DOE/NV/25946--953

APPLICATION FOR PERMIT TO OPERATE A CLASS II SOLID WASTE DISPOSAL SITE AT THE NEVADA TEST SITE

U10C DISPOSAL SITE

March 2010
Rev. 0

Prepared for the
U.S. National Nuclear Security Administration
Department of Energy
Nevada Site Office
by
National Security Technologies, LLC

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List of Acronyms

ACM	Asbestos-Containing Material
ACWM	Asbestos-Containing Waste Material
CCRFD	Clark County Regional Flood Control District
CFR	Code of Federal Regulations
CWMA	Controlled Waste Management Areas
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FFACO	Federal Facilities Agreement and Consent Order
NAC	Nevada Administrative Code
NDEP/BFF	Nevada Division of Environmental Protection, Bureau of Federal Facilities
NNSA/NSO	National Nuclear Security Administration Nevada Site Office
NSTec	National Security Technologies LLC
NTS	Nevada Test Site
PCB	Polychlorinated Biphenyl
RACM	Regulated Asbestos-Containing Material
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SWDS	Solid Waste Disposal Site
SWMA	Solid Waste Management Authority
TSCA	Toxic Substance Control Act
USGS	U.S. Geological Survey
WAC	Waste Acceptance Criteria
WW	Waste and Water

1.0 Applicant Information

Land Manager: (Owner)	U.S. National Nuclear Security Administration Department of Energy Nevada Site Office P.O. Box 98518 Las Vegas, NV 89193-8518
Authorized Agent:	Ken M. Small Program Manager, Resource Conservation and Recovery Act
Operator:	National Security Technologies, LLC P. O. Box 98521 Las Vegas, Nevada 89193-8521
Authorized Agent:	Stephen M. Younger President and General Manager

2.0 Facility Information

Name:	U10C Solid Waste Disposal Site
County:	Nye County
Location:	Nevada Test Site Area 9
NSO Coordinates:	266395 N - 206715 E (meters) (Based on Nevada State Plane Grid - Central Zone, North American Datum, 1983)

3.0 Policy

Nevada Test Site (NTS) solid waste disposal sites must be permitted by the state of Nevada Solid Waste Management Authority (SWMA). The SWMA for the NTS is the Nevada Division of Environmental Protection Bureau of Federal Facilities (NDEP/BFF). The U. S. Department of Energy (DOE) National Nuclear Security Administration Nevada Site Office (NNSA/NSO), as land manager (owner), and National Security Technologies (NSTec), as operator, will store, collect, process, and dispose of all solid waste by means that do not create a health hazard, public nuisance, or cause impairment of the environment. NTS disposal sites will not be included in the Nye County Solid Waste Management Plan.

4.0 Notification

Portions of this document require signatory verification by a professional engineer or a qualified groundwater scientist approved by the state of Nevada. The internal process of creating and reviewing this document by NSTec and NNSA/NSO guarantees that qualified individuals have reviewed this document and concur with its content.

Nevada Administrative Code (NAC) 444.685 exempts entities of the federal government from the financial assurance requirements outlined in the state of Nevada solid waste disposal regulations. Therefore, these requirements are not addressed in this document. This document will function as part of the operating record for the disposal site described herein.

5.0 Background Summary

The NTS is located approximately 105 km (65 mi) northwest of Las Vegas, Nevada. NNSA/NSO is the federal lands management authority for the NTS and NSTec is the Management & Operations contractor. Access on and off the NTS is tightly controlled, restricted, and guarded on a 24-hour basis. The NTS is posted with signs along its entire perimeter.

NSTec is the operator of all solid waste disposal sites on the NTS. The U10C Disposal Site is located in the northwest corner of Area 9 at the NTS (Figure 1) and is located in a subsidence crater created by two underground nuclear events, one in October 1962 and another in April 1964. The disposal site opened in 1971 for the disposal of rubbish, refuse, pathological waste, asbestos-containing material, and industrial solid waste. A Notice of Intent form to operate the disposal site as a Class II site was submitted to the state of Nevada on January 26, 1994, and was acknowledged in a letter to the DOE on February 8, 1994. It operated as a state of Nevada Class II Solid Waste Disposal Site (SWDS) until it closed on October 5, 1995, for retrofit as a Class III SWDS. The retrofit consisted of the installation of a minimum four-foot compacted soil layer to segregate the different waste types and function as a liner to inhibit leachate and water flow into the lower waste zone. Five neutron monitoring tubes were installed in this layer to monitor possible leachate production and water activity. Upon acceptance of the installed barrier and approval of an Operating Plan by NDEP/BFF, the site reopened in January 1996 as a Class III SWDS for the disposal of industrial solid waste and other inert waste.

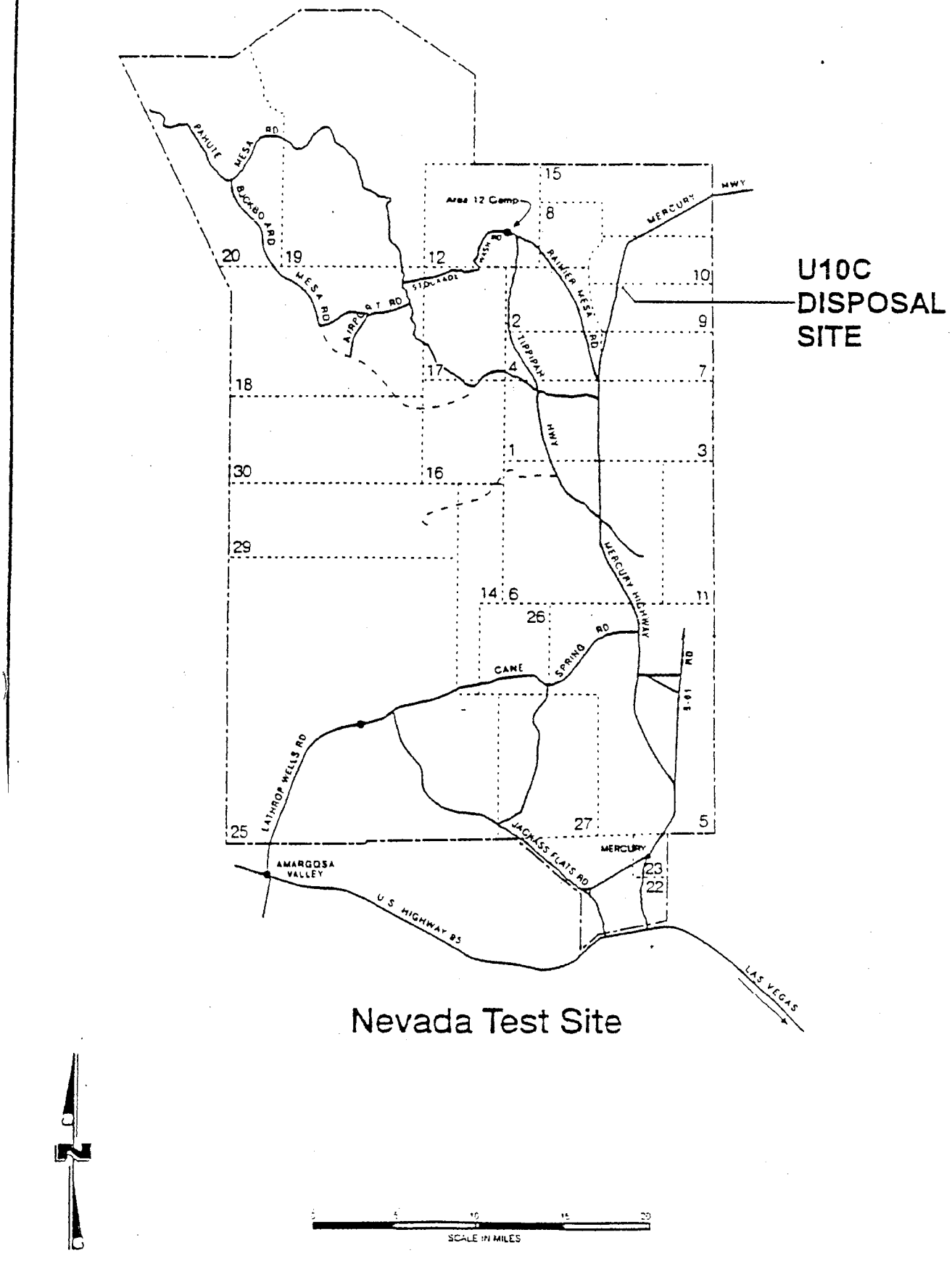


Figure 1. Location of U10C Disposal Site

6.0 Waste Characterization Plan

6.1 Summary

The site will be used for the disposal of refuse, rubbish, garbage, sewage sludge, pathological waste, Asbestos-Containing Material (ACM), industrial solid waste, hydrocarbon-burdened soil, hydrocarbon-burdened demolition and construction waste, and other inert waste (hereafter called permissible waste). Waste containing free liquids or regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA) will not be accepted for disposal at the site. Waste regulated under the Toxic Substance Control Act (TSCA), excluding Polychlorinated Biphenyl [PCB], Bulk Product Waste (see Section 6.2.5) and ACM (see Section 6.2.2.2) will not be accepted for disposal at the site.

The disposal site will be used as the sole depository of permissible waste which is:

- Generated by entities covered under the U.S. Environmental Protection Agency (EPA) Hazardous Waste Generator Identification Number for the NTS;
- Generated at sites identified in the Federal Facilities Agreement and Consent Order (FFACO);
- Sensitive records and media, including documents, vugraphs, computer disks, typewriter ribbons, magnetic tapes, etc., generated by NNSA/NSO or its contractors;
- ACM generated by NNSA/NSO or its contractors according to Section 6.2.2.2, as necessary;
- Hydrocarbon-burdened soil and solid waste from areas covered under the EPA Hazardous Waste Generator Identification Number for the NTS;
- Other waste on a case-by-case concurrence by NDEP/BFF.

The generator of permissible waste is responsible for preparing documentation related to waste acceptance criteria, waste characterization, and load verification. Waste and Water (WW) personnel are responsible for operating the disposal site and reviewing documentation to determine if the waste is acceptable.

6.2 Waste Acceptance Criteria

6.2.1 Waste Characteristics

Permissible waste shall be consistent with the following examples:

- Refuse consisting of putrescible animal and vegetable wastes, primarily from food service operations;
- Rubbish consisting of combustible and non-combustible waste from office, industrial, and food service operations;
- Pathological waste consisting of dead animal remains and dried sewage sludge;
- Non-regulated asbestos;
- Asphalt;
- Non-asbestiform insulation;

- Metal sheet, bars, rods, tubes, and castings;
- Wood;
- Rubber (not including recyclable waste tires);
- Plastic;
- Cloth;
- Paper;
- Cement and concrete;
- Various materials of geologic origin;
- Cable and wire;
- Empty containers;
- Manufactured items such as swamp coolers, furniture, rugs, carpet, electronic components, etc.;
- Construction debris;
- Demolition debris;
- Drained fuel filters (gasoline and diesel);
- Crushed non-terne plated oil filters;
- Solid fractions from sand/oil/water separators;
- Decontaminated underground or aboveground storage tanks;
- Non-friable asbestos contained in buildings, housing structures, and trailers; and
- PCB bulk product waste.

Permissible waste may contain the following types of petroleum hydrocarbons or coolants:

- Various types of jet fuel;
- Various grades of diesel fuel;
- Hydrocarbon lubricants and hydraulics;
- Mineral oil;
- Kerosene;
- Asphaltic petroleum hydrocarbon; and
- Ethylene glycol.

The disposal of hydrocarbon-burdened soil and hydrocarbon-burdened demolition and construction waste will be limited to only one truck load per day, not to exceed 50 cubic yards per week. Larger amounts will require approval from NDEP/BFF on a case-by-case basis.

6.2.2 Special Wastes

6.2.2.1 Automobiles and Military Transport Vehicles

Automobiles and military transport vehicles will be accepted for disposal. They will not be compacted but will have all fluids (fuel, crankcase oil, differential oil, power steering fluid, and radiator anti-freeze), tires, and batteries removed before disposal. Areas of the vehicles contaminated with residual fluids will not be characterized to determine the extent of hydrocarbon contamination or potential RCRA/TSCA constituents, unless knowledge indicates

that these analyses are required. To allow cover material to fill as much void space as possible, doors and hoods will be removed before covering with soil.

6.2.2.2 Regulated Asbestos-Containing Material (RACM)

RACM means:

- Friable asbestos material;
- Category I nonfriable ACM that has become friable;
- Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or
- Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by Title 40 Code of Federal Regulations (CFR) 61 Subpart M.

6.2.2.2.1 Packaging and Shipment Requirements

RACM will be wetted with a water and surfactant mixture and packaged in:

- A plastic bag which is not less than six mils thick and sealed so that it is airtight; or
- A combination of plastic bags which equal at least six mils in thickness; or
- A container made of cardboard or metal which is lined with plastic.

Each package will bear a label that conforms to the requirements identified in NAC 444.971.

The vehicle used to transport RACM will be fully enclosed or be covered so as to prevent damage to the bags or containers and prevent the release of asbestos fibers.

Each waste shipment will be accompanied by a shipping document and load verification documentation. After the RACM is disposed of in the landfill, NNSA/NSO will submit copies of the documentation to the state of Nevada.

6.2.2.2.2 Shipment Inspection and Refusal

WW personnel shall inspect each load to verify compliance with packaging and shipping requirements. The following examples are cause for refusal:

- Required paperwork not available or incomplete;
- RACM is not wetted;
- Packaging is not labeled;
- Labels do not bear the correct statement; or
- Packaging has been breached causing asbestos fibers to be released.

