**Nevada
Environmental
Restoration
Project**

**ANNUAL REPORT
RCRA POST CLOSURE MONITORING
AND INSPECTIONS FOR CAU 112:
AREA 23 HAZARDOUS WASTE TRENCHES,
NEVADA TEST SITE**

**FOR THE PERIOD
OCTOBER 1996 - OCTOBER 1997**

Revision: 0

January 1998

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**Prepared for
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Nevada Operations
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**Prepared by
Bechtel Nevada
Restoration Programs**

MASTER

January 1998

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NEVADA TEST SITE**

Approved by: _____

Janet L. Appenzeller-Wing, Project Manager
Industrial Sites Subproject

Date: _____

Approved by: _____

Michael O Giblin, Acting Project Manager
Nevada Environmental Restoration Project

Date: _____

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LIST OF ABBREVIATIONS AND ACRONYMS

BN	Bechtel Nevada
CAU	Corrective Action Unit
cm	centimeter(s)
CRMC	Cumulative Residual Moisture Content
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ET _{POT}	Potential Evapotranspiration
ft	foot (feet)
gal	gallon
in	inch(es)
km	kilometer
l	liter
m	meter(s)
mCi	millicurie
mi	mile
NDEP	Nevada Division of Environmental Protection
NTS	Nevada Test Site
RCRA	Resource Conservation and Recovery Act
REEC _o	Reynolds Electrical and Engineering Company
RVMC	Residual Volumetric Moisture Content
sec	seconds
VMC	Volumetric Moisture Content
VLDPE	Very Low Density Polyethylene
yr	year

Executive Summary

INTRODUCTION

The Area 23 Hazardous Waste Trenches were closed in-place in September 1993. Post-closure monitoring of the Area 23 Hazardous Waste Trenches began in October 1993. The post-closure monitoring program is used to verify that the Area 23 Hazardous Waste Trench covers are performing properly, and that there is no water infiltrating into or out of the waste trenches. The performance of the Area 23 Hazardous Waste Trenches is currently monitored using 30 neutron access tubes positioned on and along the margins of the covers. Soil moisture measurements are obtained in the soils directly beneath the trenches and compared to baseline conditions from the first year of post-closure operation. This report documents the post-closure activities between October 1996 and October 1997.

REGULATORY CRITERIA

A formal change of the compliance criteria for the Unit Nevada Test Site (NTS) RCRA Part B Permit was submitted to the Nevada Division of Environmental Protection (NDEP) in December 1996 and was approved on February 10, 1997. The changes were incorporated into the Part B Permit (NEV HW009) as a Class 1 Modification as per Appendix I to 40 CFR §270.42.

The level of concern, point of compliance, and schedule of actions is summarized below. Notification to NDEP is required if residual volumetric moisture contents (RVMC) above five percent (relative to baseline conditions) are observed and confirmed in two consecutive monitoring periods, at a point directly beneath each respective hazardous waste trench. The NDEP must be notified within seven days of determination of a valid trend. A preliminary written assessment detailing recommendations to determine the nature, cause, and action to be taken is to be submitted to NDEP for concurrence within 30 days of the notification.

RESULTS OF INSPECTIONS AND THE MONITORING PROGRAM

Based on previous neutron logging results and visual inspections of the cement well head protection boxes located along the cover margins, evidence of ponding and water leakage down along the access tubes and protection boxes had been noted. In February 1997, access tube B-13 and its well head protection box were excavated to verify these observations. Excavation of access tube B-13 revealed improperly installed bentonite seals, uncompacted soils, and void

space along the neutron access tube and beneath the well head protection box verifying the results observed in the neutron logs.

Maintenance and corrective actions to address these ponding and leakage problems was started on September 18, 1997. Soils were excavated from around all 46 well head protection blocks, a bentonite layer was emplaced, and the soils recompact and graded to prevent run-on and ponded water from infiltrating down along the access tubes. The soils along the toe of the closure cover were regraded to provide improved drainage. The repair work was finished on September 30 and the equipment de-mobed by October 2, 1997.

The unit was inspected quarterly. No significant concerns were observed.

PRECIPITATION

Precipitation for the period October 1996 through October 1997 was 13.11 centimeters (cm) (5.16 inches [in]) (U. S. National Weather Service, 1997). The highest 30 day cumulative rainfall occurred on September 25, 1997 with a total of 5.84 cm (2.30 in). The heaviest daily precipitation occurred on September 25, 1997 with a total of 2.46 cm (0.97 in) falling in that 24 hr period.

The Part B Permit (NDEP, 1995) specifies that rainfall events that exceed one inch in any 30-day period will require monthly monitoring for one quarter. The action level of 2.54 cm (1.0 in) in any 30 day period was exceeded on September 3, 1997 with 3.43 cm accumulated (1.35 in) which required one quarter of monthly monitoring. This action level was again exceeded on October 10, 1997 with 2.57 cm accumulated (1.01 in), requiring monthly monitoring through at least January 1998.

SOIL MOISTURE MONITORING

Graphs of Cumulative Residual Moisture Content (CRMC) relative to the regulatory level of concern (5 percent Residual Volumetric Moisture Content [RVMC]) are found for each trench in Figures ES-1 through ES-4.

The CRMC graph tracks changes over time from the baseline conditions at the point of compliance (directly beneath the hazardous waste trench) for each access tube. The residual moisture content is calculated by subtracting the first year average soil moisture content (baseline) from the soil moisture content for each monitoring period on a depth basis. The residual soil moisture is plotted as *Residual Volumetric Moisture Content vs Logging Date* for each access tube.

The soil moisture content point of compliance is located at a depth of one meter (three ft) from the bottom of each neutron access tube (the point directly beneath each hazardous waste trench). The monitored depth varies from tube to tube because the angled boreholes have varying stand-off distances to each respective trench.

The level of regulatory concern is indicated as the dark line at the five percent residual moisture level (Figures ES-1 through ES-4). Values exceeding this limit for two consecutive monitoring periods require notification to NDEP and the submittal of an Action Plan to investigate the cause.

INDIVIDUAL TRENCH SUMMARY

No significant concerns were observed during the site inspections over the period November 1996 through October 1997.

The annual subsidence survey of the two covers indicates that subsidence has not been detected to date.

Soil conditions remain dry and stable beneath the trenches through the October 1996 to October 1997 monitoring period. Due to the heavy September precipitation some near surface leakage beneath the well head protection boxes is seen in the first 6.1 m. (20 ft) of some access tubes located along the cover margins.

Moisture contents at the point of compliance for all access tubes remain below the compliance criteria of five percent RVMC. Trench conditions are summarized below:

Trench A

Cumulative residual moisture contents at the point of compliance for all Row A tubes remain at less than one percent RVMC with no trends evident. The Row A access tubes remain stable, dry, and below the compliance criteria of five percent RVMC.

Trench B

Cumulative Residual Moisture Contents at the point of compliance indicates that soils surrounding the Row B access tubes are below the compliance level of five percent RVMC with no trends evident.

Trench C

Cumulative residual moisture contents at the point of compliance for all Row C tubes

remain at less than one percent RVMC with no trends evident. The Row C access tubes remain stable, dry, and below the compliance criteria of five percent RVMC.

Trench S-1

Cumulative residual moisture contents at the point of compliance for all Row S-1 tubes remain at less than one percent RVMC with no trends evident.

All access tubes remain dry, stable and below the compliance criteria of five percent RVMC.

Trench S-2

Cumulative residual moisture contents at the point of compliance for all Row S-2 tubes remain at less than one percent RVMC with no trends evident.

Row S-2 access tubes remain stable, dry, and below the compliance criteria of five percent RVMC.

Control Well V-1

The Vertical Control Tube V-1 is a 15.24 meter (50 feet) vertical neutron access tube located at the north margin of the cover. This tube is located in a slight depression that frequently fills with ponded water from runoff from the covers and from a catchment area located to the north. As a result, this "control" tube best represents a worse case scenario rather than typical conditions. Evidence of ponded water, as well as cracks and erosion in the soils surrounding the concrete access box have been noted. As result of this ponding this access tube has shown significantly more leakage than observed on any of the other access tubes. Corrective action to prevent future problems of this nature were completed in September 1997.

The Cumulative Residual Moisture Contents at the point of compliance for Control Tube V-1 varies from about - 0.5 to 1.5 percent RVMC and is the result of moisture infiltrating down along the access tube.

The cumulative residual moisture content for access Tube V-1, while noisier than other access tubes, remains below the Action Level of five percent RVMC.

FINDINGS

1. Most access tubes located along the periphery of the cover (Tubes A, B, C-1 through C-4, and S-2) show low levels of infiltration occurring down along the access tube. Access tubes located on, and penetrating the cover, indicate infiltration is limited to 1.83 m (6 ft) where the geomembrane liner is located. No leakage across the liner has been observed.
2. Excavation and inspection of access tube B-13 revealed improperly installed bentonite seals, uncompacted soils, and void space along the neutron access tube and beneath the well head protection box verifying the results observed in the neutron logs. Corrective actions based on these findings were implemented.
3. No significant concerns were observed during the site inspections over the period November 1996 through October 1997.
4. The annual subsidence survey of the two covers indicates that subsidence has not been detected to date.
5. Soil conditions remain dry and stable beneath the trench through the October 1996 to October 1997 monitoring period.
6. Moisture contents at the point of compliance for all access tubes remain below the compliance criteria of five percent RVMC.

RECOMMENDATIONS

1. Inspections, during periods of heavy rainfall, should be conducted to visually determine that the corrective action and maintenance activities have not overlooked any areas of run-on or ponding that need correcting.

Mercury Hazardous Waste Trench- Row A

Cumulative Residual Moisture Content Beneath Trench

Residual Volumetric Moisture Content % = Volumetric moisture for a given date minus the baseline (first year average) volumetric moisture.

FIGURE ES-1 ROW A CUMULATIVE RESIDUAL MOISTURE CONTENT

Mercury Hazardous Waste Trench- Row B **Cumulative Residual Moisture Content Beneath Trench**

FIGURE ES-2 ROW B CUMULATIVE RESIDUAL MOISTURE CONTENT

Mercury Hazardous Waste Trench- Row C

Cumulative Residual Moisture Content Beneath Trench

Residual Volumetric Moisture Content % = Volumetric moisture for a given date minus the baseline (first year average) volumetric moisture.

FIGURE ES-3 ROW C CUMULATIVE RESIDUAL MOISTURE CONTENT

Mercury Hazardous Waste Trench- Row S1

Cumulative Residual Moisture Content Beneath Trench

Residual Volumetric Moisture Content % = Volumetric moisture for a given date minus the baseline (first year average) volumetric moisture.

FIGURE ES-4 ROW S1 CUMULATIVE RESIDUAL MOISTURE CONTENT

Mercury Hazardous Waste Trench- Row S2

Cumulative Residual Moisture Content Beneath Trench

Residual Volumetric Moisture Content % = Volumetric moisture for a given date minus the baseline (first year average) volumetric moisture.

FIGURE ES-5 ROW S2,V1 CUMULATIVE RESIDUAL MOISTURE CONTENT

1.0 INTRODUCTION

1.1 SCOPE AND OBJECTIVE

This annual Neutron Soil Moisture Monitoring report provides an analysis and summary for site inspections, meteorological information, and neutron soil moisture monitoring data obtained at the Area 23 Hazardous Waste Landfill, Corrective Action Unit (CAU) 112, located in Mercury, Nevada. This report covers the period October 1996 through October 1997.

Inspections of the Area 23 Hazardous Waste Landfill are conducted to determine and document the physical condition of the covers, facilities, and any unusual conditions that could impact the proper operation of the landfill closure.

The objective of the neutron logging is to monitor the stability in soil moisture conditions beneath the trenches and detect changes that may be indicative of moisture entering through the landfill cover and therefore producing leachate movement beneath the landfill.

1.2 SITE HISTORY

A summary of significant events concerning the closure of the Area 23 Hazardous Waste Trenches can be found in table 1.

The Area 23 Landfill (Figure 1) has been in operation for approximately 25 years. During that time various trenches were excavated and used for the disposal of sewage from portable toilets, sanitary waste, aerosol cans, wood waste, non-infectious medical waste, and hazardous wastes. All the trenches were originally covered with a soil cover. A portion of the landfill (Figure 2) was closed under the Resource Conservation and Recovery Act (RCRA) using an engineered soil/synthetic geomembrane cover. The cover was completed in August 1993. Soil moisture monitoring began in October 1993.

The unit consists of two covers, a smaller cover for Trench A, and a larger, separate cover for Trenches B, C, S-1, and S-2. Hazardous Waste Trench A is greater than 51.8 meters (170 feet) in length and approximately 0.61 m (2 ft) wide and 1.68 m (5.5 ft) deep. The northern portion of this trench was identified as containing hazardous waste and is approximately 16.76 m (55 ft) in length, with the remaining portions filled with sanitary wastes. The southern extent of the trench (containing sanitary waste) is not known (U.S. DOE, 1992).

Trench B is 135 m (442 ft) long, 0.61 to 0.91 m (2 to 3 feet) wide and 1.68 to 2.13 m (5.5 to 7 ft) deep. Monuments for Trench B were labeled "Medical Waste" and "Sanitary Waste" on the north end of the trench. Medical waste was found overlying hazardous waste on the north end of the trench during characterization studies (U.S. DOE, 1992).

