study Group	June __, 2001 TBD

Proposed Schedule (cont.)

Public Involvement Tool	Purpose	Date
Focus groups (conducting research on companies that provide this service)	Consult key individuals through focus groups to obtain feedback on proposed corrective measures	TBD
Web Site at http://erproject.lanl.gov	All documents (once finalized) on the MDA H CMS will be posted to the ER Project's Virtual Library and available at the Laboratory's Public Reading Room. The format of the virtual library is under reconstruction and is scheduled for completion on March 15, 2001. MDA H documents will include the • CMS plan (listing the alternatives to be evaluated and the evaluation criteria) • RCRA facility investigation report (describes the nature and extent of contamination and the present-day risk at MDA H) • Draft CMS report (evaluate a range of alternatives for remediation of MDA H and recommend a selected remedy) • Public comment period for the CMS report scheduled to begin on or before August 1, 2002	TBD April 2001 April 2001 June 2002 August 2002
Public comment (A summary of public comments and responses will be maintained and made available online.)	Comments will be solicited through all the mechanisms listed above. MDA H staff and the ER Project Communications and Outreach point of contact will begin identifying major community concerns. This information will be prepared in a question and answer format, updated monthly, and placed on the ER Project Virtual Library.	Ongoing

TBD = to be determined.

Saundra Martinez is the designated ER Project Communications & Outreach Team point of contact. Saundra can be reached at 665-6771 or by email at msaundra@lanl.gov

Appendix E

Schedule for Corrective Measures Study/Corrective Measures Implementation at Material Disposal Area H

APPENDIX E SCHEDULE FOR CORRECTIVE MEASURES STUDY/CORRECTIVE MEASURES IMPLEMENTATION AT MATERIAL DISPOSAL AREA H

The schedule for the corrective measures study (CMS)/corrective measures implementation (CMI) is detailed in Table E-1.

Table E-1
Schedule for the CMS/CMI

Activity	Date
Finalize CMS plan to NMED	3/30/01
Initiate public involvement	2/12/01
Complete CMS report	4/02
Public comment period initiated	8/1/02
Public comment period completed	10/01/02
Submit request for proposal for design/construction of final corrective measure	1/03

Monthly management status reports and technical quarterly progress reports will be provided, as required by the permit.