These discrepancies will result in all or portions of the shipment being set aside until the identified issue is resolved and corrective action taken by the generator. This may include, but is not limited to, wetting and repackaging the RACM.

6.2.2.2.3 Disposal Procedure

A separate area within the disposal site has been designated for the disposal of RACM and asbestos-containing waste material (ACWM). The following procedures will be used when handling and disposing of RACM:

- Each package or container will be handled in a manner that limits breakage;
- Vehicles that contained a package or container that leaked will be rinsed out; and
- RACM will be covered with at least 15 cm (6 in) of compacted material that does not contain asbestos within 24 hours after placement.

6.2.3 Prohibited Wastes

The following wastes are prohibited from disposal at this site:

- Hazardous waste per NAC 444.580 - see Section 6.2.4;
- Waste regulated by TSCA - see Section 6.2.5;
- Permissible waste which exceeds the criteria in Section 6.2.6;
- Waste containing "free liquid" per NAC 444.692 - see Section 6.2.7;
- Waste tires – see Section 6.2.8;
- Medical waste per NAC 444.589;

6.2.4 RCRA Constituents

Permissible waste will not be accepted for disposal if it is determined that the material is a RCRA listed constituent or displays a RCRA characteristic. Material or environmental media contaminated with gasoline must be tested using the RCRA Toxicity Characteristic Leaching Procedure for benzene and lead, as a minimum, unless process knowledge indicates the absence of these analytes. Fuel and oil filters are exempt from testing requirements after they have been drained of all liquid.

6.2.5 TSCA Constituents

Permissible waste must be tested for PCBs, unless process knowledge indicates their absence. The total concentration of PCBs must be below 50 parts per million (ppm) to be accepted for disposal. Infrequent disposal of fluorescent light ballasts, which may contain small amounts of PCBs, is not prohibited.

PCB bulk product wastes specifically identified in 40 CFR 761.62(b)(1)(i) (i.e., plastics, molded rubber parts, caulking, applied dried paint, varnishes, non-liquid building demolition debris) and which meets waste acceptance criteria are to be disposed as permissible wastes regardless of PCB concentration. Further, NDEP requires that PCB bulk product waste disposal approval be handled on a case-by-case basis.

6.2.6 Radioactive Constituents

Permissible waste submitted for disposal must meet the surface activity release requirements in Article 422 of the NSO/ORD Radiological Control Manual (May 2000), "Release to Uncontrolled Areas," and not exceed the mass concentrations in 10 CFR 30.70, Schedule A, or Table 6.1 of this document. When radionuclides not identified in this section are known or suspected to be present in permissible wastes, applicable limits will be established before waste is accepted for disposal. All limits established for radionuclides not addressed in this section will be done with the concurrence of the state of Nevada.

Table 6.1. Radiological Volumetric Limits for NTS Landfill Disposal

Radionuclide*	Mass Concentration Limits (pCi/g)
^{226}Ra, ^{232}Th, ^{237}Np, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{242}Cm, ^{244}CM	10
^{22}Na, ^{63}Ni, ^{90}Sr, ^{94}Nb, ^{99}Tc, ^{137}CS, ^{152}Eu, ^{154}Eu, ^{151}SM, ^{234}U, ^{235}U, ^{238}U, $^{**241}Pu$, ^{125}Sb, ^{147}Pm, ^{60}Co	100

* Progeny in equilibrium with their parent radionuclide have been incorporated with these limits (e.g., 137Cs, 90Sr) and do not need a sum of fractions determination.

$^{**241}Pu$ is an activation product, not a fission product. ^{226}Ra is a daughter product of ^{238}U.

Based upon process knowledge, permissible waste generated outside Controlled Areas, as defined in the NSO/ORD Radiological Control Manual (May 2000), is assumed to have no added radioactivity and does not require surface contamination surveys or radiological analysis. Permissible waste generated inside Controlled Areas shall be segregated using one or more of the following: process knowledge, surface surveys, or radiological analysis.

When a mixture of radionuclides is known or potentially present, a sum of fractions must be performed using the following equation:

$$\sum_{i=1}^{n} \frac{C_i}{VL_i} \leq 1$$

where C_i is the measured activity of radionuclide i; VL_i is the mass concentration limit for radionuclide i; and n is the number of radionuclides in the mixture.

6.2.7 Free Liquids

Waste shall not contain free liquids. If testing is required to verify the absence of free liquid, it shall be performed by Test Method 9095: Paint Liquids Filter Test, described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," EPA Publication Number SW-846. Sufficient sorbing material will be mixed with the permissible waste to ensure that free liquids do not exist before being accepted at the disposal site. The sorbing material will have similar

physical and chemical properties to dry, fine grained soil or meet the criteria established for nonbiodegradable sorbing materials found in 40 CFR 264.314, "Special requirements for bulk and containerized liquids." Coarse materials, which have poor sorbing characteristics and which may induce greater porosity in the compacted lifts, will not be used. Disposal site personnel shall inspect loads to verify the absence of free liquids. If free liquids are observed, the waste will be rejected.

6.2.8 Waste Tires

Recyclable waste tires are transported offsite to a Facility for the Management of Waste Tires. Tires that are unsuitable for recycling are disposed of in the Area 9 SWDS according to NAC 444.648.

6.3 Waste Characterization

Waste will be characterized to ensure that it meets acceptance criteria and will not create an environmental hazard or threaten the health of the general public. Waste will be characterized through process knowledge, sampling, and analysis, or a combination of these methods.

6.3.1 Process Knowledge

Generators can adequately characterize permissible waste by their familiarity and experience with the process by which the material was generated. Process knowledge relies on a waste generator's knowledge of the chemical properties of process ingredients, including concentration levels of contaminants in the ingredients at the start of the process; and how each step of the process chemically and/or physically affected the processed material by adding, removing, producing, depleting or neutralizing the contaminants in process ingredients, by-products, and/or finished products. Material Safety Data Sheets often are used as a means of identifying the process ingredients, and through the generator's knowledge of the process, the waste can be identified.

Process knowledge may also be "derived" through the repeated analyses of the same event. From repeated sampling and analyses, waste may be disposed of without further analysis.

Each generator using process knowledge will provide written documentation to the disposal site operator before disposal.

6.3.2 Sampling and Analysis

A sampling and analysis plan for all suspect permissible waste will be developed and implemented. The plan ensures that each waste can be properly characterized for RCRA analytes, PCBs, or free liquids.

6.3.3 Waste Minimization/Segregation

It is NNSA/NSO policy to use waste minimization techniques to reduce waste generation. This may be accomplished by separating waste at the point of generation or collection.

7.0 Design Report

7.1 Design Information

7.1.1 Location and Facilities

The disposal site is located at the north end of Yucca Flat in Area 9, NTS, Nye County, Nevada (see Figure 1). The site is located in a subsidence crater which was created from two underground nuclear events. The first event, U10f (also known as Santee) was detonated on October 27, 1962. The second event, U10c (also known as Tuff), was detonated on April 24, 1964. The emplacement hole for Tuff is located 170 m (559 ft) northwest of Santee. The site opened in 1971 for the permanent disposal of rubbish, refuse, pathological waste, asbestos-containing material, and industrial solid waste generated in the northern areas of the NTS. It operated as a state of Nevada Class II SDWS until it closed on October 5, 1995, for retrofit as a Class III SDWS for the disposal of industrial solid waste and other inert waste.

Figure 2 is a topographic location map indicating all features within a 0.8 km (0.5 mi) area using a contour interval of 0.7 m (2 ft). Rather than using the NAC 444.680 regulatory requirement of a 1.6 km (1.0 mi) radius, a 0.8 km (0.5 mi) radius was chosen to obtain better resolution of the site and its facilities. No other structures or changes in land use are located within a one mile radius.

Figure 3 enlarges the area surrounding the disposal site to identify the location of the borrow pit, fencing, site facilities, and the location of the monitoring tubes. Figure 4 represents the expanded borrow pit (approved by NDEP/BFF May 10, 2000). The closest inhabited structure, a trailer, is located at the entrance to the site. The facility will be staffed when in operation. Figure 5 is an As-Built drawing of the site with a typical cross section A identified. The typical cross section is shown in Figure 6.

Vehicles travel to the disposal site via permanent, paved roads constructed on the NTS. A roadway leading directly into the disposal site off the main road is approximately one-quarter mile long and consists of tightly compacted soil and gravel. A compacted dirt road winds down to the bottom of the disposal site.

Access to the interior of the site is controlled by a perimeter fence which has a locked gate to prevent unauthorized disposal of solid waste. The entrance to the disposal site is posted with a sign that clearly indicates the operator of the disposal site, the hours of operation, and wastes that are accepted for disposal. Site facilities consist of a base station (trailer) with electrical power, radio communication system, telephone, portable toilets, potable water dispensers, and a truck scale.

7.1.2 Liner System

A minimum 1.2 m (4 ft) compacted soil barrier was installed in late 1995 before opening the site for the disposal of permissible waste. A review of the construction project is provided in Appendix A. The purpose of the soil layer is to segregate the two different portions of the disposal site and inhibit leachate through the barrier, thus acting as a liner for the permissible

waste. As an indicator of the amount of water and hydrocarbon leachate entering into the soil barrier, five neutron monitoring tubes have been placed three feet into the layer. Initial neutron logging started on a monthly basis in January 1996. Annual readings will be performed thereafter to determine if water or hydrocarbon leachate has entered this barrier.

7.1.3 Methane Gas Monitoring

Based on knowledge of the physical and chemical composition of the past and currently generated waste and low annual rainfall attributing to high evapotranspiration at the disposal site, the generation and accumulation of explosive or toxic gases is considered minimal or non-existent. Therefore, gas monitoring is not considered necessary.

7.1.4 Airport Safety

The NTS has two landing strips and one airport available for use. These facilities are greater than 3 km (10,000 ft) from the disposal site and not available for public use. Therefore, they are not subject to state of Nevada municipal solid waste landfill requirements.

7.1.5 100-Year Flood Plain

A hydrologic/hydraulic assessment of the area (Appendix B) was performed using methods described in the Clark County Regional Flood Control District (CCRFCD) Manual (CCRFCD, 1990). The disposal site could be impacted by floods from the watershed (Appendix C) that covers approximately 7.7 km^2 (3 mi^2) northwest of the site. Field investigations and calculations indicate that a detention system comprised of both the natural topography west of Circle Road and the elevated road grade will provide approximately 63.7 ha-m (48 ac-ft) of storage volume. One 0.6 m (2 ft) and one 1 m (3 ft) culvert will release water under the roadway from the detention area.

A storage routing model, developed using the HEC-1 Flood Hydrograph Package (COE, 1990), indicates that storage volume for 46.5 ha-m (35 ac-ft) of water is required and that simultaneous discharge from both culverts will result in a peak discharge of 1 M3/Min (37 ft^3/sec). Flow released through the culverts will become sheetflow with peak discharge resulting in a maximum depth of 0.009 m (0.03 ft). This depth is less than the 0.3 m (1 ft) Federal Emergency Management Agency (FEMA) regulatory depth for a 100-year flood hazard zone (FEMA, 1991). Therefore, the disposal site is not within a 100-year flood hazard zone.

7.1.6 Surface Water Protection

There are no perennial bodies of surface water in the vicinity or immediately downgradient from the disposal site which require protection from potential disposal site water runoff.

7.1.7 Ground Stability

The NTS is in the southern Great Basin region of the Basin and Range Physiographic Province. The Province is characterized by a series of north-south trending mountain ranges separated by broad alluvial valleys. The higher elevations on the NTS are on Pahute Mesa, approximately 2,200 m (7,216 ft) and Rainier Mesa, 2,340 m (7,675 ft) above sea level. The lowest elevations

are in Frenchman Flat and Jackass Flat, both at approximately 910 m (3,000 ft) above sea level (ERIDA, 1977).

Yucca Flat is one of three principal valleys within the NTS. Yucca Flat is approximately 129 km (80 mi) northwest of Las Vegas. It is 31 km (19 mi) long and 16 km (10 mi) wide; elevations range from 900 to 1,400 m (3,000 to 4,600 ft) above sea level (DRI, 1988). The disposal site is in the north portion of Yucca Flat at an elevation of 1,298 m (4,261 ft) above sea level.

Three major rock units predominate at the NTS: complexly folded and faulted sedimentary rocks of the Paleozoic age, volcanic tuffs and lavas of the Tertiary age, and alluvium of late Tertiary and Quaternary age. In many places, Paleozoic sediments are overlain by volcanic tuffs and lavas. The alluvium was derived from erosion of the nearby hills composed of Tertiary and Paleozoic rocks (ERIDA, 1977).

A U.S. Geological Survey (USGS) study (Williams, 1965) provided information on the lithology of the immediate area. The 588 m (1,930 ft) lithologic log of drill hole U10C indicates that Quaternary and Tertiary alluvium exists from ground level down to approximately 479 m (1,570 ft). The makeup of this material is tuffaceous sand and gravel in varied proportions. The upper 122 m (400 ft) consists primarily of quartzite fragments, while the lower portion is predominately zeolite, quartz, and feldspar. Tertiary Timber Mountain Tuff exists below this level. The makeup of the tuff layer is primarily quartz and sanidine crystals with a 12 m (40 ft) layer of principally black vitrophyre at the 536 m (1,760 ft) to 626 m (1,800 ft) depth.