TABLE 1 CHRONOLOGY OF SIGNIFICANT EVENTS - AREA 23 HAZARDOUS WASTE TRENCHES

DATE	SIGNIFICANT EVENTS
1988	<u>Closure Plan for the Nevada Test Site; Earth Technology Corporation, 1988</u>
1990	Letter to DOE/NV from NDEP, <u>Effective Date of Closure for Area 23 Landfill</u> , May 17, 1990
	<u>Exploratory Excavation at the Area 23 Landfill, Nevada Test Site, Mercury, Nevada; Issued 1990</u>
1991	Excavation activities occurred during the period October 14, 1991 to November 21, 1991. Four exploratory trenches and potholes were used to identify waste materials and locations.
1992	<u>Area 23 Exploratory Excavation Activities to Identify the Location of Hazardous Waste Trenches (Phase 1 Report) Vol 1 and Vol 2; issued April 1992</u>
	Four small exploratory trenches excavated for sampling. Activities occurred between June 29, through July 1, 1992.
1993	<u>Amended Closure Plan Area 23 Landfill Hazardous Waste Trenches (Phase 2 Report); issued April 1993.</u>
	Closure of the Hazardous Waste Trenches March 25 through August 26, 1993
	79 neutron access tubes were installed along the periphery and through the cover of the two landfills between March 25 to May 18, 1993. Approximately 5,200 feet of casing was installed
	Post closure monitoring began in October 1993.
	<u>Certification and Closure Report Area 23 Landfill Hazardous Waste Trenches; issued October 1993.</u>
	<u>First Quarterly Report RCRA Post Closure Monitoring and Inspection Mercury Hazardous Waste Trenches; report issued April 1993.</u>
1994	<u>Second Quarterly Report RCRA Post Closure Monitoring and Inspection Mercury Hazardous Waste Trenches; report issued May 1994.</u>
	<u>Third Quarterly Report RCRA Post Closure Monitoring and Inspection Mercury Hazardous Waste Trenches; report issued August 1994.</u>
	<u>Revised Post-Closure Soil Moisture Monitoring Schedule for Closed Area 23 Landfill Hazardous Waste Trenches; December 21, 1994 Letter from P.J. Liebendorfer to D.R. Elle.</u>

DATE	SIGNIFICANT EVENTS
1995	RCRA Part B permit number NEV HW009 became effective May 1, 1995
	<u>Fourth Quarterly Report RCRA Post Closure Monitoring and Inspection Mercury Hazardous Waste Trenches</u> ; report issued January 1995.
	In September 1995, NDEP requested that a uniform reporting format and specific changes in the presentation of the soil moisture data be developed. In subsequent meetings between DOE, NDEP, and REECo (now Bechtel Nevada) the compliance criteria was modified placing the point of compliance beneath each respective hazardous waste trench.
1996	<u>Annual Report RCRA Post-Closure Monitoring and Inspection Mercury Hazardous Waste Trenches Volume And II December 1994 - December 1995</u> ; report issued March 1996.
	A request was submitted to NDEP in December 1996 requesting that the interim monitoring criteria be formally adopted.
1997	<u>Annual Report RCRA Post-Closure Monitoring and Inspection Mercury Hazardous Waste Trenches Volume And II</u> ; for the period October 1995 - October 1996; report issued January 1997.
	NDEP approved the request to adopt the proposed monitoring criteria on February 10, 1997. The changes were incorporated into the Permit (NEV HW009) as a Class I modification as per Appendix I to 40 CFR §270.42
	Maintenance and corrective actions to address the ponding and leakage problems associated with the access tubes located along the margins of the cover was started September 18 and completed October 2, 1997. Soils were excavated around the well head protection blocks, a bentonite layer was emplaced and the soils recompact and graded to prevent run-on and ponded water from infiltrating down along the access tubes. The soils along the toe of the closure cover were regraded to provide improved drainage.
1993 - 1997	No infiltration has been detected through the covers and the waste remains dry and stable.

Trench C is 114.6 m (376 ft) long, to 0.91 m (2 to 3 ft) wide and 0.15 to 2.44 m (0.5 to 8 ft) deep. Concrete monuments on the north end of Trench C were labeled "Sanitary Waste", "Aerosol Cans", and "Hazardous Waste" (U.S. DOE, 1992).

Trench S-1 is approximately 84.12 m (276 ft) long, 0.91 to 1.37 m (3 to 4.5 ft) wide and varies from 1.52 to 3.96 m (5 to 13 ft) deep. Trench S-1 was marked with a concrete monument labeled "Sewage" on the north end of the trench and unmarked on the south end (U.S. DOE, 1992).

Trench S-2 is greater than 70.7 m (232 ft) long, 1.07 to 2.13 m (3.5 to 7 ft) wide, and 3.05 to 4.27 m (10 to 14 ft) in depth. Trench S-2 was marked with a concrete monument as "Sewage" on the north end, but unmarked on the southern end. The southern end was not determined in exploratory excavations (U.S. DOE, 1992).

Waste inventories (Earth Technology, 1988) indicate that approximately 62,459 liters (L) (16,500 gallons [gal]) of hazardous wastes were disposed of in trenches A, B, and C at the Area 23 Landfill. This waste includes 37,854 L (10,000 gal) of corrosive material and 20,820 L (5,500 gal) of ignitable materials. Approximately 13,249 L (3,500 gal) of miscellaneous non-hazardous chemicals were also disposed of in the trenches. Waste inventory data are not available for Trenches S-1 and S-2. Waste oil was observed in both trenches during exploratory excavation of these trenches (U.S. DOE, 1992).

1.3 SITE GEOLOGY AND HYDROLOGY

The Area 23 Hazardous Waste Landfill is located approximately 1.21 kilometers (km) (3/4 mile [mi]) west of Mercury, Nevada on the Nevada Test Site, (NTS) Nye County, Nevada (Figure 1). The site lies within the Mercury Valley and is underlain by unconsolidated alluvium derived from the Specter Range, Red Mountain, and Mercury Range. These ranges consist of Paleozoic carbonates and quartzites. The near surface alluvium is composed of silty sands containing abundant gravel and cobbles. Some boulders, up to three feet in diameter, have been noted. Localized caliche development is present in the near surface and is observed in the boreholes used to emplace the neutron access tubes.

The NTS is underlain by the Ash Meadows aquifer. It is an interbasin flow system above a carbonate basement rock and is relatively independent of the topographic boundaries. The Ash Meadows aquifer beneath the Area 23 Landfill occupies the lower Cenozoic alluvial fill with the ground water table estimated at about 244 to 335 m (800 to 1,100 ft) below the ground surface with flow to the southwest (Winograd et al, 1975). The nearest water well is located approximately 5.63 km (3.5 mi) to the southwest at Army Well Number 1. A ground water monitoring well for the Area 23 Sewage Lagoons was drilled approximately 0.4 km (1/4 mi)

south of the trenches. This well was completed in March 1996 to a depth about 350 m (1300 ft). Ground water was intercepted at approximately 396 m (1300 ft) under 45 m (150 ft) of head. Groundwater level in the well is currently in equilibrium at approximately 350 m (1,150 ft).

The longest continuous rainfall records for the Nevada Test Site (NTS) available were recorded in Area 5 over a 31-year period. The average rainfall was 12.45 centimeters (cm), (4.9 inches [in]), while the annual total ranged between a minimum of 2.79 cm (1.1 in) to a maximum of 23.42 cm (9.22 in). Estimates of Potential Evapotranspiration (ET_{POT}) obtained from characterization studies in Area 5 indicate an ET_{POT} of about 157.5 centimeters/year (62 in/yr), which is significantly higher than the mean annual precipitation (U.S. DOE, 1995).

2.0 REGULATORY CRITERIA

2.1 BACKGROUND

The Amended Closure Plan (U.S. DOE, 1993) included a proposal that the level of concern triggering notification to the Nevada Division of Environmental Protection (NDEP) would be based on the hydraulic conductivity of the soils beneath the trenches. A hydraulic conductivity vs. saturation curve was proposed to determine the moisture content at which the soils had a hydraulic conductivity of 1×10^{-7} cm/sec (3.94×10^{-8} in/sec), which is the United States Environmental Protection Agency (EPA) criteria for clay liners. For soils in Area 5, this value was reached for a measured water content of 14 percent. This value was chosen for the Area 23 Hazardous Waste Trenches as the action threshold above which water movement may occur. The reporting criteria to NDEP as stated in the Amended Closure Plan was:

- "If the measured water content of 14 percent is exceeded in two consecutive monthly measurements, or obvious damage occurs to the cover....action would be taken".

Once the closure drilling and construction program was completed and the first neutron logs were obtained, it was found that the fundamental assumption of homogeneous soils similar to those in Area 5 was incorrect. The soils beneath the site are heterogeneous and inter-fingered with caliche lenses producing an environment that is not hydrologically similar to that of Area 5. Drill logs and neutron logs indicate that it would be extremely difficult, if not impossible, to use the hydraulic conductivity method originally proposed due to lithologic variability of the alluvium. Doing so would lead to numerous false positives and negatives.

Instead, it was proposed in the first quarterly neutron logging report (U.S. DOE, 1994a) to use the traditional method of a time series analysis to monitor and report wetting and drying changes over time. For the first year (baseline), RVMC was calculated monthly by the difference between the current month and the previous month's moisture content at each depth interval. The observation of a progressive wetting front (one that continues for two consecutive monthly measurements) and is greater than five percent RVMC would be tracked and reported to NDEP in the quarterly reports. Positioning errors of the neutron probe (tool), which could incorrectly infer changes in moisture content, are excluded. A further set of actions are necessary to determine the cause for progressive wetting fronts if observed in two consecutive months and infiltrating deeper than 4.27 m (14 ft).

The five percent RVMC criteria was based on data observed on other neutron logs and infiltration studies conducted at comparable sites on the Nevada Test Site. Changes of up to 15

percent RVMC over an interval of 0.9 m to 1.5 m (3 to 5 ft) have been observed in soil covers from rainfall events in the lower elevations of Area 5. Considering that the neutron probe has a repeatability of ± 1 percent RVMC due to system noise, a level of concern of five percent RVMC was chosen as a conservative initial action level for compliance reporting.

The first year data set (1994) was conducted on a monthly basis to obtain baseline data (U.S. DOE, 1994a,b,c and 1995)

Based on the data collected over the first year, the monitoring program was modified by the NDEP and United States Department of Energy (DOE) in late 1994 (NDEP, 1994). The following changes were made:

- Conduct moisture monitoring and liner inspections quarterly;
- Monitor only 30 neutron access tubes rather than 72 tubes. Table 1 provides the tubes selected for monitoring;
- Report monthly precipitation data to NDEP annually;
- If precipitation exceeds 2.54 cm (1 in) in any 30-day period, or 2.54 cm (1 in) in any six hour period, then monitoring will be conducted within two weeks of the end of the 30-day period and monthly, thereafter, for one quarter;
- After two years of post-closure monitoring, during which time the annual precipitation was average or above average, the DOE may submit a request to NDEP to reevaluate the monitoring/inspection schedule for further reductions.

The NDEP requested that a uniform reporting format and specific changes in the presentation of the soil moisture data be developed in September 1995. The emphasis is to produce a simplified presentation of trends to observe whether the compliance level is being exceeded. The compliance criteria was modified in subsequent meetings between DOE, NDEP, and Reynolds Electrical and Engineering Company (REECo) (now Bechtel Nevada [BN]) placing the "point of compliance" beneath each respective hazardous waste trench. The neutron access tubes were installed with the bottom of the access tube at a point directly beneath each respective trench. The depth from the original grade of the landfill (before the installation of the cover) to this point is provided in Appendix A. To avoid measurement errors associated with geometry problems at the end of the access tube, a point 0.91 m (3 ft) from the bottom of the access tube was selected as the measurement point.

A formal change of the compliance criteria for the Unit Nevada Test Site (NTS) RCRA Part B Permit was submitted to NDEP in December 1996 requesting adoption of the interim monitoring criteria. This request was approved on February 10, 1997. The changes were incorporated into the Part B Permit (NEV HW009) as a Class 1 Modification as per Appendix I to 40 CFR §270.42.

**TABLE 2 -- NEUTRON ACCESS TUBES MONITORED AT THE AREA 23
 HAZARDOUS WASTE LANDFILL RCRA UNIT¹**

TRENCH A	TRENCH B	TRENCH C	TRENCH S-1	TRENCH S-2
A-1	B-2	C-1	S1-2	S2-2
A-2	B-4	C-3	S1-5	S2-5
A-4	B-7	C-6	S1-8	S2-8
	B-10	C-9	S1-11	S2-11
	B-13	C-12	S1-14	S2-14
	B-16	C-15		
	B-19	C-18		
	B-22	C-21		

¹ Background control well V-1 is also monitored

2.2 SITE INSPECTION COMPLIANCE CRITERIA

Visual inspections and photographs of the Area 23 Hazardous Waste Landfill RCRA Trenches are done on a quarterly basis and are reported in the annual report. Monthly inspections are done if Precipitation Action Levels are exceeded (see Section 2.3). Inspections consist of the following observations:

- Condition of the gate (locked, open);
- Condition of signs (faded, missing, detached);
- Problems with fencing (breaks, needed repairs);
- Erosion of two overland flow diversion trenches;
- Condition of two covers (subsidence, erosion, excessive vegetation);
- Deterioration of the neutron access tube concrete pads, covers; and
- Unusual activity that could impact the proper operation of the covers.

2.3 SOIL MOISTURE MONITORING COMPLIANCE CRITERIA

A formal change of the compliance criteria for the Unit Nevada Test Site (NTS) RCRA Part B Permit was submitted to NDEP in December 1996 and was approved on February 10, 1997. The changes were incorporated into the Part B Permit (NEV HW009) as a Class 1 Modification as per Appendix I to 40 CFR §270.42.