Soil testing was performed at the site in September 1994 (Appendix D). Four samples were obtained at corners around the disposal site. Test laboratory data indicates that the near surface soils primarily consist of fine; silty sand with a permeability averaging about 2.2 x 10-5 cm/sec. These soil characteristics are consistent with characteristics of the surrounding native alluvium as described by Williams (1965).

Williams (1965) described surface effects from the U10C underground test. Paved roads in the area were not damaged; however, moderate surface fractures developed in the alluvium from the 20 to 150 kiloton nuclear blast. Local compaction of the alluvium occurred in the immediate area of ground zero. Some ground cracking and vertical displacement of the Yucca Fault resulted from the blast. Given the intensity of the blast, ground stability was established which indicates that soil in the area is not susceptible to mass movement from a natural or man-made event.

7.2 Types, Quantities, and Sources of Waste

The disposal site will be used as the sole depository of permissible waste which has been identified in the Waste Characterization Plan (see Section 6.0). These wastes and environmental media will be:

- Generated by entities covered under the EPA Hazardous Waste Generator Identification Number for the NTS;
- Generated at sites identified in the FFACO;
- Sensitive records and media, including documents, vugraphs, computer disks, typewriter ribbons, magnetic tapes, etc., generated by NNSA/NSO or its contractors;

- ACM generated by NNSA/NSO or its contractors according to Section 6.2.3.2, as necessary;
- Hydrocarbon-burdened soil and solid waste from areas covered under the EPA Hazardous Waste Generator Identification Number for the NTS;
- Other waste on a case-by-case concurrence by NDEP/BFF.

Records indicate that the subsidence crater volume after the detonation of the Tuff event was approximately 1.6 million m^3 (2.1 million yd^3) (Williams, 1965). From the time the site opened in 1971 until the barrier layer was installed in 1995, approximately 0.84 million m (1.10 million yd) of waste and cover material were added to the disposal site. Construction of the barrier layer incorporated another 91,760 m^3 (120,000 yd^3) of volume, leaving approximately 676,000 m (885,000 yd^3) of landfill capacity currently available for use. Assuming the continued use of space at the same rate, a constant waste weight, and consistent use of cover material, approximately 169,000 metric tons (221,000 tons) of waste will be disposed of during the remaining site's useful lifetime. At the current rate of disposal since the site reopened in January 1996, it is estimated that the lifetime of the site is approximately 63 years. A volume study performed in December 2008 estimated that the lifetime of the site is approximately 16 years with an estimated remaining volume of 539,833 cubic yards.

7.3 Hydrogeologic Characteristics

Groundwater flowing beneath the Yucca Flat area passes through rocks that differ substantially in terms of age, composition, and water-bearing properties. In general, the hydrogeologic units under the disposal site consist of unsaturated and saturated portions of the valley-fill aquifer that overlies a series of tuff volcanic aquifer and confining units, which in turn overlie the upper clastic confining unit and regional lower carbonate aquifer. The volcanic and carbonate rocks dip westward beneath Yucca Flat and are bounded on the west by the Topgallant fault.

Four major areas of groundwater discharge occur down gradient of the NTS, including the Oasis Valley and Ash Meadows discharge areas in Nevada and the Alkali Flat and Death Valley discharge areas in California (Winograd and Thordarson, 1975). The Yucca Flat area is encompassed by the Ash Meadows subbasin. The lower carbonate aquifer is the principal aquifer in the Ash Meadow subbasin, while the valley-fill and volcanic aquifers are locally important in the Yucca Flat area. Groundwater from the Ash Meadows subbasin discharges to the surface at Ash Meadows from a line of springs about 16 km (10 mi) long. This spring line is located about 64 km (40 mi) down gradient of Yucca Flat (Winograd and Thordarson, 1975). The rate of groundwater flow through the subbasin is highly variable and estimates vary over orders of magnitude, ranging from less than 0.01 ft/day to more than 100 ft/day for the different hydrogeologic units along various flow paths (O'Neill et al, 1993).

Groundwater is withdrawn from wells located throughout the subbasin for potable and nonpotable water. Some of this water is produced from Water Well C1, which is located at the southern edge of Yucca Flat. The depth to groundwater is approximately 457 m (1,550 ft) below the land surface. This well is located approximately 26 km (16 mi) south of the site. Studies at U10C and adjoining blast sites indicate that groundwater is approximately 553 to 567 m (1,815 to 1,860 ft) below ground level in the immediate area.

7.4 Climate

The climate of the NTS is typical of a high desert basin, exhibiting low precipitation and low relative humidity. Annual precipitation in the Yucca Flat basin is generally less than 15 cm (6 in) with the majority of the annual average occurring during the winter months. (Annual rainfall in 1995 at a site approximately 7.5 km [4.7 mi] south of the site was 18 mm [0.72 in].) Typical temperatures range from -7 to 10 C (20 to 50 F) during the winter and 16 to 38 C (60 to 100 F) during the summer (RSN, 1994). Wind patterns at the NTS are influenced by the movement of major air-pressure systems, movements due to regional topography, and localized effects due to terrain (Quiring, 1968). Southerly winds predominate in the summer and northerly winds are more common in the winter. The wind direction also varies with the time of day, with southerly winds occurring during the day and northerly winds at night (ERDA, 1977). Wind speeds at the NTS are generally strong in the spring, with averages of 9 m/sec (20 mi/hr) during spring afternoons, and mild in the fall. Gusts may occur throughout the year, usually in conjunction with late summer thunderstorms.

7.5 Runon and Runoff Control

The hydrologic/hydraulic assessment, previously described in Section 7.1.5, was performed using a 100-year 6-hour flood event, which exceeds the requirements for runon protection from a 25-year flood event. The assessment indicates that the 100-year, 6-hour flood requires storage volume for 46.5 ha-m (35-ac-ft) of water. Therefore, the natural detention system, with a storage volume of 63.8 ha-m (48 acre-ft), provides sufficient storage for this event. Also, according to the CCRFCD Manual (1990), the basin will completely drain in less than 24 hours (see Appendix B).

Flow released from the detention area will become sheetflow. Existing topography will provide adequate sheetflow protection for the disposal site. The majority of the sheetflow will come from north-northwest of the site. Flow will be intercepted by an existing channel along the north side of the site, channelizing flow to the east. Sheetflow along the west side of the site will be intercepted by the borrow pit or will flow south-southeast past the disposal site.

The requirement for runoff control has not been addressed due to the location, depth, and almost full berming of the disposal site. This issue will be addressed for further consideration when it has been determined through an internal assessment that there is a need for additional control.

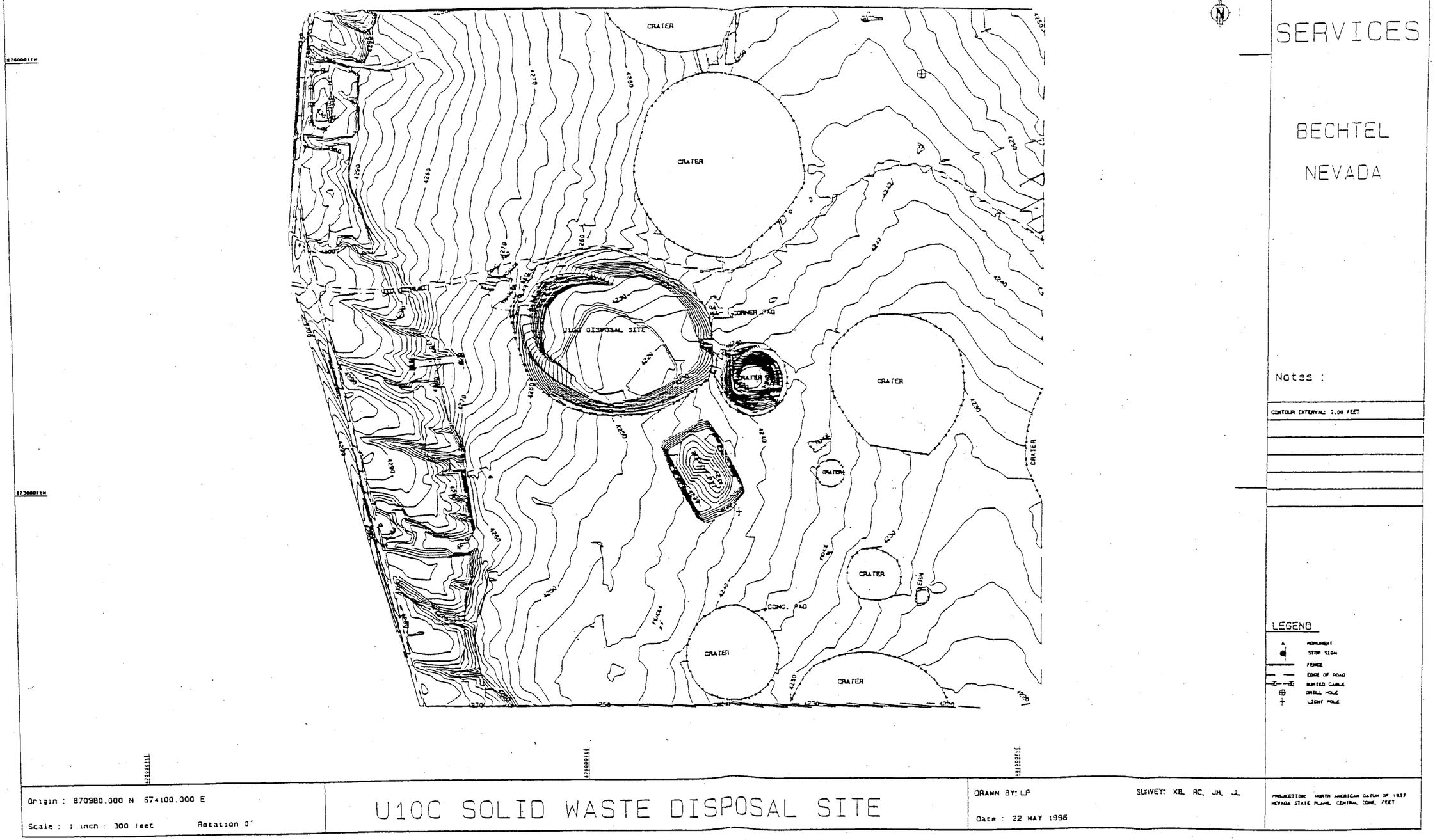


Figure 2. Disposal Site Map - ½ Mile Radius (2.0 ft contour) - May 1996

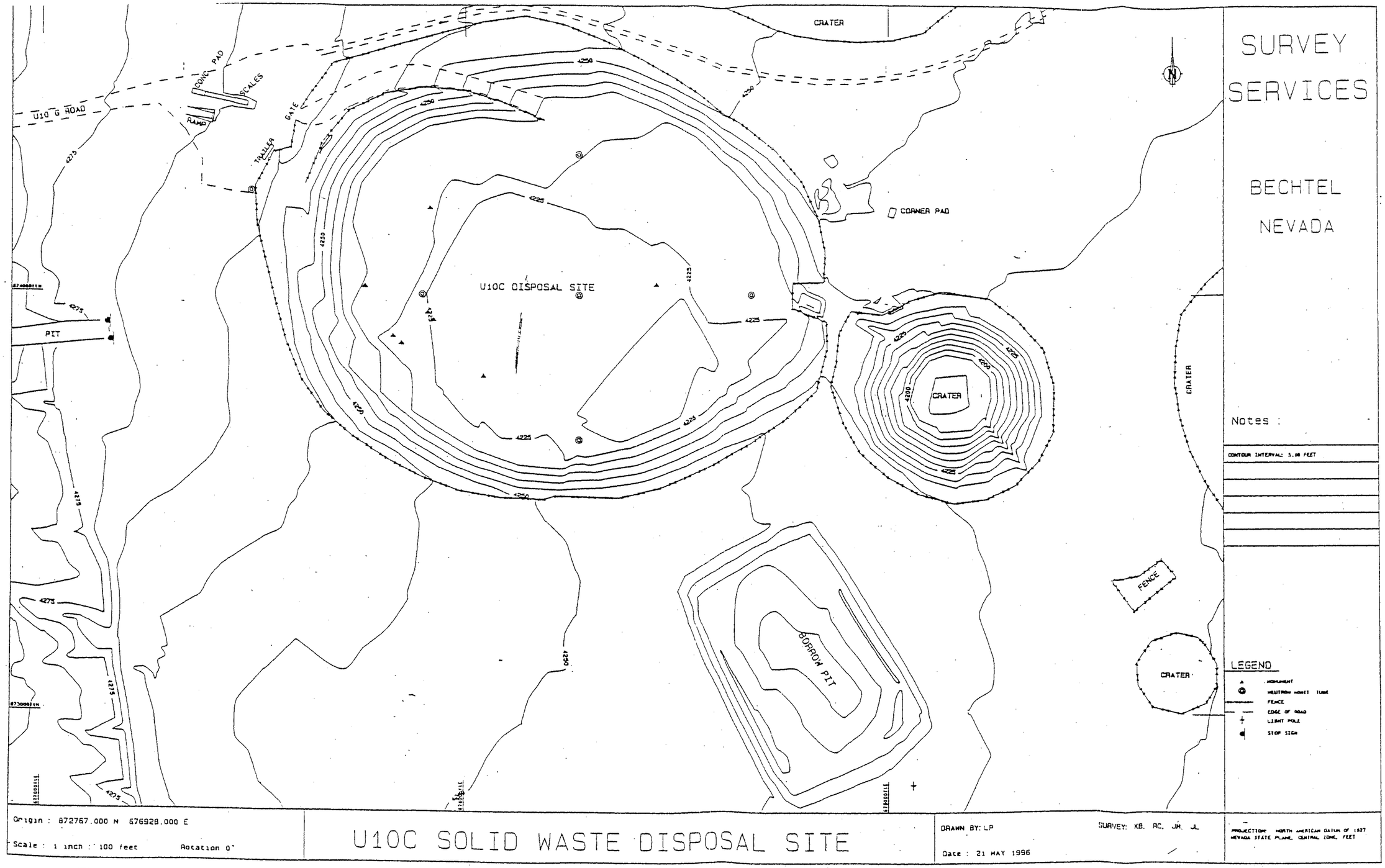


Figure 3. Current Site and Facility Map (5.0 ft contour) - May 1996

U10c CRATER
LANDFILL

10Q CRATER

HAUL ROAD
(EXIST)

N 873503.76
E 678800.60
EL 4243.35

N 873313.74
E 678876.53
EL 4248.00

N 873315.17
E 679002.98
EL 4254.34

(4235)

(4050)

(4230)

N 873139.38
E 678830.89
EL 4232.29

N 873246.55
E 679067.43
EL 4231.36

EXIST BORROW AREA

BORROW AREA
(EXIST)

BORROW AREA
EXPANSION

N 873007.47
E 679040.35
EL 4229.09

N 872957.32
E 679135.17
EL 4241.85

N 872936.99
E 678772.85
EL 4231.40

EXPANDED BORROW AREA LIMITS
APPROX 6 ACRES

N 872735.34
E 678776.12
EL 4244.97

N 872663.85
E 678713.46
EL 4248.88

N 872457.27
E 678440.92
EL 4241.46

REFERENCES

TITLE SHEET	JS-009-10o-T1
SITE PLAN	JS-009-10o-C1
SECTIONS	JS-009-10o-C2
RETENTION POND PLAN	JS-009-10o-C3
PROFILE & SECTIONS	JS-009-10o-C4
DETAILS	JS-009-10o-C5

NOTES

1. EXPANDED BORROW AREA LIMITS APPROVED BY NDEP PER TELECON. 5/8/00 FROM WOLFINBARGER. NDEP TO HOLDEN. BK. APPROVED BY DOE PER E-MAIL FROM CARTER TO HOLDEN.
2. EXPAND BORROW AREA WESTWARD FROM WESTERN FACE OF EXISTING BORROW AREA.
3. USE EXISTING HAUL ROAD.
4. DO NOT EXCEED 2:1 SLOPE ON BORROW AREA PERIMETER.

SITE PLAN
SCALE: 1" = 80'

GRAPHIC SCALE
0 40 80 160 240 FEET
1" = 80'

05/31/2000 02:47:43 PM s:\Cgm\009\file10c1.dgn

Figure 4. 10C Crater Expanded Borrow Area

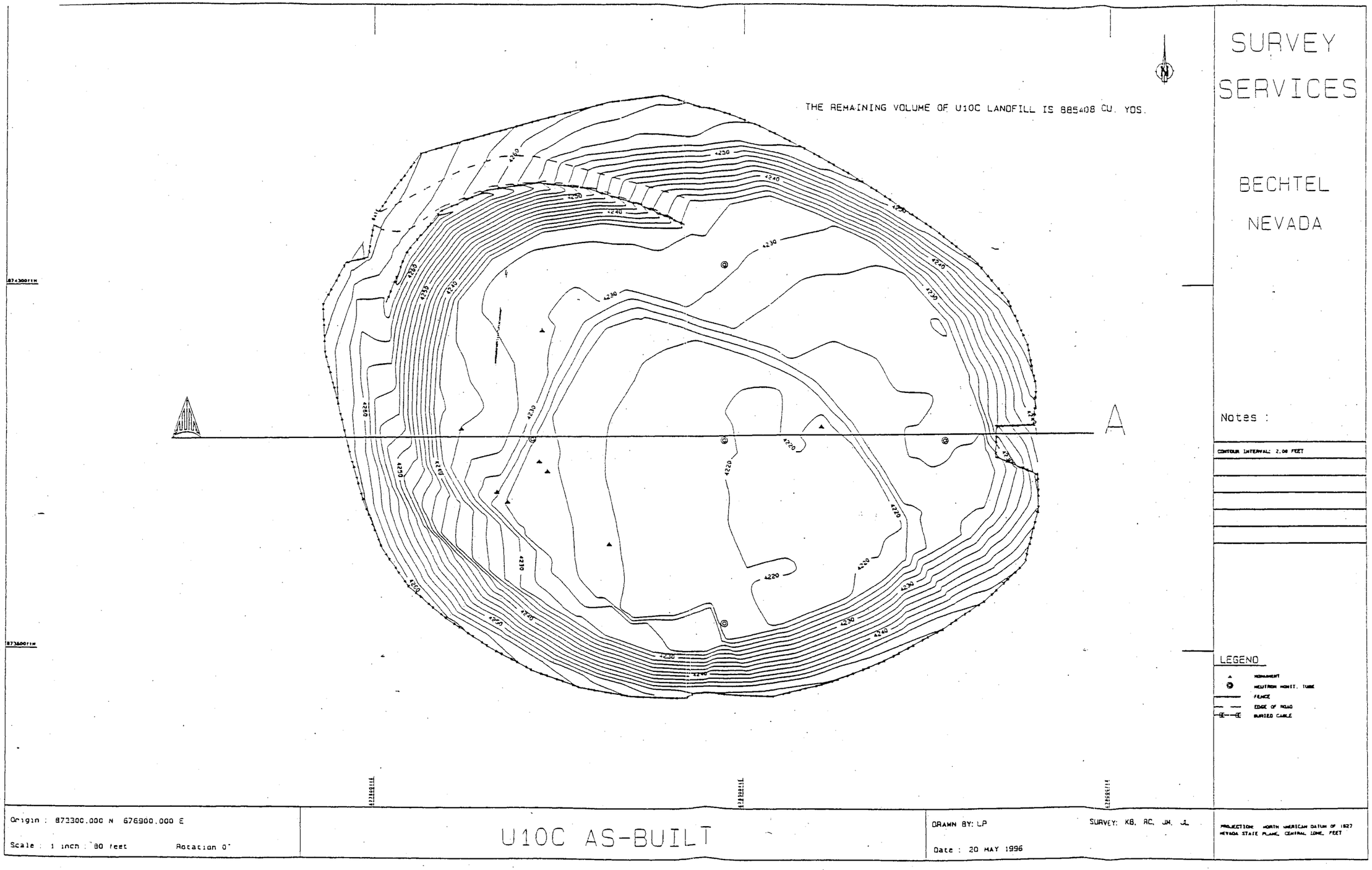


Figure 5. U10C As-Built (2.0 ft contour) - May 1996

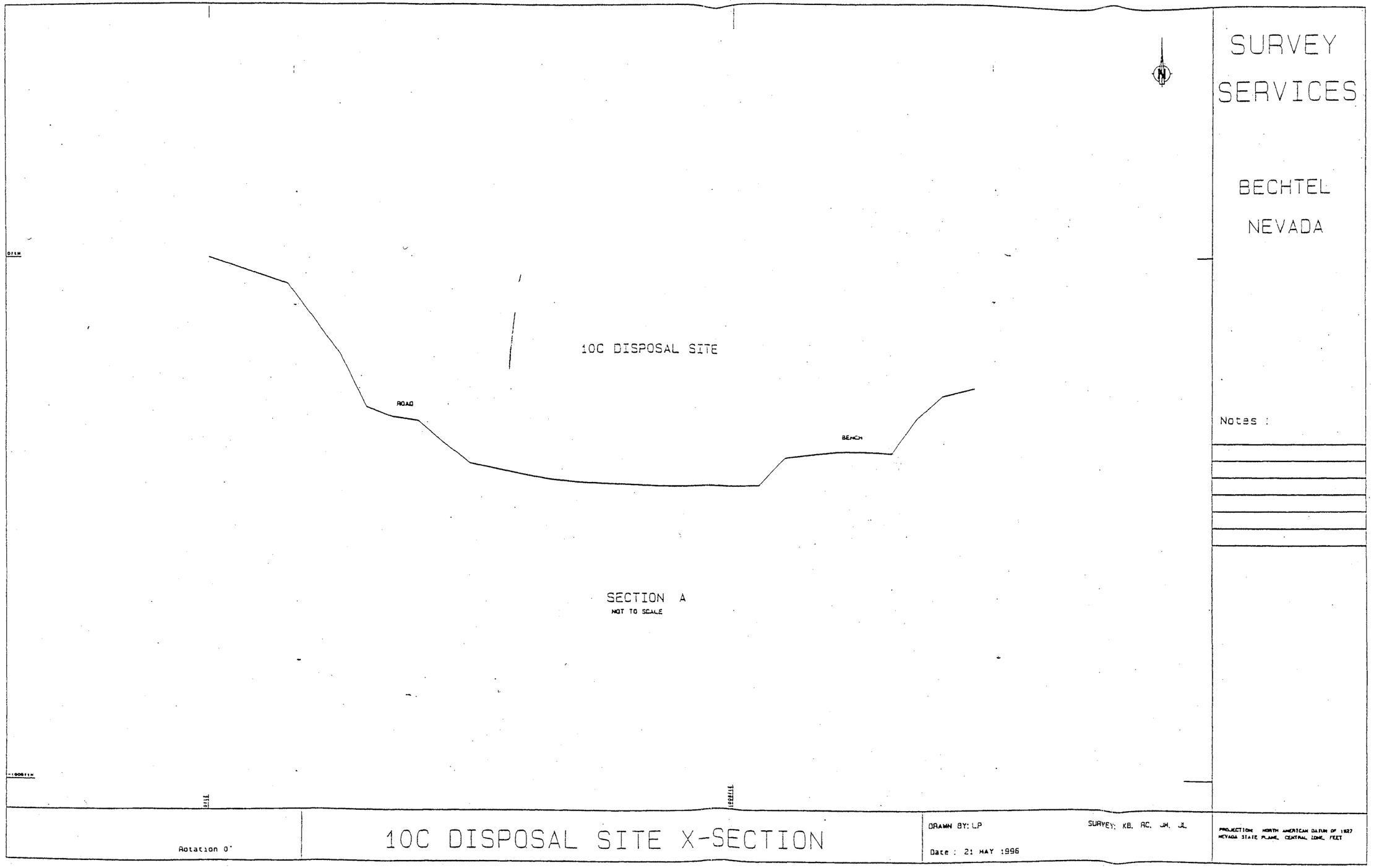


Figure 6. Cross Section Map - May 1996

8.0 Water Monitoring Plan

8.1 Groundwater Monitoring Waiver

The state of Nevada may suspend groundwater monitoring requirements if it can be demonstrated that "there is no potential for migration of pollutants and contaminants from the site to the waters of the state during the active life of the site, including the period of closure and post closure" [NAC 444.683]. This demonstration must be based on "processes affecting the fate and transport of contaminants and predictions of the fate and transportation of contaminants and a consideration, of the impacts on public health and the environment" [NAC 444.7481]. The major factors affecting leachate generation and migration into the groundwater are climate, geology and hydrogeology, water availability, and the condition of the waste before and after placement into the disposal site. Each of these factors is discussed below.

8.1.1 Climatic Factors

The climatic conditions are discussed in detail in Section 7.4. In general, the average annual precipitation is less than 15 cm (6 in) with the majority occurring during the winter months. This weather pattern is followed by mild temperatures and windy conditions in the spring. Summer weather is hot and breezy with low humidity. There are isolated periods of stormy weather late in the season. The fall is usually balmy and variably windy.

These climatic factors are a great determining factor for a large water evaporation rate. An evaporation study was performed from February 1993 to September 1993 at a site approximately 14 km (9 mi) south of the disposal site (French, 1993). Results of the study indicated that the annual precipitation for the area is 125 mm (5 in), and the estimated evaporation potential is 1,814 mm (71.4 in). One may therefore conclude that evaporation is a dominant factor influencing surface and upper vadose zone waters which will inhibit the potential for leachate generation and subsequent transport into the groundwater.

8.1.2 Geology/Hydrogeology Factors

The geology/hydrogeology characteristics of the area are discussed in detail in Sections 7.1.7 and 7.3. In general, the surface soils consist predominantly of silty sand. Moisture profiles of similar soils monitored over time at the low-level radioactive waste site in Beatty indicate that water percolates and redistributes to depths of only 2 m (6.6 ft) below the surface after an intense rainfall (Nichols, 1987). Fischer (1992) found that water potential gradients between depths of 7 and 13 m (23 to 43 ft) acted in an upward direction.

As indicated in Section 7.3, the depth to groundwater is over 549 m (1,800 ft). Although information on the working point depth of the U10C event is classified, it is likely that this nuclear event and others in the area have compromised the quality of the groundwater under this disposal site. NNSA/NSO is currently studying the effects of nuclear blasts on groundwater through its Underground Testing Area Corrective Action Work Plan. Given these studies, geology/hydrogeology factors inhibit or prevent infiltrate or leachate from reaching the groundwater.

8.1.3 Water Availability

Liquid must first be present in the landfill in order for leachate to be formed or migrate. The following site-specific characteristics inhibit leachate formation and migration:

- A relatively small amount of rain impacts the site by direct onfall and climatic conditions are favorable for evaporation to exceed infiltration (see Sections 7.4 and 8.1.1).