Notification to NDEP is required if residual volumetric moisture contents (RVMC) above five percent (relative to baseline conditions) are observed and confirmed in two consecutive monitoring periods, at a point directly beneath each respective hazardous waste trench. The NDEP must be notified within seven days of determination of a valid trend. A preliminary written assessment detailing recommendations to determine the nature, cause, and action to be taken is to be submitted to NDEP for concurrence within 30 days of the notification.

Soil moisture monitoring is accomplished using a calibrated neutron tool. Thirty neutron access tubes are logged at one-foot intervals. The data are collected based on the calendar year and analyzed quarterly (January, April, July, and October), with an annual report issued by January 31st of the following year. Data analysis is based on the calculated residual moisture content obtained by subtracting the first year average soil moisture content (baseline) from the soil

moisture content for each monitoring period on a depth basis.

Neutron logging operations will be according to the following guidance and notification criteria based on discussions with the DOE and NDEP:

- Report monthly precipitation data to NDEP annually;
- If precipitation exceeds 2.54 cm (1 in) in any 30-day period, or 2.54 cm (1 in) in any six hour period, then monitoring will be conducted within two weeks of the end of the 30-day period and monthly, thereafter, for one quarter;
- Wetting events with greater than five percent RVMC, showing a progressive change in either moisture content or movement will be tracked and reported on a quarterly basis. Events that occur as single point anomalies (at one depth) that are attributable to logging tool positioning errors will be excluded;
- The NDEP is to be notified if the RVMC is confirmed to be above five percent relative to baseline conditions for two consecutive monitoring periods. The point of compliance is the point directly beneath each respective hazardous waste trench. Notification of NDEP will be within seven days of the confirmation. Within 30 days of the notification, a preliminary written assessment detailing recommendations to determine the nature, cause, and action to be taken will be submitted to NDEP for concurrence.

3.0 SITE INSPECTIONS AND ANNUAL SUBSIDENCE SURVEY

3.1 INTRODUCTION

The two covers and the surrounding area are thoroughly examined and photographed each Quarter. The inspection checklists for the reporting period are found in Appendix B. Inspections consist of criteria identified in Section 2.3.

Based on previous neutron logging results and visual inspections of the cement well head protection boxes located along the cover margins, evidence of ponding and water leakage down along the access tubes and protection boxes was noted. In February 1997, access tube B-13 and its well head protection box were excavated to confirm these observations. Excavation of access tube B-13 revealed improperly installed bentonite seals, uncompacted soils, and void space along the neutron access tube and beneath the well head protection box verifying the results observed in the neutron logs.

Maintenance and corrective actions to address these ponding and leakage problems was started on September 18, 1997. Soils were excavated from around all 46 well head protection blocks, a bentonite layer was emplaced and the soils recompact and graded to prevent run-on and ponded water from infiltrating down along the access tubes. The soils along the toe of the closure cover were regraded to provide improved drainage. The repair work was finished on September 30 and the equipment de-mobed by October 2, 1997.

3.2 FINDINGS FROM THE QUARTERLY INSPECTIONS

3.2.1 Fourth Quarter Inspection (October - December 1996)

Monthly inspections were completed on October 24, November 27, and December 30, 1996. The fencing and signs were in good condition and there were no signs of erosion.

3.2.2 First Quarter Inspection (January - March 1997)

Monthly inspections were completed on January 22, February 20, and March 27, 1997. The fencing and signs were in good condition after several of the signs were repaired.

The soils surrounding neutron access tube B-13 were excavated in order to verify the neutron logging data which indicated a development of voids and water infiltration. Examination of the

soils beneath the cement well head protection box and access tube confirmed the presence of voids beneath and extending down along the neutron access tube. The bentonite seals were found to be installed incorrectly. In addition the soils surrounding the well protection box and access tube were not compacted. These problems were repaired with the placement of additional bentonite around the access tube and proper compaction of the overlying soil. Additional soil was brought in and used to redirect rainfall runoff away from the tube. Based on these findings corrective action engineering plans were developed and repairs scheduled for all 46 neutron access tubes.

3.2.3 Second Quarter Inspection (April - June 1997)

The monthly inspections were completed May 1, June 3, and June 30, 1997. No new erosion around the neutron access tubes was noted. The fencing and signs were in good condition.

3.2.4 Third Quarter Inspection (July - September 1997)

The monthly inspections were completed on July 29, August 21, and September 30, 1997. No new erosion around the neutron access tubes was noted. The fencing and signs were in generally good condition, although wear was noted in the corners of some signs.

Repairs of the drainage problems around the neutron access tubes were nearing completion. A twenty-foot section of fencing had been removed to allow access for heavy equipment involved in the repairs. The fencing was being repaired at the time of the inspection.

Over one inch of rain fell on the site in a 30-day period as of September 3, 1997, therefore, monthly neutron logging is required at the site for the following quarter.

3.2.5 Fourth Quarter Inspection (October 1997)

The monthly inspection was completed October 28, 1997. Two signs were down and damaged but all others were in good condition. Even without the damaged signs, the site is well marked. Only minor vegetation was present on the landfill cover.

3.3 ANNUAL SUBSIDENCE SURVEY

The elevation of the subsidence markers were confirmed with an elevation survey conducted July 1997. There has been no subsidence at any of the markers since monitoring began four years ago. The survey results are found in Table 2 and the survey plat is in Appendix C.

TABLE 3 -- SUBSIDENCE MONUMENT COORDINATES AND ELEVATIONS

Monument Number	Coordinates ¹		Elevation Top of Monument ²				
	NORTHING	EASTING	August 1993	August 1994	July 1995	August 1996	August 1997
SM-1	20380836.722	1832371.6774	3669.17	3669.17	3669.17	3669.17	3669.17
SM-2	20380756.583	1832342.1769	3666.41	3666.41	3666.41	3666.41	3666.41
SM-3	20380845.802	1832220.1677	3669.31	3669.31	3669.31	3669.31	3669.31
SM-4	20380638.070	1832176.9730	3660.61	3660.61	3660.61	3660.61	3660.61
SM-5	20380443.800	1832094.8852	3653.32	3653.32	3653.32	3653.32	3653.32
SM-6	20380539.981	1832035.1841	3658.52	3658.52	3658.52	3658.52	3658.52
SM-7	20380692.893	1832079.4908	3664.49	3664.49	3664.49	3664.49	3664.49
SM-8	20380783.752	1832030.6240	3665.65	3665.65	3665.65	3665.65	3665.65
SM-9	20380638.535	1831963.6795	3659.41	3659.41	3659.41	3659.41	3659.41
SM-10	20380478.713	1831927.2693	3654.23	3654.23	3654.23	3654.23	3654.23

¹ All coordinates based on the Nevada State Plane Grid - Central Zone - North American Datum of 1983 in feet.

² All elevations based on the North American Vertical Datum of 1929 in feet.

4.0 SOIL MOISTURE MONITORING

4.1 INTRODUCTION

The objective of the Mercury Landfill Hazardous Waste Unit vadose zone monitoring system is to monitor the performance of the two landfill covers, and provide an early warning of the potential for leachate migration from the landfill into the subsurface.

The Area 23 Landfill Hazardous Waste Trenches monitoring system uses a portable neutron moisture logging tool to determine changes in the moisture content in soils surrounding neutron access tubes which extend beneath the landfill. By monitoring changes in soil moisture content it is possible to detect the movement of wetting and drying fronts in the soils beneath the two hazardous waste trenches. The detection of changes in soil moisture content beneath the landfill provides an early warning of the potential movement of leachate from the landfill to the surrounding environment, indicating possible failure of one or both covers.

A total of 79 neutron access tubes have been drilled at approximately 45 degree angles along the margins of the trenches (Figure 2). The access tubes extend to a point directly beneath the trenches and range in length from 11.6 m (8.2 m in vertical depth) to 31.1 m (21.9 m in vertical depth) [38 ft (27 ft vertical depth) to 102 ft (72 ft vertical depth)]. The average length of the tubes is 19.8 m (14.0 m vertical depth) [65 ft (46 ft vertical depth)].

Two Campbell Pacific Nuclear Hydropromes (Model 503DR) each containing 50 mCi ²⁴¹Americium/Beryllium neutron sources are used to obtain moisture logs in the access tubes. Each logging tool has a published range of 0-32 percent volumetric moisture content (VMC), with a precision of 0.24 percent at 24 percent VMC at a one minute count time (CPN, 1894).

Calibration of the neutron logging tools were done in soil pits constructed at the Area 23 Landfill. Six different soil moisture contents were used (3.4, 5.4, 7.5, 7.8, 11.2 and 12.0 percent VMC). The pits were carefully constructed to match typical near surface in-situ formation conditions and used the same neutron access tubes (approximately 12.7 cm [5 in] outside-diameter steel ODEX 115 drill casing) as installed beneath the waste trenches.

The calibration procedure and results are discussed in the first quarterly post-closure report (U.S. DOE 1994a). Based on the results of the field calibration, the best fit linear regression equation for moisture content of the soil surrounding the neutron access tubes (percent VMC) is given by:

$$\text{Meter Serial No. 1304: } \% \text{ VMC} = 3.15 \times 10^{-3} \times (\text{COUNTS}) - 8.06$$

$$\text{Meter Serial No. 7074: } \% \text{ VMC} = 4.68 \times 10^{-3} \times (\text{COUNTS}) - 8.36$$

where "COUNTS" refers to the raw output from the neutron logging tool.

A coefficient of determination (r^2) of 0.98 was obtained for both linear regression calibration curves indicating that the calibration data set and calibration model are in excellent agreement over the range of volumetric water contents represented. These logging tools can provide accurate estimates of the moisture content in typical near surface geologic materials found at the landfill site.

The repeatability (precision) of the logging tools based on counting statistics can be determined from the approximate 95 percent confidence interval:

$$\text{Meter Serial No. 1304} = [3.15 \times 10^{-3}(\text{COUNTS}) - 8.06] \pm 6.17 \times 10^{-3} (\text{COUNTS}/k)^{0.5}$$

$$\text{Meter Serial No. 7074} = [4.68 \times 10^{-3}(\text{COUNTS}) - 8.36] \pm 9.17 \times 10^{-3} (\text{COUNTS}/k)^{0.5}$$

Where:

COUNTS are the instrument recorded and displayed value (actual count normalized to 16 seconds); and

k = count time in seconds divided by 16.

A 16-second count time is used at the site resulting in a $k = 1$.

The calibration was conducted over the range of three percent to 12 percent volumetric moisture content. It is valid (provides accurate moisture contents) over the range of moisture contents for soils with approximately the same mineralogy and density as the calibration soil.

Meter 7074 is no longer in use at the Area 23 Hazardous Waste Trenches after being irreparably damaged on January 28, 1997. Meter 1304 is now being used to log all Area 23 access tubes.

Soil moisture monitoring was initially done on a monthly basis for the 79 neutron access tubes over the first year of operation (U.S. DOE, 1994a,b,c and 1995). This data set represents the baseline conditions to which all subsequent data (this report) are compared. After the first year of operation, permission was granted by the Nevada Division of Environmental Protection to reduce the number of monitored access tubes from 79 to 30, and begin quarterly monitoring (NDEP, 1994).

4.2 OPERATING PROCEDURES

Neutron logging operations follow Standard Operating Procedure (549)C-4.4.21/592 (BN, 1990). The procedure was modified to operate without a centralizer on the downhole tool as the neutron access tubes are inclined at a 45 degree angle. Field quality control operations require a daily standard count test to be run at the start and end of the day. Failure to pass this statistical test, which is detailed in the Standard Operating Procedure, requires stopping operations, notifying the supervisor, and determining the cause.

Using this procedure, neutron logs are obtained by lowering the neutron tool to within 0.61 m (2 ft) of the bottom of the access tube. A count is obtained using a 16-second count time at 0.3 m (1 ft) intervals along the length of the access tube. The data is recorded on field log sheets and stored in the data logger of the neutron probe as raw counts. The data logger is then downloaded to an office personnel computer on a daily basis where it is converted into absolute moisture content. Once the data have been converted to absolute moisture contents they are presented as two graphs; *Cumulative Residual Moisture Content* and *Baseline Difference*. These graphs are discussed later.

4.3 PRECIPITATION DATA

Precipitation data was collected from the National Weather Service Nuclear Support Office's CLINET station "MER" in Mercury, Nevada. This station was relocated from its former location, approximately 1.2 km (3/4 mi) east of the Area 23 Hazardous Waste Trenches, to a location approximately 30 m (100 ft) northeast of the entrance gate. Precipitation records for this station for the period October 1995 through October 1996 are found in Appendix D and are summarized in Table 3 and Figure 3.

Total precipitation for the reporting period October 1996 through October 1997 was 13.11 cm (5.16 in). The highest daily precipitation event occurred September 25, 1997 with 2.46 cm (0.97 in) of precipitation occurring in that 24 hr period. The action level of 2.54 cm (1.0 in) in any 30 day period was exceeded on September 3, 1997 with 3.43 cm accumulated (1.35 in) which required one quarter of monthly monitoring. This action level was again exceeded on October 10, 1997 with 2.57 cm accumulated (1.01 in), requiring monthly monitoring through at least January 1998.