- Waste Acceptance Criteria (WAC) prohibits the disposal of "free liquids" (see Section 6.2.7).

- Runon does not affect the disposal site (see Section 7.5).

The presence of these natural and man-made controls greatly inhibits the formation of significant amounts of leachate which could then migrate to the groundwater.

8.1.4 Waste and Cover Conditions

The condition of the waste and cover material are factors which inhibit the formation of leachate. The following factors are relevant:

- "Free liquids" are prohibited in the disposal site (see Section 6.2.7).

- The barrier layer, which is a minimal 1.2 m (4 ft) layer of compacted native soil, possesses saturation and porosity factors which must be exceeded before leachate may migrate through the layer (see Section 7.1.2).

- Permissible waste added to the disposal site is not water saturated and sufficient unburdened soil is added as cover to assure that the total soil mass in the site is unsaturated. Due to the lack of moisture, there is no driving force for potential liquids to form leachate (see Sections 8.1.1 and 8.1.3).

Given these factors, the potential for leachate formation is considered minimal; however, a soil moisture monitoring system has been installed to detect changes in the compacted soil barrier which forms the bottom liner.

8.2 Monitoring System

The soil moisture monitoring system consists of five vertical neutron access tubes within the disposal site margins and one monitoring tube outside the perimeter of the disposal site (see Figure 2). The access tubes extend 1 m (3 ft) into the barrier layer. The compacted liner material at the bottom is necessary as a clean zone for background counts, as well as a buffer zone in the unlikely event of hydrocarbon or water transport.

Initial neutron logging took place in December 1995. Water added for dust control and compaction during construction have affected initial counts and accurate background counts will not be available until the system comes to equilibrium. Logging took place monthly during the first eight months of operation to establish a baseline. Thereafter, logging occurred

semi-annually. However, Section 8.1 of the permit application states that the monitoring frequency may be reduced. The monitoring history of the U10c Landfill demonstrates stability of site moisture content. A review of the monitoring history demonstrated that the moisture content has been satisfactorily below regulatory action levels. As a result, NDEP/BFF agreed to lower the monitoring frequency for the U10C Landfill from semi-annually to annually.

Access tubes should be inspected with a mirror for condensate before logging and any condensate should be swabbed out with absorbent material attached to a pole. The minimum logging interval is 0.3 m (1 ft).

The monitoring system is designed to detect liquid movement through the four-foot layer of compacted soil, as well as monitor changes in the industrial solid waste. Only changes within the four-foot layer of compacted soil will trigger a response to NDEP/BFF; changes within the waste will simply be monitored. Should the Action Level be reached, the NDEP/BFF will be advised and appropriate action will be determined in conjunction with NDEP/BFF.

Logging will continue annually throughout the active life of the disposal site. Continued use of the system will be addressed in the closure and post-closure plans for the site.

8.2.1 Monitoring Tube Report

A neutron soil moisture gauge will be used to monitor for changes in the soil moisture content within the 1.2-m (4-ft) interval. All data will be reported as either counts per minute or percent soil moisture content. The Action Level requiring NDEP/BFF notification will be the midpoint between the existing baseline data (representing dry conditions) and saturated conditions measured at a point approximately 0.3 m (1 ft) above the bottom of the monitoring tube. The NDEP/BFF will be notified of any Action Level reached or exceeded within 21 days of the confirmation.

A monitoring report will be sent annually to NDEP/BFF. Neutron logging of each monitoring tube will be performed in the first quarter of each calendar year. The report will be formatted into two parts:

- A short narrative discussing current results, identifiable trends, and identification of periods when free standing water is visible within the disposal area; and
- Graphical representation of rainfall and counts over time that will indicate trends.

The report will be sent to NDEP/BFF no later than the last Friday of the second quarter.

9.0 Operating Plan

9.1 Collection and Transportation

WW personnel will be responsible for the operation and maintenance of the disposal site. Collection and transportation will be the responsibility of the facility manager or generator of the permissible waste.

9.2 Personnel

One disposal site operator and a teamster are regularly assigned to the disposal site to control access during hours of operation, determine acceptance of the waste, and weigh the solid waste before the collection vehicle enters the disposal site. During abnormal circumstances, additional personnel may be required. However, under no circumstances will the disposal site have less than two workers in attendance during heavy equipment operation.

9.3 Processing In

Loads of waste may only be processed while WW personnel are working at the disposal site. Each load of industrial solid waste or special waste will be accompanied with the following paperwork:

- Signed load verification documentation which contains waste characterization information, a statement on the absence of prohibited materials, and the waste source by location;
- Radiological certification, if necessary; and
- Weight or weight estimate.

A truck scale is available at the disposal site to determine the weight of the waste. However, disposal site operators may accept weight measurements from other scales. If the truck scale at the disposal site is not functioning or it is not practicable to weigh the waste due to its size or other physical characteristics, other adequate measures can be used to determine the weight of the waste. If the truck scale is not functioning, WW personnel will correct the deficiency. Scales used are electronic and are designed and manufactured to remain in calibration; an annual calibration check is conducted.

9.4 Off-Loading

Before entering the disposal site, transporters of industrial waste will be required to have a weigh ticket or estimated weight. Disposal site operators shall designate the area of the disposal site where the transporter will off-load. Industrial waste may be offloaded either by the transporter or disposal site personnel. Disposal site operators will ensure that bulky waste larger than two feet in any axis will be arranged horizontally across the base of the disposal site to achieve the thinnest lift possible.

9.5 Daily Log

A daily log will be maintained to indicate the following:

- Each load of industrial solid waste which is disposed;
- Identification of personnel entering the disposal site;
- Routine disposal site activities such as operational/temporary cover installation, litter control, dust suppression, etc.; and
- Nonroutine events such as unforeseen circumstances (fire, medical, equipment failure, recyclable material retrieval, hazardous or toxic waste identification), rainfall indicators, and those events which cause pooling water or erosion.

9.6 Random Inspections

WW personnel will inspect one randomly selected load of waste monthly. Once the waste has been dumped onto the ground, the inspector will closely examine the load of industrial solid waste or special waste to determine if prohibited materials, identified in Section 4.1 of this Plan, are contained in the waste. Each inspection will be documented, signed by the inspector, and placed in the disposal site operating record.

If prohibited waste is identified in the disposal site by site personnel or during randomly selected inspections, the area will be cordoned off and operations in the area will be discontinued. The area will not be reopened until an investigation of the circumstances responsible for the disposal of the hazardous or toxic waste are completed and documented. This procedure does not apply to recyclable items that may be considered a hazardous waste (i.e., batteries, lead bricks, partially full aerosol cans). Recyclables must be segregated when discovered, documented in the daily log, and turned over to WW supervision for proper disposal.

NDEP/BFF, through NNSA/NSO, will be notified if prohibited wastes are discovered at the site either through random inspections or during daily operations. This notification will be made to WW supervision by the disposal site operator.

9.7 Signage/Hours of Operation

A sign is posted at the entrance to the disposal site which informs personnel of the hours of operation, prohibited materials, and an emergency contact telephone number. The site is protected from entry by a locked chain between two guard posts at the entry and a fence completely surrounding the site (see Figure 6 for locations).

9.8 Disposal Site Equipment

Many types of vehicles may be used at the NTS to collect and transport solid waste. Collection vehicles may consist of 4-cubic yard load luggers, 20-cubic yard roll-off boxes, short and long flat bed and dump bed trucks, pickup trucks, or trailers.

The equipment used at the disposal site consists of a D-8 dozer, a 4- or 8-cubic yard front end loader, a non-potable water truck, and a motor grader. Other types of equipment that may be used at the disposal site on an irregular basis include cranes, forklifts, and rollers.

9.9 Operating Records

Records and a log will be maintained by designated disposal site personnel.

The following documentation must be present with each load of permissible waste, if applicable:

- A load verification document;
- Analytical results or written documentation of process knowledge;
- Weigh ticket or estimated weight; and
- Radioactive Material Clearance.

Before acceptance, the disposal site operator will ensure that all documentation is complete, accurate, and legible. If the documentation is not acceptable, the disposal site operator will reject the waste for disposal. The disposal operator may also reject the waste, if upon a random inspection, it is determined that the waste does not conform to WAC or is falsely represented.

The amount and source of permissible waste delivered to the disposal site will be documented in the operating record. Additional documentation required as operating records are Access Records and Inspection Checklists.

9.10 Cover and Lift Control

Cover material will consist of native soil obtained from a borrow pit south of the disposal site which provided soil for the barrier layer.

9.10.1 Cells/Compaction

Waste will be spread evenly and compacted to form a lift which will not vary by more than 0.6 m (2.0 ft) along the face. The height of the lift can vary but shall not exceed 2.0 m (6.0 ft). Each lift will be covered with at least six inches of compacted earthen material. Compaction will be uniform making at least two passes with a D-8 bulldozer or an equivalent piece of equipment.

Waste, which has confined open areas (i.e., storage tanks, vehicles), will be filled with native soil or other inert material so that more than 90 percent of the original volume will remain filled when compacted. Bulky items will be covered with the major axis horizontal to minimize the lift height.

It is expected that large quantities of combustible construction and demolition debris will not be disposed in the site. Therefore, the requirements of NAC 444.652, which require cross-sectioned cells separated by compacted cover material, are not applicable.

9.10.2 Operational/Temporary Cover

Permissible waste will be covered daily, as required by NAC 444.688. The operational cover will consist of native material compacted to a layer which is at least six inches thick using a D-8 dozer or equivalent piece of equipment. It will be graded to disperse direct rainfall on the disposal site and maximize evaporation of the water. Cracks, depressions, and erosion will be promptly repaired to maintain the cover's integrity. A temporary cover, consisting of at least 30 cm (12 in) of compacted earthen material, will be placed on waste disposal areas which have not received waste for more than 90 days.

9.11 Dust Control

Water trucks containing non-potable water will be used to suppress dust on the compacted dirt roads, as necessary, and during operations involving the compaction of cover material or the production of borrow material.

9.12 Litter Control

WW personnel will remove, on a continuing basis, windblown material collected on the fence surrounding the disposal site. Scavenging and salvaging are not permitted in the disposal site.

9.13 Vector Control

Pathological waste (dead animals) and putrescible animal and vegetable waste from food service operations will be covered immediately. Pathological waste will be dispersed to the degree practical, throughout the non-putrescible waste.

The only disease that is common to the area is the hantavirus. Disposal site personnel are trained on proper management of rodent feces to include disinfection techniques and wearing proper personal protective equipment.

9.14 Fire Protection

Open burning of solid waste is prohibited by NAC 444.6675. However, fires could be initiated through malfunctioning electrical devices or disposal site equipment. Fire extinguishers are located in the base station and on disposal site equipment.

Disposal site personnel will use hand held fire extinguishers to control small fires. Where fires cannot be extinguished with small, hand held extinguishers, the NTS Fire Department will be notified by calling 911 on the telephone or using a "Mayday" signal on the NTS radio communication system. Under no circumstances will disposal site operators attempt to extinguish a large fire without instructions from the NTS Fire Department.

The fire station serving the disposal site is located in Area 6 (approximately 18 miles away) and operates 24 hours per day, seven days a week.

9.15 Methane Gas/Explosive Gas Monitoring

It is not anticipated that the waste and environmental media will generate methane gases. Based on the physical and chemical composition of the buried material and low annual rainfall at the disposal site, the generation and accumulation of explosive or toxic gases is considered minimal or non-existent. Therefore, methane gas/explosive gas monitoring is not considered necessary.

9.16 Unforeseen Circumstances

9.16.1 Medical Emergency

Emergency medical services are located in Area 6, approximately 18 miles away. This facility operates 24 hours per day, 365 days per year. Disposal site personnel may contact Medical Services by calling 911 or by using a "Mayday" signal on the NTS radio communication system. Additional emergency services are available through the Fire Department (Section 9.14).

9.16.2 Natural Events

The disposal site is protected from runon water through flood channel control and compacted soil berms. However, rainfall falling directly on the site may result in muddy conditions which require that the site be closed for a short period of time until additional native soil is added to muddy areas to provide a workable surface.

9.16.3 Equipment Failure

Equipment at the disposal site will be maintained to prevent failure. However, there may be circumstances where equipment failure may occur; and the equipment cannot be repaired in a timely manner. Backup equipment (i.e., loaders, scrapers, dozers) will be obtained from other NTS operations to provide, as a minimum, an operational cover in the interim while the equipment dedicated for the disposal site is being repaired.

9.17 Site Inspections

The disposal site will be inspected semi-monthly (twice a month). The inspection will consist of the following items:

- Erosion of the berm or walls;
- Settling of the covered material;
- Condition of fencing;
- Condition of roadway;
- Accumulation of litter; and
- Accumulation of water.

Each inspection will be noted in the log. Corrective measures will be taken as soon as possible to correct the deficiency. All corrective measures and their completion dates will be noted in the log.

Where there is an excessive accumulation of water, the approximate area and depth of the ponded water will be noted in the log.

9.18 Solid Waste Report

A solid waste report will be sent semi-annually to NDEP/BFF. The report will include the quarterly totals of weight of permissible waste received, weight of PCB bulk product waste disposed, exceptions to the WAC, and whether the waste was generated from NTS operations, or onsite/offsite FFACO operations. Each calendar year serves as the reporting period.

10.0 Closure Plan

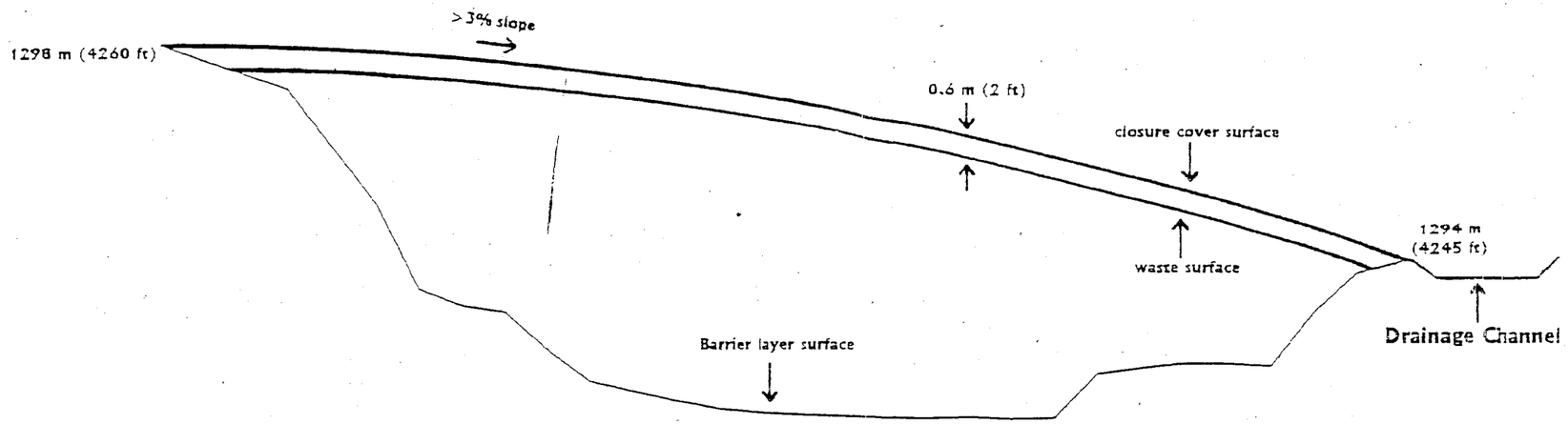
NDEP/BFF will be notified in writing of an intent to close the disposal site at least 15 days before beginning closure activities. Closure activities will commence within 30 days of written acceptance of the plan by NDEP/BFF and will be completed within 180 days after beginning the closure.

It is anticipated that the disposal site will be used until permissible waste reaches an elevation of approximately 1,298 m (4,260 ft) on the north and northwest side and 1,294 m (4,245 ft) on the south and southeast side (see Figure 7). The final design will incorporate a cap configuration which will have a slope of not less than three percent to the center and be graded along the sides to drain surface water into the borrow pit south of the disposal site. The southern and eastern edges of the closure cap will have an adequately designed drainage channel arrangement which will prohibit water from entering adjacent subsidence craters. This will prevent water from entering a potential preferential pathway to groundwater.

The cover will consist of an infiltration layer containing a minimum 0.46 m (18 in) of earthen material having a capability that is less than the permeability of the natural subsoils, but not greater than 1×10^{-5} cm/sec. Quality assurance checks will guarantee that the infiltration layer has met the specification requirements before completion of the final cover. An erosion layer, consisting of at least 15.2 cm (6 in) of native soil, will be placed on the infiltration layer. The erosion layer will be vegetated with native plants to stabilize the surface and reduce wind and water erosion.

An alternative design may be recommended at the time of closure which meets or exceeds infiltration requirements, controls erosion, maintains cover stability, and protects ground waters of the state of Nevada.

The closure plan will address all steps which will be taken to complete closure. This information will consist of a plan discussing the cover specifications, an estimate of the total volume of waste placed in the disposal site during its lifetime, decommissioning of any equipment or structures, and the installation of water, vadose zone, and/or gas monitoring devices, as required. The plan will meet all applicable regulations and will follow all relevant and appropriate regulations to the extent possible. Closure activities will commence within 30 days of written acceptance of the plan by NDEP/BFF and will be completed within 180 days after beginning the closure.



SECTION A (reference Figure 4)

NOT TO SCALE

SURVEY SERVICES

BECHTEL NEVADA

Notes :

10C DISPOSAL SITE CLOSURE COVER

Figure 7. 10C Disposal Site Closure Cover

11.0 Post-Closure Plan

The post-closure program will:

- Maintain the integrity and effectiveness of the final cover;
- Correct the effects of settlement, subsidence, erosion, or other circumstances, which may effect the integrity of the final cover
- Demonstrate at closure that any leachate is present or demonstrate that any leachate does not pose a threat to public health and safety and the environment;
- Monitor groundwater or demonstrate that any leachate does not pose a threat to public health and safety and the environment (post-closure groundwater monitoring will be contingent upon discovery of large amounts of leachate); and
- Monitor gas or to demonstrate that any potential gas generation does not pose a threat to public health and safety and the environment.

The post-closure program will be conducted for a period of 30 years. However, the land manager/operator maintains the right to request a waiver from the items listed above or request a waiver in the time period, if it can be demonstrated that a less extensive program is sufficient to protect public health and safety and the environment.

12.0 References

Clark County Regional Flood Control District, *Hydrologic Criteria and Drainage Design Manual, Las Vegas, Nevada, 1990.*

Desert Research Institute (DRI), *CERCLA Preliminary Assessment of DOE's Nevada Operations Once Nuclear Weapons Test Areas,* Las Vegas, NSO, 1988.

Energy Research and Development Administration, *Final Environmental Impact Statement, Nevada Test Site, Nye County, Nevada,* ERDA-1551, September 1977.

Federal Emergency Management Agency, *Flood Insurance Study; Guidelines and Specifications for Study Contractors,* Washington, DC (FEMA 37), 1991.

Fischer, J. M., *Sediment Properties and Water Movement Through Shallow Unsaturated Alluvium at an Arid Site for Disposal of Low-Level Radioactive Waste Near Beatty, Nevada, U.S.* Geological Survey Water Resources Investigation Report 92-4032, 1992.

French, R. H., Letter report on "FY-93 Evaporation Studies at ER 6-1 Ponds" to Stephen J. J. Lawrence, U.S. Department of Energy Environmental Restoration and Waste Management, Desert Research Institute/Water Resources Center, September 29, 1993.

Nichols, W.D., *Geohydrology of the Unsaturated Zone at the Burial Site for Low-Level Radioactive Waste Near Beatty, Nye County, Nevada, U.S.* Geological Survey Open File Report 85-198, 1987.

O'Neill, L., et al., A *Case for Resource Conservation and Recovery Act (RCRA) "No Migration" Variance and Land Disposal of Mixed Land Disposal Restrictions (LDR) Waste at the Nevada Test Site (NTS),* Proceedings of the Symposium on Waste Management, Tucson, Arizona, February 28 - March 4, 1993, pp. 1333-1346.

Raytheon Services Nevada, *[Review Draft] Flood Assessment at the Area 6 Proposed Liquid Waste Treatment System, DOE/Nevada Test Site, Nye County; Nevada,* May 1994.

Quiring, R. F., *Climatological Data, Nevada Test Site and Nuclear Rocket Development Station,* U.S. Department of Commerce, Environmental Sciences and Services Administration Report ERLTM-ARL 7, 1968.

U.S. Army Corp of Engineers, Flood Hydrograph Package (HEC-1 Computer Program Version 4.0), Davis, California, September 1990.

Williams, W. P., *Surface Effects from Underground Tests of the U10c and U9ar Sites, Yucca Flat, Nevada Test Site, U.S.* Geological Survey, Technical Letter NTS-89, May 26, 1965.

Winograd, I. J. and W. Thordarson, U.S. Geological Survey, *Hydrogeologic and Hydrochemical Framework, South-Central Great Basin, Nevada-California, with Special Reference to the Nevada Test Site, Professional* Paper 712 C, 1975.

Appendix A

U10C Class III Disposal Site Construction of a Temporary Barrier

U10c Class III Disposal Site
Construction of a Temporary Barrier

Construction Summary Report

prepared by:

Raytheon Services Nevada
December 20, 1995

U10c Class III Disposal Site Temporary Barrier Construction Summary Report

CONSTRUCTION SUMMARY

RSN, REECo and DOE assembled a team of engineers and scientists to develop plans for the construction of a compacted earthen barrier for the U10c disposal site on the Nevada Test Site (NTS). From a borrow pit located southeast of the disposal site, fill material was conveyed and compacted to at least 90% using heavy equipment. The bottom of the disposal site was elevated by four feet of earthen material. An additional one foot of earthen material was added to the middle of the disposal site which accumulates water during intense storm events. The project team has reviewed all design and construction requirements and have determined that the barrier at U10c disposal site exceeds minimum standards.

DESIGN RATIONAL

The design of the barrier is based on all water within the disposal site draining into a centralized accumulation area. The size of the barrier underneath this accumulation area would be increased by the addition of earthen material. This would increase the evaporation and transpiration performance of the barrier.

The boundary of the disposal site is approximately 28 acres with the disposal site comprising about 17 acres. The hydraulic pressure on the barrier's surface from a 25 year, 24 hour precipitation is about 3.5 inches. The project team determined that increasing the barrier thickness to five feet at the storm water accumulation area in the disposal site would be sufficient to prevent significant percolation of moisture through the waste. With the installation of six neutron monitoring wells, engineers and scientists can monitor the performance of the barrier and determine the course of corrective actions, if required. Attached are complete design drawings for the disposal site (JS-009-10c-T1, C1 and C2).

Soil samples from the borrow area were tested to have a saturated permeability of approximately 7.9E-06 centimeters per second. All rocks larger than 3" were removed. The engineering drawings required the earthen soil be spread into three inch lifts and compacted to 90%. A minimum of four foot of native material was placed over sloped areas within the disposal site which contains solid waste. The thickness of the barrier will provide the necessary erosion and hydraulic performance for this disposal site.

U10c Class III Disposal Site Temporary Barrier Construction Summary Report

SUMMARY OF CONSTRUCTION ACTIVITIES

A pre-construction meeting was held October 5, 1995. Members of the NTS project team were present. The team included personnel from REECo (construction, waste operations and field supervision), RSN (survey, inspection and project management) and DOE (engineering) departments or divisions. The design rationale, quality assurance testing (i.e., density) and project schedule were discussed so the project team could make informed decisions during the construction of the barrier.

LIFT DIMENSIONS

Native material was placed in three inch loose lifts. All material larger than three inches was removed prior to placement in the bottom of the disposal site. Non-potable water trucks were used both in the borrow pit and in the disposaL site to provide the necessary moisture for compaction and dust suppression. Heavy equipment placed additional three inch loose lifts while compacting the previous lifts using the wheel action of the scrapers, water trucks, sheep foot rollers and dozers. Additional lifts were added until a twelve inch thick compacted layer was established. The process was repeated until the disposal site achieved the desired barrier thickness (i.e., four feet).

QUALITY ASSURANCE TESTING

REECo construction personnel performed quality assurance density tests throughout construction to insure the design requirements were met. Originally, the project team required measurements to be taken every 1,000 cubic yards. After further review, the project team determined to analyze the barrier's compaction on an informal basis at nine specific locations. The nine test locations were the mid-points between the neutron access tubes in the bottom of the disposal site. See the attached "Practical Sampling Design" sketch for the testing locations and the "NTS Inspection - Daily Inspection Log's" for density test values. REECo would perform the density tests which were witnessed and documented by RSN inspection personnel. The quality assurance tests indicate that the barrier has an average density compaction of 94.3%. The quality assurance tests ranged from 90.2% to 103.4% compaction with over 40% of the tests having a density between 91% and 92%.

U10c Class III Disposal Site Temporary Barrier Construction Summary Report

SURVEY

In order to document the entire construction activity at U10c disposal site, surveys were completed before and after construction. See the attached "10c Pre-Construction Topo" and "Final 10c Topo" drawings. A comparison of these two drawings shows that a four foot barrier was constructed with five foot of compacted native material underneath the intense storm events accumulation area.

FIRST FILL OPERATION

During the initial survey of the disposal site, the project team met to review all construction activities. The project team agreed that the bottom of the disposal site would be brought up to an elevation of 4,220 feet using the native material. Four foot of compacted material would be placed over sloped areas in the disposal site. The project team laid out the necessary grade staking indicators based on the results of the survey. Equipment and personnel were mobilized beginning on October 16, 1995. Construction of the barrier began on October 18, 1995. By November 2, 1995, over 100,000 cubic yards of native material was placed in the bottom of the disposal site. The survey results indicated the four foot barrier was constructed (elevation 4,220). Construction activities were suspended until the survey of the disposal site was completed (1st progress survey).

SECOND FILL OPERATION

The first progress survey showed that all of the first goals had been met, but the gently sloping area in the west side of the disposal site had insufficient cover material. The project team agreed that the area between elevation 4220 feet on the east and 4225 feet on the west would be filled using native material. The project team laid out the necessary grade staking indicators based upon the first progress survey. Construction began on November 20, 1995 and by November 23, 1995, over 11,000 cubic yards of native soil was placed in the deficient area. Construction activities were again suspended until a survey of the disposal site was completed (2nd progress survey).

U10c Class III Disposal Site Temporary Barrier Construction Summary Report

THIRD FILL OPERATION

The second progress survey showed that the requirements outlined in the construction drawings were achieved. After final review, the project team determined that the best management practice for the disposal site would be to add additional soil to the southwest corner where the disposal site access road enters the bottom of the disposal site. Survey crews laid out the remaining stakes used for grading. By November 28, 1995, an additional 2,000 cubic yards of native soil was added to the southwest corner of the disposal site. The post construction survey was initiated and completed. The project team reviewed the before and after survey drawings. The project team agreed that all requirements in the engineering drawings were met or exceeded and the disposal site has a four foot compacted soil barrier.