**TABLE 4 - PRECIPITATION DATA FOR THE MERCURY NEVADA,
 METEOROLOGICAL STATION, MER, FOR THE PERIOD NOVEMBER 1, 1996
 THRU OCTOBER 31, 1997**

DATE	PRECIPITATION inches	MONTHLY ACCUMULATION inches	30 DAY ACCUMULATION ¹ inches
November 21, 1996	0.56	0.56	0.90
December 9, 1996	0.38	0.38	0.94
December 22, 1996	0.02	0.40	0.40
December 27, 1996	0.05	0.45	0.45
December 30, 1996	0.02	0.47	0.47
January 4, 1997	0.02	0.02	0.49
January 5, 1997	0.04	0.06	0.53
January 12, 1997	0.09	0.15	0.24
January 13, 1997	0.17	0.32	0.41
January 15, 1997	0.04	0.36	0.45
January 25, 1997	0.03	0.39	0.46
February 27, 1997	0.08	0.08	0.08
June 9, 1997	0.03	0.03	0.03
June 13, 1997	0.23	0.26	0.26
June 14, 1997	0.73	0.99	0.99
July 21, 1997	0.02	0.02	0.02
July 22, 1997	0.05	0.07	0.07
July 23, 1997	0.10	0.17	0.17
July 28, 1997	0.09	0.26	0.26
August 7, 1997	0.01	0.01	0.27
August 8, 1997	0.04	0.05	0.31
August 9, 1997	0.02	0.07	0.33
September 1, 1997	0.11	0.11	0.18
September 2, 1997	0.48	0.59	0.66
September 3, 1997	0.69	1.28	1.35
September 5, 1997	0.05	1.33	1.40
September 25, 1997	0.97	2.30	2.30
October 10, 1997	0.04	0.04	1.01

Data from the U. S. National Weather Service Nuclear Support Office, 1995 and 1996

¹To meet compliance requirements the 30-Day Accumulative records the total integrated rainfall that has occurred over the previous 30-day period. Monthly monitoring, rather than quarterly, is required for one quarter when 2.54 cm (1 in) of rainfall has occurred over a 30-day period.

Area 23 Hazardous Waste Trenches Precipitation Events - Regulatory Compliance Mercury Weather Station, MER

Figure 3 Precipitation Area 23 META Station

4.4 SOIL MOISTURE MONITORING RESULTS

4.4.1 DATA PRESENTATION

Due to the initial regulatory requirement to monitor underneath the trenches, and construction limitations in order to minimize the introduction of water through the Very Low Density Polyethylene (VLDPE) cover, the depth at which a tube intersects the centerline of any specific trench varies with the stand-off distance to that trench. A listing of depths can be found in Appendix A. Unless specifically stated, all depths reported here are access tube length, not vertical depth.

The *Cumulative Residual Moisture Content* graph (Figures 4-8) tracks changes over time from baseline conditions relative to the regulatory level of concern. The residual moisture content is calculated by subtracting the first year average soil moisture content (baseline) from the soil moisture content for each monitoring period on a depth basis. The depth used is approximately 0.91 m (3 ft) from the bottom of each neutron access tube. This corresponds to the point directly beneath each hazardous waste trench and avoids geometry problems associated with the end of the access tube. This residual value is plotted as *Residual Volumetric Moisture Content vs Date* for each access tube (Figures 4 through 8). The level of regulatory concern is indicated as a heavy line at the plus five percent residual moisture level. Values exceeding this limit for two consecutive monitoring periods require notifying the NDEP within seven days and the submittal of an Action Plan to investigate the cause within 30 days.

A second graph *Baseline Difference* (Appendix E) shows the changes occurring for one specific monitoring period along the entire length of a neutron access tube relative to baseline conditions. It is calculated by subtracting the first year average soil moisture content (baseline) from the current soil moisture content for each monitoring period on a depth basis. The result of this subtraction is referred to as the *Residual Soil Moisture Content (or Residual Moisture)*. The *Residual Soil Moisture Content* is plotted along with the actual *Volumetric Soil Moisture Content* of both the current and baseline data vs Depth from the top of the casing. A positive residual moisture content indicates conditions at that depth and point in time that are wetter than baseline conditions, while negative values indicate dryer conditions. Repeatability and instrumentation noise is approximately $\pm$ one percent RVMC. The *Baseline Difference* graph provides detailed information on the overall performance of the entire unit, while the *Cumulative Residual* graph focuses only on cumulative trends relative to the regulatory level of concern at a specific depth which are needed to make compliance decisions.

Mercury Hazardous Waste Trench- Row A

Cumulative Residual Moisture Content Beneath Trench

Residual Volumetric Moisture Content % = Volumetric moisture for a given date minus the baseline (first year average) volumetric moisture.

FIGURE 4 ROW A CUMULATIVE RESIDUAL MOISTURE CONTENT

Mercury Hazardous Waste Trench- Row B **Cumulative Residual Moisture Content Beneath Trench**

FIGURE 5 ROW B CUMULATIVE RESIDUAL MOISTURE CONTENT

Mercury Hazardous Waste Trench- Row C

Cumulative Residual Moisture Content Beneath Trench

Residual Volumetric Moisture Content % = Volumetric moisture for a given date minus the baseline (first year average) volumetric moisture.

FIGURE 6 ROW C CUMULATIVE RESIDUAL MOISTURE CONTENT

Mercury Hazardous Waste Trench- Row S1

Cumulative Residual Moisture Content Beneath Trench

FIGURE 7 ROW S1 CUMULATIVE RESIDUAL MOISTURE CONTENT

Mercury Hazardous Waste Trench- Row S2

Cumulative Residual Moisture Content Beneath Trench

Residual Volumetric Moisture Content % = Volumetric moisture for a given date minus the baseline (first year average) volumetric moisture.

FIGURE 8 ROW S2,V1 CUMULATIVE RESIDUAL MOISTURE CONTENT

4.4.1.2 DISCUSSION OF ANALYTICAL DATA TRENDS

Figures 4 through 8 provide summary monitoring information with respect to the level of regulatory concern. Observations for each trench are provided below. As noted previously, monthly monitoring was started in September 1997 due to a 30 day integrated rainfall over 1 inch (2.54 cm).

4.4.1.2.1 HAZARDOUS WASTE TRENCH A (ROW A)

Baseline Difference graphs for Tubes A-1, A-2, and A-4 in Trench A are found in Appendix E. Conditions remain dry and stable at depth from October 1996 through October of 1997. Near surface wetting events, associated with the unusually heavy 2.30 inch (5.84 cm) September rainfall, can be observed to extend to approximately 5.2 m (17 ft) in tubes A-1 and A-4, while infiltration along Tube A-2 was limited to 0.9 m (3 ft). This increase in moisture content is due to leakage along the cement well head protection access boxes as described in the previous report. The scheduled maintenance and repair activities to correct this problem were delayed due to this event and were started immediately afterwards. The September 26th (monthly) log of Tube A-1 shows an increase of about 3% RVMC extending down to about 4.6 m (15 ft). By the following month (fourth quarter October 21) this moisture had redistributed and decreased to about 1.5% RVMC with no further increase in depth noted. In a similar manner Tube A-4 had returned to baseline conditions below the 1.8 m (6 ft) level by the fourth quarter. The behavior of these tubes is typical of that observed along the access tubes located along the periphery of the cover. Rapid near surface changes in moisture content in response to heavy rainfall events with subsequent drying immediately afterwards. Visual observations of water infiltrating along the well head protection boxes was noted during this event. The maintenance and repair activities completed in October 1997 were designed to correct this problem.

Cumulative Residual Moisture Content graphs for Row A Tubes A-1, A-2, and A-4 are found in Figure 4. The vertical depth (from the original grade) beneath Trench A for tube A-1, A-2, and A-4 is approximately 16.8 m (55 ft)

The residual soil moisture content on Row A remains unchanged from the first year baseline conditions at less than one percent RVMC. Maximum variation is $\pm$ one percent which is within the range of instrumentation noise.

No trends are evident and conditions remain dry and stable and below the compliance criteria of 5%RVMC.

4.4.1.2.2 HAZARDOUS WASTE TRENCH B (ROW B)

Baseline Difference graphs (Appendix E) indicate similar conditions as observed on Row A with near surface wetting events typically occurring in the first 1.5 m (5 ft) due to the heavy September rainfall. Most tubes peak at about 0.9 m (3 ft) in depth and range from between 6.5 to about 12 percent. Tube 13 shows a singular peak of 13 percent occurring and remaining stationary at the 1.5 m (5 ft) level. In the September monthly monitoring logs Tubes 2, 4, and 7 indicate some infiltration along the access tubes to a depth of 6.1, 5.2, 3.0 m (20, 17, and 10 ft) respectively. These residual moisture contents range 2 to 1.5 percent and return to baseline conditions in the October logs.

As discussed in the previous report (USDOE, 1996) Tube B-13 (and to a lesser extent Tubes B-10 and B-16) were noted to show a progression of moisture moving to a depth of about 15.2 m (50 ft) where it was contained, probably due to a caliche layer. Tubes B-13 and B-10 have stabilized and show no change over the last four quarters while Tube B-16 indicates a movement of only about 0.3 m (1 ft).

The cumulative residual moisture contents for Row B, Tubes B-2, B-4, B-7, B-10, B-13, B-16, B-19, and B-22 are found in Figure 5. The vertical depth (from the original grade) beneath Trench B for Tubes B-2 through B-7 varies from approximately 21.3 to 18.3 m (70 to 60 ft), while tubes B-10 through B-22 vary between 16.8 to 15.8 m (55 to 52 ft). A listing of depths can be found in Appendix A.

Compared with the other row's cumulative residual moisture content the results on Row B are somewhat noisy at ± 1 percent RVMC. This artifact, as discussed in the previous report (DOE, 1996), is most likely caused by water leakage down along the access tube as a result of the precipitation and ponding. With the exception of Tube B-2, after October 1996 the data is more typical, with a scatter (noise level) of about ± 0.5 percent RVMC. This may indicate that the access tube is returning to baseline conditions.

All Row B access tubes remain at less than one percent RVMC and are well within the compliance criteria of five percent RVMC.

4.4.1.2.3 HAZARDOUS WASTE TRENCH C (ROW C)

Access Tubes C-1 and C-3 are located along the northwest periphery of the cap. The remaining access Tubes C-6 through C-21 are located on and penetrate the cover. The depth of Tubes C-1 and C-3 is approximately 18.3 m (60 ft) beneath the original grade, while Tubes C-6 through C-21 are approximately 6.1 m (20 ft) beneath the original grade.

Baseline Difference graphs (Appendix E) for Tubes C-1 and C-3 are similar to those of Row A and B and other access tubes located along the periphery of the cover and show some near surface wetting along the access tube. Tube C-1 has an eight percent RVMC peak at two feet in depth and about a 1 percent change from prior conditions down to about 3.3 m (11 ft) as a result of the September precipitation.

Access Tubes C-6 through C-21 are installed through the cover and are very similar in the character of their soil moisture content profiles. The September precipitation can be seen as a peak of up 14 recent RVMC (Tube C-15) in the 0.3 to 0.6 m (1 to 2 ft) levels with some wetting down to the 1.8 m (6 ft) level of about 2 percent RVMC. The geomembrane liner, located at 1.8 m (6 ft), provides a barrier to infiltration. Below this depth, the residual moisture contents remain at less than one percent and no indications of leakage across the geomembrane liner are observed.

Cumulative Residual Moisture Content graphs for Row C, Tubes C-1, C-3, C-6, C-9, C-12, C-15, C-18, and C-21 are found in Figure 6. The vertical depth (from original ground surface) beneath Trench C for Tubes C-1 and C-3 is approximately 18.3 m (60 ft). Both of these tubes lie along the margin of the cover. Tubes C-6 through C-21 are installed on the cover and extend through it to a vertical depth (from original ground surface) of approximately 6.1 m (20 ft).

Cumulative Residual Moisture Contents (Figure 6) at the point of compliance for all Row C tubes remain at less than one percent RVMC with no trends evident. Row C access tubes remain stable, dry and below the compliance criteria of five percent RVMC.

4.4.1.2.4 HAZARDOUS WASTE TRENCH S-1 (ROW S-1)

Access tubes for Row S-1 are installed on top of the cover and penetrate through it to a depth of approximately 6.1 m (20 ft) below the original ground surface.

Baseline Difference graphs (Appendix E) for tubes on Row S-1 are very similar to those of Row C. Wetting can be observed in the first 0.3 to 0.6 m (1 to 2 ft) with some infiltration down to 1.8 m (6 ft) where the geomembrane liner prevents any further movement. As was observed on Row C, most of the tubes still have one to three percent residual moisture remaining just above the liner at 1.8 m [6 ft]. This may be due to the protective rock cover layer (Rip-Rap) preventing, or slowing the natural evaporative processes. Below the liner the tubes remain stable and dry with the residual moisture contents remaining at less than one percent and with no leakage observed across the geomembrane liner.

Cumulative residual moisture content graphs for Row S-1, Tubes S1-2, S1-5, S1-8, S1-11, and S1-14 are found in Figure 7. All tubes are installed on the cover and extend through it to a

vertical depth of approximately 6.1 m (20 ft) from the original ground surface.

Cumulative residual moisture contents at the point of compliance for all Row S-1 tubes (Figure 7) remain at less than one percent RVMC with no trends evident. Row S-1 access tubes remain stable, dry and below the compliance criteria of five percent RVMC.

4.4.1.2.5 HAZARDOUS WASTE TRENCH S-2 (ROW S-2)

Access tubes on Row S2 are located along the northwest periphery of the cover. Baseline Difference graphs (Appendix E) indicate similar conditions as observed on Row A and B with some near surface (0 to 1.5 m [0 to 5 ft]) wetting beneath all the cement well head protection boxes except S2-5 which indicates a -2.5 %RVMC which is probably indicative of a void in this area.

An increase in moisture content (approximately three percent RVMC) is noted at the bottom of access tube S2-14. As discussed in the previous reports (DOE 1995, 1996), it is still not clear if this represents a positioning error in the steep gradient in moisture content associated with the change in lithology at this point or if it may also reflect a change in moisture content due to water or condensate that has moved down inside of the access tube.

The cumulative residual moisture contents for Row S-2, Tubes S2-2, S2-5, S2-8, S2-11, and S2-14, are found in Figure 8. The vertical depths (from the original surface) beneath Trench S-2 for Tubes S2-1 through S2-5 is approximately 16.8 m (55 ft). For tubes S2-8 to S2-14 the depth varies from 19.8 to 21.9 m (65 to 72 ft). A listing of access tube depths can be found in Appendix A.

Cumulative Residual Moisture Contents at the point of compliance for all Row S-2 tubes remain at less than one percent RVMC with no trends evident. Row S-2 access tubes remain stable, dry and below the compliance criteria of five percent RVMC.

4.4.1.2.6 VERTICAL CONTROL TUBE V-1

The Vertical Control Tube V-1 is a 15.2 m (50 ft) vertical neutron access tube located at the north margin of the cover. Its purpose was to provide information on infiltration and evaporation sequences of the soils immediately surrounding the RCRA closure. It is used for background comparative purposes. Unfortunately, the tube is located in a slight depression that frequently fills with ponded water from runoff from the covers and a catchment area located to the north. As a result this "control" tube represents a worse case scenario in terms of the amount and degree of water infiltration, rather than typical conditions.

Baseline Difference graphs (Appendix E) indicate slight wetting conditions in the surface to about 3.3 m (11 ft) for the period October 1996 to January 1997. Considering the influence of the precipitation event seen in the near surface in the other access tubes located along the periphery of the cover, V-1 remains relatively unaffected. Although the majority of the V-1 access tube remains above baseline conditions there has been no net change between the first quarter, January 1997, to the fourth quarter, October 1997, logs.

Cumulative Residual Moisture Contents for Control Tube V-1 (Figure 8) remain somewhat noisy varying from -0.5 to 1.5 percent RVMC within the reporting period January 1997 to October 1997.

The cumulative residual moisture contents for access Tube V-1, while noisier than other access tubes, remains below five percent RVMC.

5.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 SUMMARY AND CONCLUSIONS

1. Excavation of access tube B-13 revealed improperly installed bentonite seals and void space along the neutron access tube and beneath the well head protection box verifying the results observed in the neutron logs.
2. Maintenance and repair activities were conducted to correct the leakage problem with the access tubes located along the cover margins. The bentonite seals were installed in excavations around the well head protect boxes to prevent water infiltration around these structures. The cover and soils surrounding the well heads were recompacted and regraded to improve run-off. Corrective action was applied to all 46 access tubes.
3. Inspections of the cover were done to identify any significant changes to the unit requiring action. No significant concerns were observed.
4. An elevation survey of the subsidence markers was conducted in July 1997. There has been no subsidence at any of the markers since monitoring began five years ago.
5. Most access tubes located along the periphery of the cover (Tubes A, B, C-1 through C-4, and S-2) show low levels of infiltration occurring down along the access tubes to depth. Access tubes located on, and penetrating the cover, indicate infiltration is limited to 1.83 m (6 ft) where the geomembrane liner is located. No leakage across the liner has been observed.
6. All monitored access tubes are within the compliance criteria of less than five percent residual volumetric moisture content at the compliance point directly beneath each respective trench. Soil conditions remain dry and stable underneath the trenches.

Summary of trench conditions:

Trench A

Cumulative Residual Moisture Contents at the point of compliance indicates that soil surrounding the access tubes are stable, dry, and below the compliance level of five percent RVMC.

Trench B

Row B access tubes remain stable and dry, and are within the compliance criteria.

Trench C

Cumulative residual moisture contents at the point of compliance for all Row C tubes remain at less than one percent RVMC with no trends evident.

The Row C access tubes remain stable, dry, and below the compliance criteria of five percent RVMC.

Trench S-1

Cumulative residual moisture contents at the point of compliance for all Row S-1 tubes remain at less than one percent RVMC with no trends evident.

The Row S-1 access tubes remain stable, dry, and below the compliance criteria of five percent RVMC.

Trench S-2

Cumulative residual moisture contents at the point of compliance for all Row S-2 tubes remain at less than one percent RVMC with no trends evident.

The Row S-2 access tubes indicates that the soil remains stable, dry, and below the compliance criteria of five percent RVMC.

Control Well V-1

The Vertical Control Tube V-1 is a 15.24 m (50 ft) vertical neutron access tube located at the north margin of the cover. This tube is located in a slight depression that frequently fills with ponded water from runoff from the covers and from a catchment area located to the north. As a result, this "control" tube best represents a worse case scenario rather

than typical conditions. Evidence of ponded water, as well as cracks and erosion in the soils surrounding the concrete access box have been noted in the past. As result of this ponding, this access tube has shown significantly more leakage than observed on any of the other access tubes. Regrading and repairs were finished in October 1997.

The Cumulative Residual Moisture Contents at the point of compliance for Control Tube V-1 varies from about - 0.5 to 1.5 percent RVMC and is the result of moisture infiltrating down along the access tube.

The cumulative residual moisture content for access Tube V-1, while noisier than other access tubes, remains below the compliance level of five percent RVMC.

5.2 FINDINGS

Excavation of access tube B-13 revealed improperly installed bentonite seal, uncompacted soil, and void space along the neutron access tube and beneath the well head protection box verifying the results observed in the neutron logs. Corrective actions based on these findings were implemented.

Most access tubes located along the periphery of the cover (Tubes A, B, C-1 through C-4, and S-2) show low levels of infiltration occurring down along the access tubes to depth. Access tubes located on, and penetrating the cover, indicate infiltration is limited to 1.83 m (6 ft) where the geomembrane liner is located. No leakage across the liner has been observed.

No significant concerns were observed during the site inspections over the period November 1996 through October 1997.

The annual subsidence survey of the two covers indicates that subsidence has not been detected to date.

Soil conditions remain dry and stable beneath the trench through the October 1996 to October 1997 monitoring period.

Moisture contents at the point of compliance for all access tubes remain below the compliance criteria of five percent RVMC.

5.3 RECOMMENDATIONS

1. Inspections, during periods of heavy rainfall, should be conducted to visually determine that the corrective action and maintenance actives have not over looked any areas of run-on or ponding that need correcting.

6.0 REFERENCES

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CAU No. 112
Section: APPENDIX A
Revision: 0
Date: 1/28/98

APPENDIX A

NEUTRON ACCESS TUBE INSTALLATION SUMMARY

APPENDIX A -- NEUTRON ACCESS TUBE INSTALLATION SUMMARY

NEUTRON ACCESS TUBE NUMBER	DRILLING COMPLETION DATE	PLANNED		AS-BUILT		CALCULATED VERTICAL DEPTH ¹ (FEET)	VERTICAL POINT OF COMPLIANCE DEPTH ¹ (FEET)
		LENGTH (FEET)	ANGLE	LENGTH (FEET)	ANGLE		
V-1	5-28-93	50.0	90	50.0	90	50.0	48
A-1	5-18-93	78.0	45	78.0	45	55.1	53.0
A-2	5-19-93	80.0	45	71.5	45	50.6	48.8
A-3	5-19-93	84.0	45	84.0	45	59.4	NM ²
A-4	5-20-93	84.0	45	84.0	45	59.4	56.6
B-1	4-29-93	104.0	45	104.0	45	73.5	NM ²
B-2	4-30-93	98.0	45	98.0	45	69.3	67.2
B-3	4-30-93	92.0	45	92.0	45	65.0	NM ²
B-4	5-3-93	88.3	45	88.3	45	62.4	60.1
B-5	5-4-93	84.2	45	84.2	45	59.5	NM ²
B-6	5-4-93	84.0	45	84.0	45	59.4	NM ²
B-7	5-5-93	84.1	45	84.1	45	59.4	56.6
B-8	5-6-93	84.0	45	84.0	45	59.4	NM ²
B-9	5-7-93	79.5	45	79.5	45	56.2	NM ²
B-10	5-10-93	78.0	45	78.0	45	55.1	53.0
B-11	5-10-93	78.0	45	78.0	45	55.1	NM ²
B-12	5-11-93	79.0	45	79.0	45	55.8	NM ²
B-13	5-11-93	79.0	45	79.0	45	55.8	53.7
B-14	5-11-93	74.0	45	74.0	45	52.3	NM ²
B-15	5-12-93	74.0	45	74.0	45	52.3	NM ²
B-16	5-12-93	74.0	45	77.0	45	54.4	53.0
B-17	5-13-93	79.0	45	79.0	45	55.8	NM ²
B-18	5-13-93	79.5	45	79.5	45	56.2	NM ²
B-19	5-13-93	78.0	45	78.0	45	55.1	53.7
B-20	5-14-93	78.0	45	78.0	45	55.1	NM ²
B-21	5-14-93	79.0	45	79.0	45	55.8	NM ²
B-22	5-17-93	78.0	45	78.0	45	55.1	53.0
B-23	5-17-93	79.5	45	79.5	45	56.2	NM ²
C-1	5-26-93	88.0	45	88.0	45	62.2	60.1
C-2	5-27-93	92.0	45	75.0	45	53.0	NM ²
C-3	5-21-93	94.0	45	85.0	45	60.1	55.2
C-4	4-12-93	41.0	45	41.0	45	29.0	NM ²
C-5	4-12-93	41.0	45	41.0	45	29.0	NM ²
C-6	4-9-93	41.0	45	41.0	45	29.0	26.2
C-7	4-9-93	41.0	45	41.0	45	29.0	NM ²
C-8	4-7-93	41.0	45	41.0	45	29.0	NM ²
C-9	4-7-93	41.0	45	41.0	45	29.0	25.5
C-10	4-7-93	41.0	45	41.0	45	29.0	NM ²
C-11	4-7-93	41.0	45	41.0	45	29.0	NM ²
C-12	4-6-93	41.0	45	41.0	45	29.0	26.2
C-13	4-6-93	41.0	45	41.0	45	29.0	NM ²
C-14	4-6-93	41.0	45	41.0	45	29.0	NM ²

NEUTRON ACCESS TUBE NUMBER	DRILLING COMPLETION DATE	PLANNED		AS-BUILT		CALCULATED VERTICAL DEPTH ¹ (FEET)	VERTICAL POINT OF COMPLIANCE DEPTH ² (FEET)
		LENGTH (FEET)	ANGLE	LENGTH (FEET)	ANGLE		
C-15	4-5-93	41.0	45	41.0	45	29.0	26.9
C-16	4-5-93	41.0	45	41.0	45	29.0	NM ²
C-17	4-5-93	41.0	45	41.0	45	29.0	NM ²
C-18	4-5-93	41.0	45	41.0	45	29.0	27.6
C-19	4-2-93	41.0	45	41.0	45	29.0	NM ²
C-20	4-2-93	41.0	45	41.0	45	29.0	NM ²
C-21	4-2-93	41.0	45	41.0	45	29.0	27.6
S1-1	3-25-93	41.0	45	41.0	45	29.0	NM ²
S1-2	3-25-93	41.0	45	41.0	45	29.0	27.6
S1-3	3-26-93	41.0	45	41.0	45	29.0	NM ²
S1-4	3-26-93	41.0	45	41.0	45	29.0	NM ²
S1-5	3-30-93	41.0	45	41.0	45	29.0	26.9
S1-6	3-30-93	41.0	45	41.0	45	29.0	NM ²
S1-7	3-31-93	41.0	45	41.0	45	29.0	NM ²
S1-8	3-31-93	41.0	45	41.0	45	29.0	27.6
S1-9	3-31-93	41.0	45	41.0	45	29.0	NM ²
S1-10	3-31-93	41.0	45	41.0	45	29.0	NM ²
S1-11	4-1-93	41.0	45	41.0	45	29.0	27.6
S1-12	4-1-93	41.0	45	41.0	45	29.0	NM ²
S1-13	4-1-93	41.0	45	41.0	45	29.0	NM ²
S1-14	4-1-93	41.0	45	41.0	45	29.0	26.9
S1-15	4-2-93	41.0	45	41.0	45	29.0	NM ²
S2-1	4-13-93	74.2	45	74.2	45	52.4	NM ²
S2-2	5-18-93	78.0	45	78.0	45	55.1	53.0
S2-3	4-14-93	78.0	45	78.0	45	55.1	NM ²
S2-4	4-15-93	79.0	45	79.0	45	55.8	NM ²
S2-5	4-16-93	82.2	45	82.2	45	58.1	55.2
S2-6	4-19-93	82.2	45	82.2	45	58.1	NM ²
S2-7	4-19-93	92.0	45	92.0	45	65.0	NM ²
S2-8	4-21-93	92.0	45	92.0	45	65.0	63.6
S2-9	4-21-93	93.5	45	93.5	45	66.1	NM ²
S2-10	4-22-93	96.0	45	96.0	45	67.9	NM ²
S2-11	4-22-93	97.4	45	97.4	45	68.9	66.5
S2-12	4-23-93	99.0	45	99.0	45	70.0	NM ²
S2-13	4-26-93	103.6	45	103.6	45	73.2	NM ²
S2-14	4-27-93	101.9	45	101.9	45	72.0	69.3
S2-15	4-28-93	98.2	45	98.2	45	69.4	NM ²