NEUTRON ACCESS TUBE INSTALLATION

By December 14, 1995, five neutron access tubes were placed in the compacted earthen barrier. One additional access tube was placed outside of the disposal unit boundary to monitor moisture through undisturbed land. The tubes are made out of 3/4 inch stainless steel and will be protected from equipment damage by a 3 1/2 inch diameter schedule 40 aluminum alloy pipe mounted within a 4 foot diameter cylindrical concrete pipe.

CONCLUSIONS

In the construction of an earthen soil barrier for the U10c disposal site, all engineering parameters were met. These parameters include:

* a four foot barrier;
* removal of rocks with a size of three inches or larger;
* native soil in lifts less than eight inches thick;
* 90% compaction and
* installation of neutron access tubes.

ORIGINAL

PAGE 1 OF 1

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 01

PROJECT : 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR-007 / ***

CONTRACTOR : REECo

DATE : oct- 18-1995 WED.

CONTRACT: W.O. #4074-108

WEATHER: CLEAR

INSPECTOR (S) : Kirk Powell/Laurel Hughes

TEMPERATURE LOW 58 HIGH 83

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbein

LABOR FORCE

OPRS: 7 CRPN: ____ IRWN: ____ WRMN: ____ MASN: ____ SHMT: ____ TMRS: ____

SURV: 1 LABR: ____ LNMN: ____ PNTR: ____ INSUL: ____ FTTRS: ____

[X] ACTIVITY [ ] NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

__/__/__ THRU __/__/__

THE CONTRACTOR HAS PLACED 12" OF COMPACTED MATERIAL AND PERFORMED DENSITY TESTS AT THE FOLLOWING LOCATIONS SET BY RSN SURVEY

POINT #2 = 92.3 #3 = 91.0 #5 = 90.9

REFERENCE = JS-009-10C-C1

NOTE = THE CONTRACTOR IS PLACING FILL MATERIAL IN 3" TO 5" LOOSE LIFTS AND COMPACTING THEM AS THEY GO. DENSITY TESTS ARE PERFORMED ON COMPACTED 1' LIFT. THIS COULD BE A DEFICIENCY PROBLEM

NO OTHER WORK WAS OBSERVED

DOE PE: E. Hanson

ORIGINAL

PAGE 1 OF 1

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 02

PROJECT: 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR807 / ***

CONTRACTOR: REECo

DATE: OCT 19, 1995

CONTRACT: W.O. #4074-108

WEATHER: CLEAR

INSPECTOR (S): Kirk Powell/Laurel Hughes

TEMPERATURE LOW 58 HIGH 83

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbein

LABOR FORCE

OPRS: 7 CRPN: ____ IRWN: ____ WRMN: ____ MASN: ____ SHMT: ____ TMRS: ____

SURV: 1 LABR: ____ LNMN: ____ PNTR: ____ INSUL: ____ FTTRS: ____

■ ACTIVITY ☐ NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

__/__/__ THRU __/__/__

THE CONTRACTOR CONTINUES TO PLACE 3" LOOSE" LOOSE LIFTS AND COMPACT THEM AFTER EACH LIFT. DENSITY TESTS WERE TAKEN ON THE SECOND FOOT LIFT AT THE FOLLOWING LOCATIONS. POINT #2 97.4

#3 101.0

#4 97.2

#5 92.9

REFERENCE: JS-009-10C-C1

DOE PE: E. Hanson

PAGE 1 OF 1

ORIGINAL

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 03

PROJECT: 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR507 / *** *

CONTRACTOR: REECo

DATE: Oct. 23. 1995 Monday

CONTRACT: W.O. #4074-108

WEATHER: C/Clear

INSPECTOR (S): Kirk Powell/Laurel Hughes

TEMPERATURE LOW 46 HIGH 69

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbein

LABOR FORCE

OPRS: 7 CRPN: ____ IRWN: ____ WRMN: ____ MASN: ____ SHMT: ____ TMRS: ____

SURV: 1 LABR: ____ LNMN: ____ PNTR: ____ INSUL: ____ FTTRS: ____

☑ ACTIVITY ☐ NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

__/__/__ THRU __/__/__

THE CONTRACTOR CONTINUES TO PLACE 3" TO 5" loose LIFTS AND COMPACT AS THEY GO.

DENSITY TESTS WERE PERFORMED AT THE FOLLOWING LOCATIONS = #2 = 103.4 #3 = 96.6 #4 = 90.2 #5 = 101.7 #8 = 90.6

REFERENCE = JS-009-10C-C1

NO OTHER WORK WAS PERFORMED OR OBSERVED

DOE PE: E. Hanson

ORIGINAL

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 04

PROJECT: 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR 807 / * * *

CONTRACTOR: REECo

DATE: 10-25-95 WED

CONTRACT: W.O. #4074-108

WEATHER: clear

INSPECTOR (S): Kirk Powell/Laurel Hughes

TEMPERATURE LOW 46 HIGH 64

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbein

LABOR FORCE

OPRS: 7 CRPN: ____ IRWN: ____ WRMN: ____ MASN: ____ SHMT: ____ TMRS: ____

SURV: 1 LABR: ____ LNMN: ____ PNTR: ____ INSUL: ____ FTTRS: ____

[X] ACTIVITY [ ] NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

__/__/__ THRU __/__/__

THE CONTRACTOR HAS PLACED 3" TO 5" OF Loose Fill AND COMPACTED AS THEY GO, DENSITY Tests ARE PERFORMED ON 12" OF COMPACTED MATERIAL. DENSITY TESTS WERE PERFORMED ON the Following

Point #2 102.2

" 3 95.4

" 4 100.5

" 5 100.2

" 8 97

REFERENCE = JS-009-10C-C/ RVC = 96-002

NO OTHER WORK WAS PERFORMED - OR OBSERVED

DOE PE: E. Hanson

ORIGINAL

PAGE 1 OF 1

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 05

PROJECT: 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR-807/***

CONTRACTOR: REECo

DATE: OCT 26-95 · THURSDAY

CONTRACT: W.O. #4074-108

WEATHER: Clear

INSPECTOR (S): Kirk Powell/Laurel Hughes

TEMPERATURE LOW 45 HIGH 71

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbein

LABOR FORCE

OPRS: 7 CRPN: ____ IRWN: ____ WRMN: ____ MASN: ____ SHMT: ____ TMRS: ____

SURV: 1 LABR: ____ LNMN: ____ PNTR: ____ INSUL: ____ FTTRS: ____

☒ ACTIVITY ☐ NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

____/____/____ THRU ____/____/____

THE CONTRACTOR PERFORMED DENSITY TESTS ON THE NEXT 12" LIFT OF COMPACTED MATERIAL. TESTS WERE PERFORMED ON THE FOLLOWING POINTS:

#1 = 92.1

#6 = 97.0

#7 = 97.2

REFERENCE = JS-009-10C-1C RVC-96-002

NO OTHER WORK WAS PERFORMED OR OBSERVED

DOE PE: E. Hanson

ORIGINAL

PAGE 1 OF 1

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 06

PROJECT: 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR-807 / ***

CONTRACTOR: REECo

DATE: Oct. 31 TUESDAY ~~Oct. 26, 1995 THURSDAY~~

CONTRACT: W.O. #4074-108

WEATHER: Clear

INSPECTOR (S): Kirk Powell/Laurel Hughes

TEMPERATURE LOW 48 HIGH 70

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbein

LABOR FORCE

OPRS: 7 CRPN: ____ IRWN: ____ WRMN: ____ MASN: ____ SHMT: ____ TMRS: ____

SURV: 1 LABR: ____ LNMN: ____ PNTR: ____ INSUL: ____ FTTRS: ____

[X] ACTIVITY [ ] NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

__/__/__ THRU __/__/__

THE CONTRACTOR HAS PLACED 12" OF COMPACTED MATERIAL AND DENSITY TESTS HAVE BEEN PERFORMED ON THIS LIFT AT THE FOLLOWING LOCATIONS.

Point #1. = 91.3

#6. 98.7

#7. 91.9

#9 91.3

REFERENCE= JS-009-10C-C1, RVC. 96-002

NO OTHER WORK WAS PERFORMED OR OBSERVED

DOE PE: E. Hanson

ORIGINAL

PAGE 1 OF 1

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 07

PROJECT: 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR-807/***

CONTRACTOR: REECo

DATE: NOV. 2 1995. THURSDAY

CONTRACT: W.O. #4074-108

WEATHER: CLEAR

INSPECTOR (S): Kirk Powell/Laurel Hughes

TEMPERATURE LOW 46 HIGH 64

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbein

LABOR FORCE

OPRS: 7 CRPN: ____ IRWN: ____ WRMN: ____ MASN: ____ SHMT: ____ TMRS: ____

SURV: 1 LABR: ____ LNMN: ____ PNTR: ____ INSUL: ____ FTTRS: ____

☑ ACTIVITY ☐ NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

__/__/__ THRU __/__/__

THE CONTRACTOR CONTINUES TO PLACE LOOSE FILL MATERIAL AND COMPACT IT UNTIL THERE IS 12" OF COMPACTED MATERIAL. TESTS HAVE BEEN PERFORMED AT EACH 12" LIFT, THE FOLLOWING TEST WERE TAKEN TODAY AT #1, 91.0 #6, 95.4 #7 92.5.

TOTAL TEST TAKEN AT EACH SET POINT AS OF 11-2-95

AR #1 = 3 #5 = 4

#2 = 4 #6 = 3

#3 = 4 #7 = 3

#4 = 3 #8 = 2

REFERENCE JS-009-10C-01 #9 = 1

RVC-96-002

NO OTHER ACTIVITY WAS OBSERVED.

DOE PE: E. Hanson

ORIGINAL

PAGE 1 OF 1

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 08

PROJECT: 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR-807/***

CONTRACTOR: REECo

DATE: 11-7-95 TUESDAY

CONTRACT: W.O. #4074-108

WEATHER: Clear

INSPECTOR (S): Kirk Powell/Laurel Hughes

TEMPERATURE LOW 27 HIGH 68

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbein

LABOR FORCE

OPRS: 7 CRPN: ____ IRWN: ____ WRMN: ____ MASN: ____ SHMT: ____ TMRS: ____

SURV: 1 LABR: ____ LNMN: ____ PNTR: ____ INSUL: ____ FTTRS: ____

☒ ACTIVITY ☐ NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

__/__/__ THRU __/__/__

THE CONTRACTOR HAS COMPLETED PLACING FILL MATERIAL IN THE CLASS II DISPOSAL SITE OF 10C CRATER. THE BARRIER IS AT THE PROPER DEPTH IN ACCORDANCE WITH JS-009-10C-C/ AND THE FINAL DENSITY TESTS WERE PERFORMED AT THE FOLLOWING LOCATIONS

POINT # 1 = 90.4 #7 = 93.2

#6 = 91.2 #9 = 90.6

OTHER DENSITY TESTS WERE TAKEN IN AREAS NOT DESIGNATED FOR INFORMATION ONLY, ALL HAD 90% OR BETTER READINGS

REFERENCE = JS-009-10C-C/: RVC-96-002

NO OTHER WORK ACTIVITY WAS OBSERVED

DOE PE: E. Hanson

PAGE 1 OF 1

ORIGINAL

NTS INSPECTION - DAILY INSPECTION LOG
NEVADA TEST SITE

REPORT NO.: 09

PROJECT : 10C Crater Class II Disposal Site Temp. Barrier

PA/I.P. NO's.: NVR-807/IP-00170

CONTRACTOR : REECo

DATE : 11-22-95 WED

CONTRACT: W.O. #4074-108

WEATHER: clear

INSPECTOR (S) : Laurel Hughes

TEMPERATURE LOW _____ HIGH _____

SUPERVISION

CONTR/SUBCONTR.SUPT.: D. Finney

RSN PROJECT ENGINEER: R. Ziegenbien

LABOR FORCE

OPRS: 5 CRPN: _____ IRWN: _____ WRMN: _____ MASN: _____ SHMT: _____ TMRS: _____

SURV: _____ LABR: _____ LNMN: _____ PNTR: _____ INSUL: _____ FTTRS: _____

☒ ACTIVITY ☐ NO ACTIVITY REPORTED DURING THE FOLLOWING PERIOD:

__/__/__ THRU __/__/__

THE CONTRACTOR HAS PLACED ADDITIONAL FILL MATERIAL IN 10 C CRATER DISPOSAL SITE AND COMPACTED IT. DENSITY TEST WERE TAKEN ON EACH 12" OF COMPACTED MATERIAL. THE FOLLOWING TEST WERE TAKEN IN THE MORNING #9. 91.6, #8 90.7 #7 90.5 #6. 91.4. THE FOLLOWING WAS TAKEN IN THE AFTERNOON #9. 92.5 #8. 92.4 #7 92.4, #6 94.0 #5 92.3

NO OTHER ACTIVITY WAS OBSERVED.