Note: 1 Calculated depth is from existing grade prior to construction of the cover and is based upon the As-Built length of casing and angle

Note: 2 NM - Not Monitored

CAU No. 112
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APPENDIX B

MONTHLY INSPECTION CHECKLISTS

AREA 23 HAZARDOUS WASTE LANDFILL INSPECTION CHECKLIST

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 10-24-96
2. Facility Manager (name and organization): NA
3. Reason for inspection: Routine: ☒ Problem Reported: ☐ Unusual weather or other condition: ☐ Provide any necessary details: _____
4. Name, organization and telephone number of person reporting problem: NA
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Windy cold

LANDFILL AREA

6. Is the landfill area gate closed: yes Locked: yes
7. Describe the condition of the fencing (i.e., are repairs required?): Good
8. Describe the condition of the signs (missing, fading, damaged, etc.): Good
9. Is there excessive erosion of the two overland flow diversion trenches: NO
If yes, describe: _____
10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: NONE

11. Describe any unusual deterioration of the neutron-access tube concrete pads: nothing new
12. Are all neutron access tube covers closed: Yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: NONE

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: NONE
15. Describe the effect (or possible effect) of any changes noted above: NA
16. Describe any other discharges into the landfill or along the top of the landfill: NONE
17. Additional comments, observations, or recommendations: NONE

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Angela Olson

Signed: Angela Olson

Date: 10-24-96

Names of other persons present during inspection (print):

AREA 23 HAZARDOUS WASTE LANDFILL INSPECTION CHECKLIST

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 11-27-96
2. Facility Manager (name and organization): _____
3. Reason for inspection: Routine: ☒ Problem Reported: ☐ Unusual weather or other condition: ☐ Provide any necessary details: _____
4. Name, organization and telephone number of person reporting problem: NA
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Rainy

LANDFILL AREA

6. Is the landfill area gate closed: yes Locked: yes
7. Describe the condition of the fencing (i.e., are repairs required?): Good
8. Describe the condition of the signs (missing, fading, damaged, etc.): Good
9. Is there excessive erosion of the two overland flow diversion trenches: _____
If yes, describe: Nothing new
10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: Nothing new

11. Describe any unusual deterioration of the neutron-access tube concrete pads: Did not observe any changes
12. Are all neutron access tube covers closed: YES
13. Describe any unusual activity or condition which could impact the proper operation of the covers: NONE

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: NONE
15. Describe the effect (or possible effect) of any changes noted above: NA
16. Describe any other discharges into the landfill or along the top of the landfill: NONE
17. Additional comments, observations, or recommendations: NONE

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Angel Johnson

Signed: Angel Johnson (Print)

Date: 11-27-96

Names of other persons present during inspection (print):

AREA 23 HAZARDOUS WASTE LANDFILL INSPECTION CHECKLIST

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 12-30-96
2. Facility Manager (name and organization): JEFFERY SMITH
3. Reason for inspection: Routine: ☒ Problem Reported: ☐ Unusual weather or other condition: ☐ Provide any necessary details: _____
4. Name, organization and telephone number of person reporting problem: _____
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): SOME RAIN / WIND

LANDFILL AREA

6. Is the landfill area gate closed: YES Locked: YES
7. Describe the condition of the fencing (i.e., are repairs required?): GOOD NO PROBLEMS NOTED
8. Describe the condition of the signs (missing, fading, damaged, etc.): OK
9. Is there excessive erosion of the two overland flow diversion trenches: NO
If yes, describe: _____
10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: N/A

11. Describe any unusual deterioration of the neutron-access tube concrete pads: NONE
12. Are all neutron access tube covers closed: YES
13. Describe any unusual activity or condition which could impact the proper operation of the covers: N/A

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: NONE NOTED
15. Describe the effect (or possible effect) of any changes noted above: N/A
16. Describe any other discharges into the landfill or along the top of the landfill: NONE
17. Additional comments, observations, or recommendations: N/A

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: JAMES McCloskey

Signed: [Signature] (Print)

Date: 12-30-96

Names of other persons present during inspection (print):

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 1-22-97
2. Facility Manager (name and organization): _____
3. Reason for inspection: Monthly: ☒ Quarterly: _____
Problem Reported: _____ Unusual Weather or other condition: _____
Provide any necessary details: Cold some snow/rain
4. Name, organization and telephone number of person reporting problem: WA
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Cold some rain/snow

LANDFILL AREA

6. Is the landfill area gate closed: Yes Locked: Yes
7. Describe the condition of the fencing (i.e., are repairs required?): OK
8. Describe the condition of the signs (missing, fading, damaged, etc.): Redrilled hole is 2 signs
9. Is there excessive erosion of the two overland flow diversion trenches: _____
If yes, describe: NO

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: Nothing new
11. Describe any unusual deterioration of the neutron-access tube concrete pads: Nothing new
12. Are all neutron access tube covers closed: yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: NONE

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: NONE
15. Describe the effect (or possible effect) of any changes noted above: NA
16. Describe any other discharges into the landfill or along the top of the landfill: NONE
17. Additional comments, observations, or recommendations: NONE

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Angela Olson

Signed: Angela Olson

(Print)

Date: 1-22-97

Names of other persons present during inspection (print):

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 2-20-91
2. Facility Manager (name and organization): _____
3. Reason for inspection: Monthly: ☒ Quarterly: _____
Problem Reported: _____ Unusual Weather or other condition: _____
Provide any necessary details: NA
4. Name, organization and telephone number of person reporting problem: NA
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Windy, cold

LANDFILL AREA

6. Is the landfill area gate closed: yes Locked: yes
7. Describe the condition of the fencing (i.e., are repairs required?): Excellent
8. Describe the condition of the signs (missing, fading, damaged, etc.): OK
9. Is there excessive erosion of the two overland flow diversion trenches: _____
If yes, describe: no

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: no
11. Describe any unusual deterioration of the neutron-access tube concrete pads: no
12. Are all neutron access tube covers closed: yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers:

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: While conducting maintenance on some of the tubes it was noted that when they were installed they were not properly packed which has allowed moisture to infiltrate. Casing is rusted
15. Describe the effect (or possible effect) of any changes noted above: infiltrate casing is rusted
16. Describe any other discharges into the landfill or along the top of the landfill: NA
17. Additional comments, observations, or recommendations: NONE

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: No If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Anaela Olson

Signed: Luella V. Ben

Date: 2-20-97

Names of other persons present during inspection (print):

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 3-27-97
2. Facility Manager (name and organization): _____
3. Reason for inspection: Monthly: ☒ Quarterly: _____
Problem Reported: _____ Unusual Weather or other condition: _____
Provide any necessary details: _____

4. Name, organization and telephone number of person reporting problem: NA
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Warm

LANDFILL AREA

6. Is the landfill area gate closed: yes Locked: yes
7. Describe the condition of the fencing (i.e., are repairs required?): Excellent
8. Describe the condition of the signs (missing, fading, damaged, etc.): Good
9. Is there excessive erosion of the two overland flow diversion trenches: _____
If yes, describe: no

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: NONE
11. Describe any unusual deterioration of the neutron-access tube concrete pads: NONE
12. Are all neutron access tube covers closed: yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: NA

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: NONE
15. Describe the effect (or possible effect) of any changes noted above: NA
16. Describe any other discharges into the landfill or along the top of the landfill: NONE
17. Additional comments, observations, or recommendations: NONE

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Angela Olson

Signed: Angela Olson (Print)

Date: 3-27-97

Names of other persons present during inspection (print):

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: May 1, 1997
2. Facility Manager (name and organization): David Cowser, BN Remediation Projects
3. Reason for inspection: Monthly: ☒ Quarterly: ☐
Problem Reported: ☐ Unusual Weather or other condition: ☐
Provide any necessary details: N/A
4. Name, organization and telephone number of person reporting problem: N/A
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Dry, medium to high (gusts up to 40 mph) winds, Temperature has been below average

LANDFILL AREA

6. Is the landfill area gate closed: Open Locked: No
Mike Floyd was on site completing the final 4 neutron tubes
7. Describe the condition of the fencing (i.e., are repairs required?):
Fencing was in good condition. All fence post and associated barbed wire was in place
8. Describe the condition of the signs (missing, fading, damaged, etc.):
I did not detect any missing signs. All signs inspected were in good condition and were clearly visible
9. Is there excessive erosion of the two overland flow diversion trenches:
If yes, describe: No recent signs of erosion were evident in either diversion trench.

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc. on the landfill covers: Evidence of past activities on top of the cover is still present. No new subsidence or erosion of neutron access tube or cover was noted.
11. Describe any unusual deterioration of the neutron-access tube concrete pads: All neutron tube concrete pads were in excellent condition. However, the past documented erosion of gravel-pad interface is still present. Tube B-B which was repaired in March is in good condition.
12. Are all neutron access tube covers closed: 4 covers were off. They were being monitored by Mike Floyd.
13. Describe any unusual activity or condition which could impact the proper operation of the covers: None

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: Operations in the vicinity of the landfill have remained unchanged.
15. Describe the effect (or possible effect) of any changes noted above: N/A
16. Describe any other discharges into the landfill or along the top of the landfill: None noted. No significant rainfall during month of April.
17. Additional comments, observations, or recommendations: None.

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: No If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Jeffrey L. Smith

(Print)

Signed: [Signature]

Date: 5/1/97

Names of other persons present during inspection (print):

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 6-3-97 (For May's Inspection)
2. Facility Manager (name and organization): _____
3. Reason for inspection: Monthly: ☒ Quarterly: _____
Problem Reported: _____ Unusual Weather or other condition: _____
Provide any necessary details: _____

4. Name, organization and telephone number of person reporting problem: NA
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Hot windy

LANDFILL AREA

6. Is the landfill area gate closed: yes Locked: yes
7. Describe the condition of the fencing (i.e., are repairs required?): Excellent -
NO repairs required
8. Describe the condition of the signs (missing, fading, damaged, etc.): OK
9. Is there excessive erosion of the two overland flow diversion trenches: _____
If yes, describe: Nothing new noted

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: NONE
11. Describe any unusual deterioration of the neutron-access tube concrete pads: NONE
12. Are all neutron access tube covers closed: yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: NA

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: NA
15. Describe the effect (or possible effect) of any changes noted above: NA
16. Describe any other discharges into the landfill or along the top of the landfill: NONE
17. Additional comments, observations, or recommendations: NONE

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Angela Olson
(Print)

Signed: Angela Olson

Date: 6-3-97

Names of other persons present during inspection (print):

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 6/30/97
2. Facility Manager (name and organization): NA
3. Reason for inspection: Monthly: ☒ Quarterly: ☐
Problem Reported: NA Unusual Weather or other condition: NA
Provide any necessary details: NA
4. Name, organization and telephone number of person reporting problem: NA
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): High winds, hot

LANDFILL AREA

6. Is the landfill area gate closed: yes Locked: yes
7. Describe the condition of the fencing (i.e., are repairs required?): Excellent
8. Describe the condition of the signs (missing, fading, damaged, etc.): OK
9. Is there excessive erosion of the two overland flow diversion trenches: None noted
If yes, describe: None noted

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: NONE
11. Describe any unusual deterioration of the neutron-access tube concrete pads: NONE
12. Are all neutron access tube covers closed: yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: NONE

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: NONE
15. Describe the effect (or possible effect) of any changes noted above: NA
16. Describe any other discharges into the landfill or along the top of the landfill: NONE
17. Additional comments, observations, or recommendations: NONE

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Angela Olson

Signed: Angela Olson (Print)

Date: 6/30/97

Names of other persons present during inspection (print):

Photos not taken 7/2/97

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 7/29/97
2. Facility Manager (name and organization): NA
3. Reason for inspection: Monthly: ☒ Quarterly: ☐
Problem Reported: ☐ Unusual Weather or other condition: ☐
Provide any necessary details: _____

4. Name, organization and telephone number of person reporting problem: _____

5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Windy - some rain

LANDFILL AREA

6. Is the landfill area gate closed: yes Locked: yes
7. Describe the condition of the fencing (i.e., are repairs required?): Good
8. Describe the condition of the signs (missing, fading, damaged, etc.): bad at the top - some are wearing pretty
bad at the holes in corners
9. Is there excessive erosion of the two overland flow diversion trenches: _____
If yes, describe: no

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: NONE
11. Describe any unusual deterioration of the neutron-access tube concrete pads: NONE
12. Are all neutron access tube covers closed: Yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: NO

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: NO
15. Describe the effect (or possible effect) of any changes noted above: NA
16. Describe any other discharges into the landfill or along the top of the landfill: NONE
17. Additional comments, observations, or recommendations: NONE

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Angela Olson

Signed: Angela Olson (Print)

Date: 7/29/97

Names of other persons present during inspection (print):

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: August 21, 1997
2. Facility Manager (name and organization): BN RP
3. Reason for inspection: Monthly: ☒ Quarterly: ☐
Problem Reported: N/A Unusual Weather or other condition:
Provide any necessary details: N/A
4. Name, organization and telephone number of person reporting problem: N/A
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): Sunny, slight wind, low WD's => Approx. 2 hrs earlier slight precip

LANDFILL AREA

6. Is the landfill area gate closed: Yes Locked: Yes
7. Describe the condition of the fencing (i.e., are repairs required?): Fencing is in good condition
8. Describe the condition of the signs (missing, fading, damaged, etc.): Signs are in place and readable
9. Is there excessive erosion of the two overland flow diversion trenches:
If yes, describe: No new signs of erosion

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: Condition unchanged since previous month
11. Describe any unusual deterioration of the neutron-access tube concrete pads: Condition unchanged from previous month
12. Are all neutron access tube covers closed: Yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: None

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: None
15. Describe the effect (or possible effect) of any changes noted above: None
16. Describe any other discharges into the landfill or along the top of the landfill: None
17. Additional comments, observations, or recommendations: None

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: No If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by:

Jeffrey L. Smith
(Print)

Signed: [Signature]

Date: 8/21/97

Names of other persons present during inspection (print):

Shannon Parsons

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 9/30/97
2. Facility Manager (name and organization): BN RP
3. Reason for inspection: Monthly: ☒ Quarterly: ☐
Problem Reported: ☐ Unusual Weather or other condition: ☒
Provide any necessary details:
Severe rain storm on 9/25/97, checked at effectiveness of repaired section access
from
4. Name, organization and telephone number of person reporting problem: N/A
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): On September 25, 1997 had a severe rainstorm. Caused some drainage
problems and restricted flow away from maintenance

LANDFILL AREA

6. Is the landfill area gate closed: Yes Locked: Yes
7. Describe the condition of the fencing (i.e., are repairs required?): Fence was being repaired. We opened 20 ft section so heavy equipment could
enter area to perform section access to the maintenance
8. Describe the condition of the signs (missing, fading, damaged, etc.): N/A
9. Is there excessive erosion of the two overland flow diversion trenches:
If yes, describe: No, these areas were in the process of being repaired.

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: N/A
11. Describe any unusual deterioration of the neutron-access tube concrete pads: N/A
12. Are all neutron access tube covers closed: Yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: N/A

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: N/A
15. Describe the effect (or possible effect) of any changes noted above: N/A
16. Describe any other discharges into the landfill or along the top of the landfill: N/A
17. Additional comments, observations, or recommendations: Over 1" of rain in 30-day period - trapped. Monthly monitoring. Site has been logged on 9/30/97

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: No If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Jeffrey L. Smith

Signed: [Signature] (Print)

Date: 9/30/97

Names of other persons present during inspection (print): _____

**AREA 23 HAZARDOUS WASTE TRENCHES (CAU 114)
INSPECTION CHECKLIST**

Inspect the landfill and surrounding area. Look for any unusual changes such as water accumulation, chemical odors, deterioration of adjacent structures, etc. Refer to the previous inspection checklist in order to identify any changes. Do not rely on your memory. An inspection should be completed after a problem is reported by contractor, DOE, or Nevada Division of Environmental Protection personnel. At a minimum, routine inspections are to be completed at a frequency negotiated with the State of Nevada.

GENERAL INFORMATION

1. Date of inspection: 10/28/97
2. Facility Manager (name and organization): _____
3. Reason for inspection: Monthly: X Quarterly: _____
Problem Reported: No Unusual Weather or other condition: No
Provide any necessary details: _____
4. Name, organization and telephone number of person reporting problem: _____
5. Describe weather conditions over the past few weeks (high winds, precipitation, local flooding): cool, sunny, windy

LANDFILL AREA

6. Is the landfill area gate closed: yes Locked: yes
7. Describe the condition of the fencing (i.e., are repairs required?): Good Condition
8. Describe the condition of the signs (missing, fading, damaged, etc.): 2 signs down and damaged - all others good
9. Is there excessive erosion of the two overland flow diversion trenches: No
If yes, describe: _____

AREA 23 HAZARDOUS WASTE TRENCHES (Continued)

10. Describe any subsidence, erosion, excessive vegetation, etc., on the landfill covers: Only minor vegetation
11. Describe any unusual deterioration of the neutron-access tube concrete pads: None
12. Are all neutron access tube covers closed: Yes
13. Describe any unusual activity or condition which could impact the proper operation of the covers: None

AREA SURROUNDING THE LANDFILL

14. Describe any significant changes within several hundred feet of the unit. Changes can include construction, change in land use, storage of materials nearby, soil piles, change in use of the facility, etc.: None
15. Describe the effect (or possible effect) of any changes noted above: N/A
16. Describe any other discharges into the landfill or along the top of the landfill: None
17. Additional comments, observations, or recommendations: None

FOLLOW UP

18. Based on the findings indicated above, is an additional inspection required before the next scheduled inspection: NO If yes, when will this inspection be completed: _____

Any significant changes must be reported to the appropriate supervisor immediately.

Inspected by: Shannon Parsons

Signed: Shannon M. Parsons (Print)

Date: 10/28/97

Names of other persons present during inspection (print):

CAU No. 112
Section: APPENDIX C
Revision: 0
Date: 1/28/98

APPENDIX C

SUBSIDENCE SURVEY PLAT

PROJECT CONTROL MONUMENT

MON NO	COORDINATE
PM 6	N: 20380817.407 E: 1832156.82
PM 7	N: 20380341.489 E: 1832156.82

SUBSIDENCE MONUMENT
LOCATION TABLE

MON NO	N	COORDINATES E	ELEV. TOP MON AUGUST, 1993	ELEV. TOP MON AUGUST, 1994	ELEV. TOP MON JULY 1995	ELEV. TOP MON AUGUST 1996
SM 1	20380836.722	1832371.8774	3669.17	3669.17	3669.17	3669.17
SM 2	20380756.583	1832342.1769	3666.41	3666.41	3666.41	3666.41
SM 3	20380845.802	1832220.1877	3669.31	3669.31	3669.31	3669.31
SM 4	20380535.070	1832076.9730	3660.61	3660.61	3660.61	3660.61
SM 5	20380423.800	1832094.8852	3653.12	3653.12	3653.12	3653.12
SM 6	20380539.981	1832045.1821	3658.52	3658.52	3658.52	3658.52
SM 7	20380592.893	1832079.4908	3664.49	3664.49	3664.49	3664.49
SM 8	20380783.752	1832030.6240	3665.65	3665.65	3665.65	3665.65
SM 9	20380638.435	1831965.6794	3659.41	3659.41	3659.41	3659.41
SM 10	20380478.713	1831927.2693	3654.23	3654.23	3654.23	3654.23

File name: SUBA2396.DWG
PLOT DATE: 09/24/96 at 13:40

NTS		
ES		
F	ELEV	DESC.
2628.5144	3663.000	MERC - 6
2117.3100	3643.170	MERC - 7

20381000
1832600

NOTES:

- 1) THE OWNER OR OPERATOR OF THIS SITE MUST RESTRICT DISTURBANCE OF THIS HAZARDOUS WASTE DISPOSAL UNIT IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS CONTAINED IN 40CFR - PART 265 - SUB-PART 6.
- 2) ALL COORDINATES BASED ON THE NEVADA STATE PLANE GRID - CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983.
- 3) ALL ELEVATIONS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1929.

SURVEYORS CERTIFICATE

I, SCOTTY J. ELLISON A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF NEVADA, DO HEREBY CERTIFY THAT THIS MAP REPRESENT A SURVEY DONE BY ME FOR THE DATE SHOWN IN THE SUBSIDENCE MONUMENT LOCATION TABLE ON JULY 1997. ALSO THAT THE MONUMENTS SHOWN FOR THE DATE OF AUGUST 1996, ARE OF THE CHARACTER SHOWN AND DO OCCUPY THE POSITIONS INDICATED.

SCOTTY J. ELLISON P.L.S.
NEVADA CERTIFICATE NO. 7166

DETAIL "A"
N.T.S.

DETAIL "B"
N.T.S.

LEGEND

- ☐ - NEUTRON ACCESS TUBE ENTRANCE STRUCTURE (SEE CONST. DWG'S FOR DETAIL)
- - MONUMENT (SEE DETAIL "A")
- ▷ - SUBSIDENCE MONUMENT (SEE DETAIL "B") (10 EA)
- - PROJECT MONUMENT

ELEV. TOP MON
JULY 1997
3669.17
3666.41
3669.31
3660.61
3651.02
3658.25
3664.49
3665.65
3659.41
3654.23

20380300
1832600

NOT FOR CONSTRUCTION

4	7-97	ANNUAL CHECK OF SUBSIDENCE MONUMENTS BY SURVEY	SJE	RSR					
3	8-26-96	ANNUAL CHECK OF SUBSIDENCE MONUMENTS BY SURVEY	SJE	RSR					
2	8-17-95	ANNUAL CHECK OF SUBSIDENCE MONUMENTS BY SURVEY	SJE	RSR					
NO.	DATE	REVISIONS	BY	CHK	APP	REV	DATE	BY	CHK
<p>CIVIL</p> <p>U.S. DEPARTMENT OF ENERGY</p> <p>NEVADA OPERATIONS OFFICE</p> <p>NEVADA TEST SITE — AREA 23</p> <p>MERCURY LANDFILL RCRA CLOSURE</p> <p>SUBSIDENCE SURVEY</p> <p>FOURTH YEAR OF POST CLOSURE MONITORING</p> <p>JULY 1997</p>									
SUBMITTED BY			USER			APPROVAL BLOCK			
RAYTHEON SERVICES NEVADA						DEPT. OF ENERGY APPROVAL DATE			
RAYTHEON SERVICES NEVADA			P. A. NO.			PROJECT ENGINEER			
			I. S. NO.			DRAWING NUMBER			
			PROJ. NO.			23-HWTC-C2			
						SHEET 1 OF 1 REVISIONS 4			

CAU No. 112
Section: APPENDIX D
Revision: 0
Date: 1/28/98

APPENDIX D

PRECIPITATION RECORDS

MONTH/YEAR **OCT -- 1996** NTS PRECIPITATION

	BJY	CS	DRA	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1														
2														
3														
4														
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25			T											
26								.30						
27		.20								.02				
28	.22	.05	.02		.08	.20	.09	.48		.00		.37	.24	.45
29										.07			.03	
30	.45	.72	.30	.21	.53	.58	.25	.24		.05		.38	.31	.50
31										.01		.17		.05
TOTAL	0.67	0.97	0.32	0.21	0.61	0.78	0.34	0.96	0.00	.25	0.00	0.92	0.60	1.00

Data Tablated By NOV 3 1996

BTC

Data Quality Control

MONTH/YEAR NOV - - 1996 NTS PRECIPITATION

	BJY	CS	DRA	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1									m	m	m			
2									↑	↑	↑			
3														
4														
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15														
16														
17														
18														
19														
20														
21	1.98	1.37	.53	1.19	2.31	2.15	.56	2.32				1.42	.58	1.15
22	.50	.08			.02	.30						.02		
23						.04								
24														
25														
26														
27														
28														
29									↓	↓	↓			
30									m	m	m			
31														
TOTAL	2.48	1.45	.53	1.19	2.33	2.49	.56	2.32	m	m	m	1.44	.58	1.15

Data Tablated By Rdd

Data Qualtiy Control Rdd

MONTH/YEAR DEC -- 1998

NTS PRECIPITATION

	A12	BJY	CS	DRA	ETu	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1	NA										m		m			
2	NA										NA		NA			
3																
4																
5																
6																
7																
8																
9		.35	.63	.35	.97	.80	.57	.61	.38	.82		.61		.68	.33	.39
10		.03			.50		.05	.25		.02		.26		.04		.01
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22		.18	.02	.01	.30		.49	.13	.02	.42		.17		.22	.05	.02
23																
24																
25																
26																
27			.07	.04	.19	.02		.03	.05	.08		.14			.07	.12
28																
29																
30		.02	.03	.02	.02	.02			.02	.04		.01		.03	.02	.03
31																
TOTAL	NA	.58	.75	.42	1.98	.84	1.11	1.02	.47	1.38	m	1.19	m	.97	.47	.57

Data Tabulated By Rdd

Data Quality Control BF

MONTH/YEAR JAN - - 1997

NTS PRECIPITATION

	A12	BJY	CS	DRA	ETu	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1											↑		↑			
2		.27	.07		.32		.50	.27			↑	.35				.40
3		.07	.05	.07	.03			.01			↑	.06			.03	.33
4					.03				.02	.03	↓				.01	
5		.02	.07	.09	.02	.01	.04		.04	.01	.06	.02			.07	.06
6																
7					.05											
8																
9																
10																
11																
12		.20	.48	.08	.36	.09	.03	.17	.09	.25	.20	.50	.22	.38	.28	.28
13		.37	.20	.20	.44	.30	.24	.35	.17	.30	.13	.50	.15	.26	.16	.30
14		.02	.02		.02			.03		.02						.02
15		.05	.01	.04	.02	.01		.02	.04	.02	.07		.05			
16																
17																
18																
19																
20			.02		.06						.05	.05				
21					.02		.02	.04				.05				
22					.27			.05		.15		.22		.04		.04
23					.02			.03			.04					
24																
25			.05	.01	.07		.08	.01	.03	.03	.01	.05		.03		.04
26							.02	.03								
27							.02	.01								
28											.07					
29																
30																
31														.02		
TOTAL		1.00	.97	.49	1.73	.41	.95	1.02	.39	.81	.63	1.80	.42	.73	.55	1.47

Data Tabulated By BF 2/6/97

Data Quality Control Rdd 2/6/97

NTS PRECIPITATION

MONTH/YEAR FEB -- 1997

	A12	BJY	CS	DAF	DRA	ETu	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1																	
2					T												
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																0.01	0.02
27		0.09	0.03	0.04	0.05	0.09		0.03	0.08	0.08	0.04	0.08	0.05	0.04	0.07	0.05	0.05
28					0.01			0.02	0.02		0.03	0.05					
29																	
30																	
31																	
TOTAL		0.09	0.03	0.04	0.06	0.09	0.00	0.05	0.10	0.08	0.07	0.13	0.05	0.04	0.07	0.06	0.07

Data Tabulated By BE

Data Quality Control RDD

3/4/97

NTS PRECIPITATION

MONTH/YEAR **MAR -- 1997**

	A12	BJY	CS	DAF	DRA	ETu	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Data Tabulated By BF 4/2/97

Data Quality Control BD

NTS PRECIPITATION

MONTH/YEAR APRIL 1997

	A12	BJY	CS	DAF	DRA	ETu	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1																	
2					.02					T							
3																	
4																	
5																	
6																	
7																	
8																	
9				.03	.02	T	.11	.02	.13	.11	T	.15	.08		.05	.07	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
TOTAL	0.0	0.0	0.03	0.02	0.02	0.11	0.02	0.13	0.11	T	0.15	0.08	0.0	0.05	0.07	0.0	0.0

Data Tabulated By ME 5/5/97

Data Quality Control ROD

NTS PRECIPITATION

MONTH/YEAR MAY 1997

	A12	BJY	CS	DAF	DRA	E Tu	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UC
1																	
2																	
3																	
4																	
5																	
6					0.01												
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19	0.03	0.06			0.08	0.03	0.03	0.08	0.08		0.25	0.23					
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
TOTAL	0.03	0.06	0.00	0.00	0.08	0.03	0.03	0.08	0.08	0.00	0.25	0.23	0.00	0.00	0.00	0.00	0.00

Data Tabulated By AF 6/04/97

Data Quality Control RDD

A12 Dip Stick Rain Gage Reading 0.03

NTS PRECIPITATION

MONTH/YEAR JUN -- 1997

	A12	BJY	CS	DAF	DRA	ETu	4JA	40MN	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9										.03							
10												.03					
11																	
12																	
13	1.15	0.10	0.55	0.28	0.17	0.78	0.03	1.98	1.15	.23	0.20	0.47	0.33	0.48	0.65	0.20	0.55
14	0.20	0.45	0.42	0.39	0.61	0.40		0.10	.25	.73	0.70	0.78	0.42	0.17	0.10	0.55	0.17
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
TOTAL	1.35	0.55	0.97	0.67	0.78	1.18	0.03	1.08	1.40	.99	0.90	1.28	0.75	0.65	0.75	0.75	0.72

Data Tabulated By BF 7/6/97

Data Quality Control Rdc

A12 Dip Stick Rain Gage Reading 1.39

NTS PRECIPITATION

JULY 1997

	A12	BJY	CS	DAF	DRA	ETu	4JA	40 Mi	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21	0.06			0.03	0.02	0.05		0.03		0.02	0.03	0.02	0.03		0.02		0.02
22	0.19	0.13	0.12	0.12	0.20	0.15	0.03	0.16	0.38	0.05	0.13	0.28	0.20	0.04	0.20	0.15	0.11
23								0.01	0.03	0.10		0.04					
24																	
25																	
26																	
27																	
28		0.02	0.02	0.02	0.23		0.02	0.03	0.04	0.09	0.03	0.15	0.02	0.03	0.02	0.03	
29																	
30																	
31																	
TOTAL	0.25	0.15	0.14	0.17	0.45	0.20	0.05	0.23	0.43	0.28	0.19	0.49	0.25	0.07	0.24	0.18	0.13

Area 12 Dip Stick Rain Gage Reading: 0.15

Data Tabulated By: *Berth A. Frankowski* 8/4/97

Data Quality Control: *Raymond D. Dennis* 8/4/97

Certified By: *Douglas A. [Signature]* 8/5/97

NTS PRECIPITATION

August 1997

	A12	BJY	CS	DAF	DRA	E Tu	4JA	40 Mi	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3	0.03																
4	0.04	0.05				0.08						0.21					
5																	
6																	
7			0.24		T					0.01							
8	0.13	0.07	0.03		T	0.17			0.07	0.04					0.22		
9	0.02				T					0.02							
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
TOTAL	0.22	0.12	0.27	0.00	T	0.25	0.00	0.00	0.07	0.07	0.00	0.21	0.00	0.00	0.22	0.00	0.00

Area 12 Dip Stick Rain Gage Reading: 0.93 from 08/01/97 thru 09/08/97

Data Tabulated By: *B.C. Frankowski* 9/15/97

Data Quality Control: *Raymond D. Dennis* 09/15/97

Certified By: *Raymond D. Dennis* 09/15/97

NTS PRECIPITATION

September 1997

	A12	BJY	CS	DAF	DRA	E Tu	4JA	40 Mi	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCO
1	0.03		0.12		0.10	0.03	0.10		0.02	0.11	0.03			0.06	0.17		
2	0.59	0.28	0.50	0.15	0.55	0.65	0.45	0.69	0.45	0.48	0.13	0.99	0.33	0.97	0.26	0.25	0.73
3	0.47	0.34	0.36	0.25	0.73	0.32	0.14	0.17	0.18	0.69	1.20	0.03	0.33	0.24	0.17	0.40	0.23
4																	
5					0.04					0.05							
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18					0.01												
19												0.02					
20																	
21																	
22																	
23																	
24																	
25	1.20	0.74	0.92	0.73	1.03	1.07	0.53	1.18	0.98	0.97	1.07	0.74	0.79	0.87	1.00	0.65	0.78
26	0.04					0.02	0.03	0.01	0.02		0.02			0.05	0.02		0.02
27																	
28																	
29																	
30																	
31																	
TOTAL	2.33	1.34	1.90	1.13	2.46	2.09	1.25	2.05	1.65	2.30	2.45	1.78	1.45	2.19	1.62	1.30	1.77

Area 12 Dip Stick Rain Gage Reading: 1.20" from 0908/97 thru 10/02/97

Data Tabulated By: *B. C. Frankowiak* 10/3/97

Data Quality Control: *Raymond D. Danni* 10/6/97

Certified By: *Raymond D. Danni* 10/6/97

NTS PRECIPITATION

October 1997

	A12	BJY	CS	DAF	DRA	E Tu	4JA	40 MI	LF2	MER	MV	PM1	PHS	RV	TS2	W5B	UCC
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10	0.04					0.04	0.03	0.05		0.04	0.07	0.04	0.04		0.03	0.04	
11												0.10					
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
TOTAL	0.04	0.00	0.00	0.00	0.00	0.04	0.03	0.05	0.00	0.04	0.07	0.14	0.04	0.00	0.03	0.04	0.00

Area 12 Dip Stick Rain Gage Reading:

0.00" from 10/02/97 thru 11/04/97

Data Tabulated By: *B. C. Frankwick* 11/5/97

Data Quality Control: *Raymond D. Dennis* 11/5/97

Certified By: *Raymond D. Dennis* 11-5-97

CAU No. 112
Section: APPENDIX E
Revision: 0
Date: 1/28/98

APPENDIX E

BASELINE DIFFERENCE GRAPHS

CAU No. 112
Section: APPENDIX E
Revision: 0
Date: 1/28/98

BASELINE DIFFERENCE

ROW A

Mercury Hazardous Waste Trenches Baseline Difference - Tube A-1

01/22/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-1

—△— 04/30/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-1

—△— 07/08/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-1

09/26/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-1

10/21/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-1

—△— 10/14/96

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-2

—△— 10/14/96 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-2

—△— 01/23/96 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-2

—△— 04/30/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube A-2

—△— 07/14/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-2

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-2

—△— 10/21/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches **Baseline Difference - Tube A-4**

10/15/96 — Baseline (1st yr. ave.) — Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube A-4

—△— 01/27/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-4

—△— 04/30/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-4

07/07/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches **Baseline Difference - Tube A-4**

09/30/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube A-4

—△— 10/22/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

CAU No. 112
Section: APPENDIX E
Revision: 0
Date: 1/28/98

BASELINE DIFFERENCE

ROW B

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-2

—△— 10/14/96 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-2

01/27/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-2

—△— 04/30/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-2

—△— 07/08/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-2

—△— 09/29/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-2

—△— 10/23/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube B-4

10/14/96 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-4

—△— 01/27/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube B-4

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-4

—△— 07/08/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-4

—△— 09/29/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-4

—△— 10/23/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-7

10/14/96 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-7

—△— 01/23/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-7

—△— 04/30/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-7

—△— 07/09/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube B-7

09/29/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-7

—△— 10/23/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube B-10

10/14/96

Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-10

01/22/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-10

04/30/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-10

—▽— 07/09/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-10

—▽— 09/29/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-10

10/20/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-13

—△— 10/14/96 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-13

—△— 01/22/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube B-13

04/25/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-13

07/09/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-13

—△— 09/29/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-13

10/20/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-16

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-16

01/22/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-16

—△— 04/25/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-16

—△— 07/09/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-16

09/30/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-16

—△— 10/20/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-19

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-19

—△— 01/22/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches **Baseline Difference - Tube B-19**

04/25/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-19

—△— 07/07/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-19

—△— 09/26/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-19

—△— 10/20/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-22

10/09/96

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube B-22

—△— 01/22/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-22

—△— 04/25/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-22

—△— 07/07/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube B-22

—△— 09/26/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube B-22

10/20/97

Baseline (1st yr. ave.)

Residual from Baseline

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BASELINE DIFFERENCE

ROW C

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-1

10/15/96

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-1

—△— 01/20/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube C-1

04/14/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-1

—△— 07/08/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-1

—△— 09/30/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube C-1

—△— 10/21/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-3

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-3

01/20/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-3

—△— 04/14/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-3

07/08/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-3

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-3

10/22/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-6

—△— 10/16/96

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-6

—▽— 01/20/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-6

—△— 04/15/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-6

—△— 07/10/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-6

09/19/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-6

10/16/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-9

—△— 10/16/96

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-9

01/20/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-9

—△— 04/15/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-9

—△— 07/10/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube C-9

09/19/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-9

—△— 10/16/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube C-12

10/16/96 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-12

—△— 01/20/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-12

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-12

—△— 07/10/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-12

—△— 09/19/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-12

10/16/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube C-15

10/16/96 — Baseline (1st yr. ave.) — Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-15

—△— 01/20/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-15

—△— 04/15/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-15

—△— 07/10/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-15

---▽--- 09/19/97

---□--- Baseline (1st yr. ave.)

---x--- Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-15

—◇— 10/16/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube C-18

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-18

01/20/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-18

—△— 04/15/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-18

—▽— 07/10/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube C-18

09/19/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-18

10/16/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-21

10/16/96

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-21

01/20/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-21

—△— 05/01/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-21

▽ 07/10/97

□ Baseline (1st yr. ave.)

× Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube C-21

Mercury Hazardous Waste Trenches

Baseline Difference - Tube C-21

—△— 10/16/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

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BASELINE DIFFERENCE

ROW S1

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-14

10/16/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-14

—△— 09/19/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-14

—△— 07/10/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-14

—△— 04/24/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-14

—△— 01/22/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-14

10/15/96

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-11

—△— 10/22/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-11

09/19/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches **Baseline Difference - Tube S1-11**

07/10/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-11

—△— 04/24/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-11

01/22/97

Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-11

10/15/96

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-8

10/16/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-8

▽ 09/19/97

□ Baseline (1st yr. ave.)

× Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-8

—△— 07/10/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-8

—◇— 05/01/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-8

01/22/97

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-8

10/15/96

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-5

—▽— 10/16/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-5

—△— 09/19/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-5

—△— 07/10/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-5

—△— 05/01/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-5

—▽— 01/27/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-5

—△— 10/15/96

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-2

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-2

09/19/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-2

—△— 07/10/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-2

—◇— 04/24/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-2

—△— 01/27/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S1-2

10/15/96 Baseline (1st yr. ave.) Residual from Baseline

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BASELINE DIFFERENCE

ROW S2

Mercury Hazardous Waste Trenches Baseline Difference - Tube S2-14

10/21/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-14

—△— 09/26/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube S2-14

07/10/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-14

—△— 04/14/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-14

—△— 01/14/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-14

10/09/96 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-11

—△— 10/21/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-11

—△— 09/26/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-11

—△— 07/14/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-11

—△— 04/10/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-11

01/14/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-11

10/08/96 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube S2-8

10/21/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-8

—△— 09/26/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-8

—△— 07/08/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-8

—▽— 04/10/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-8

—△— 01/14/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-8

10/08/96

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-5

—△— 10/21/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-5

09/26/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube S2-5

07/08/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-5

—△— 04/09/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube S2-5

01/14/97 —□— Baseline (1st yr. ave.) —x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-5

10/07/96

Baseline (1st yr. ave.)

Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-2

—△— 10/21/97 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-2

—▽— 09/26/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-2

—△— 07/08/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches Baseline Difference - Tube S2-2

—△— 04/09/97

—□— Baseline (1st yr. ave.)

—×— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-2

01/14/97 Baseline (1st yr. ave.) Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube S2-2

—△— 10/07/96 —□— Baseline (1st yr. ave.) —×— Residual from Baseline

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BASELINE DIFFERENCE

TUBE V-1

Mercury Hazardous Waste Trenches Baseline Difference - Tube V-1

Mercury Hazardous Waste Trenches

Baseline Difference - Tube V-1

—△— 01/20/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube V-1

—△— 04/09/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube V-1

—△— 07/08/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube V-1

—△— 09/30/97

—□— Baseline (1st yr. ave.)

—x— Residual from Baseline

Mercury Hazardous Waste Trenches

Baseline Difference - Tube V-1

10/21/97 Baseline (1st yr. ave.) Residual from Baseline

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