DOE PE: E. Hanson

UNITED STATES DEPARTMENT OF ENERGY

NEVADA OPERATIONS OFFICE

LAS VEGAS, NEVADA

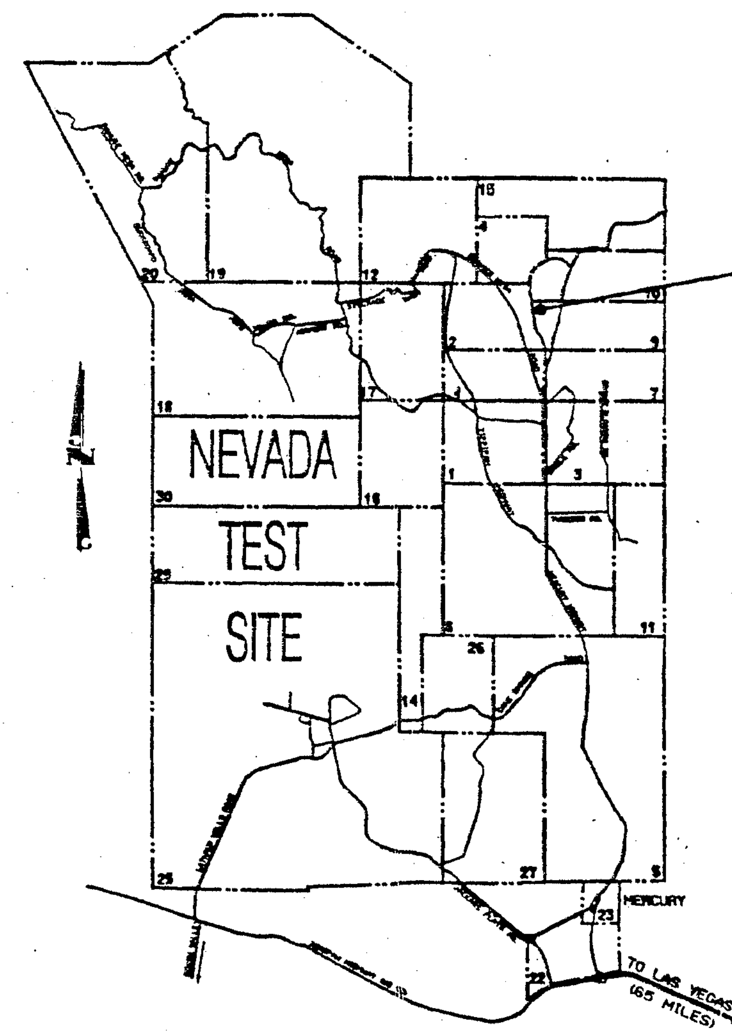
10c CRATER

CLASS II DISPOSAL SITE TEMPORARY BARRIER

AREA 9

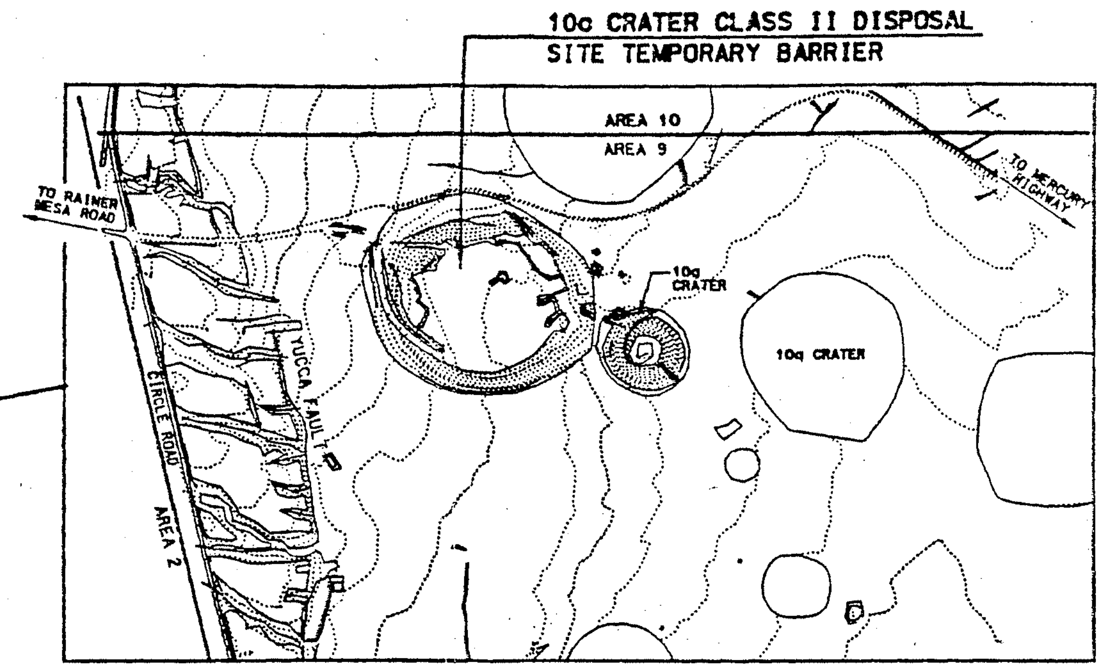
INDEX

DRAWING NUMBER	DRAWING TITLE	STANDARD NUMBER	DESCRIPTION
TITLE			
JS-009-10c-T1	TITLE SHEET	STD T1 SH 1 STD T2 SH 1	STANDARDS INDEX GENERAL NOTES, DRAFTING SYMBOLS & ANSI STANDARDS
CIVIL			
JS-009-10c-C1	SITE PLAN	STD C100 SH 1	NOTES, LEGEND & SYMBOLS
JS-009-10c-C2	SECTIONS	STD C101 SH 1	ABBREVIATIONS



LOCATION MAP

NOT TO SCALE



VICINITY MAP

NOT TO SCALE

SCOPE OF WORK

CONSTRUCTION OF A TEMPORARY NATIVE MATERIAL COVER AND NEUTRON TUBE MONITORING WELLS. ONCE COMPLETED AND ACCEPTED BY THE STATE THIS COVER WILL SERVE AS A STABLE BASE FOR DISPOSAL OF CLASS III WASTE. THE MONITORING WELLS WILL BE USED TO DEMONSTRATE THAT THERE IS NO SIGNIFICANT INFILTRATION INTO THE CLASS II WASTE PORTION OF THE DISPOSAL SITE.

PROJECT NOTES

ALL CONSTRUCTION FEATURES, MATERIALS, TESTS AND DETAILS SHALL CONFORM TO "USDOE/NV STANDARD SPECIFICATIONS, DATED DECEMBER 1994". FOR STANDARDS REFERENCED ON THIS PROJECT, SEE THE RSN DESIGN DRAWING STANDARDS.

PRIOR TO COMMENCING CONSTRUCTION ACTIVITY, THE AREA IS TO BE EVALUATED FOR RESIDUAL SOIL CONTAMINATION BY REECO HEALTH PROTECTION DEPARTMENT. NO CONSTRUCTION ACTIVITY SHALL BEGIN PRIOR TO THE RECEIPT OF APPROVAL BY REECO HEALTH PROTECTION DEPARTMENT. NO CONSTRUCTION ACTIVITY SHALL BEGIN PRIOR TO COMPLETION OF ALL APPLICABLE ENVIRONMENTAL SURVEYS AND PERMITS LISTED ON THE ENVIRONMENTAL PERMIT CHECKLIST.

METRIC NOTE

ALL DESIGN DIMENSIONS ARE SHOWN ENGLISH AND METRIC. NOMINAL CUSTOMARY ENGLISH CALLOUTS ARE MAINTAINED. METRIC CALLOUTS ARE USED WHERE NO ENGLISH CALLOUT EXISTS OR WHERE VENDOR SUPPLIED ITEMS ARE METRIC BY DESIGN.

CONSTRUCTION QUALITY CONTROL

CONTRACTOR SHALL PERFORM CONSTRUCTION SURVEYS BEFORE AND AFTER PLACEMENT OF EARTHEN BARRIER TO RELIABLY DOCUMENT ACTUAL THICKNESS OF PLACED FILL.

COMPACTION TESTING SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 02223 OF THE REFERENCED SPECIFICATIONS. THE NUMBER OF TESTS SHALL BE AS AGREED UPON BETWEEN THE CONTRACTOR, THE ENGINEER, AND THE [illegible]

SIEVE ANALYSES OF THE EARTHEN BARRIER SHALL BE PERFORMED IN ACCORDANCE WITH ASTM C136 IN SUFFICIENT NUMBERS TO PROVIDE A RELIABLE BASIS FOR CHARACTERIZING CONSISTENCY OF MATERIAL. THE NUMBER OF ANALYSES SHALL BE AS AGREED UPON BETWEEN THE CONTRACTOR, THE ENGINEER, AND THE DOE.

Prepared By

RSN Raytheon Services Nevada

DUAL ENGLISH/METRIC DRAWING

NO.	DATE	REVISIONS	BY / CK	SUP / DA	PE / ENV	USR / AE	DOE

U.S. DEPARTMENT OF ENERGY

NEVADA OPERATIONS OFFICE — LAS VEGAS, NEVADA

NEVADA TEST SITE ——— AREA 9

10c CRATER

CLASS II DISPOSAL SITE TEMPORARY BARRIER

TITLE SHEET

SUBMITTED: [signature] RAYTHEON SERVICES NEVADA — USER: [signature]

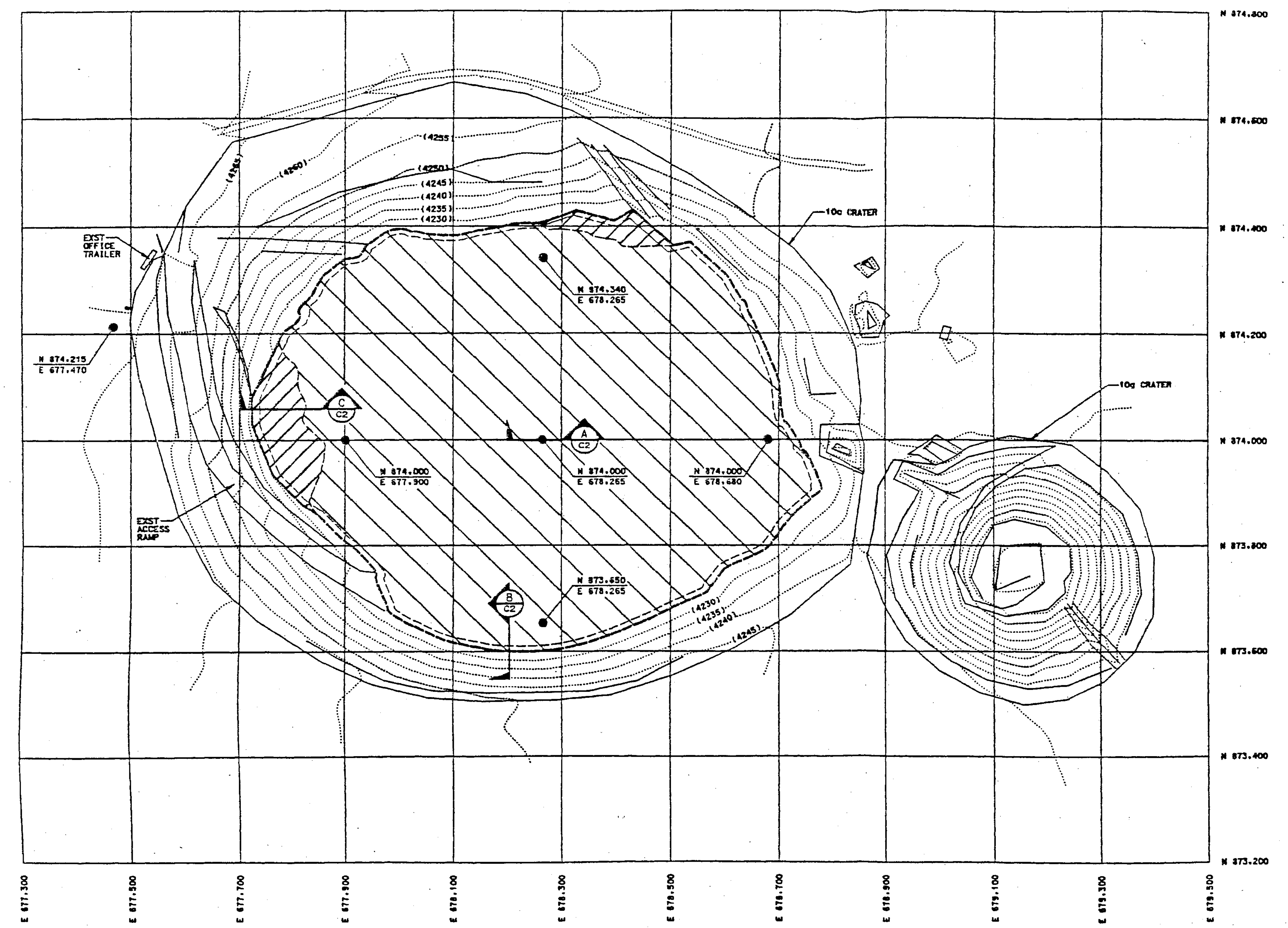
APPROVAL BLOCK — DEPT. OF ENERGY APPROVAL: [signature] — DATE: 1/5/95 — PROJECT ENGINEER

Raytheon Services Nevada, 1551 HILLSHIRE DRIVE, LAS VEGAS, NEVADA 89134

P. A. NO. 95-243 — J. O. NO. 72432-2000 — PROJ. NO. 9401.A10

DRAWING NUMBER: JS-009-10c-T1

SHEET ____ OF ____ — REVISION: 0A



SITE PLAN

SCALE : 1" = 100'

GRAPHIC SCALE

0 50 100 200 300 FEET

1" = 100'

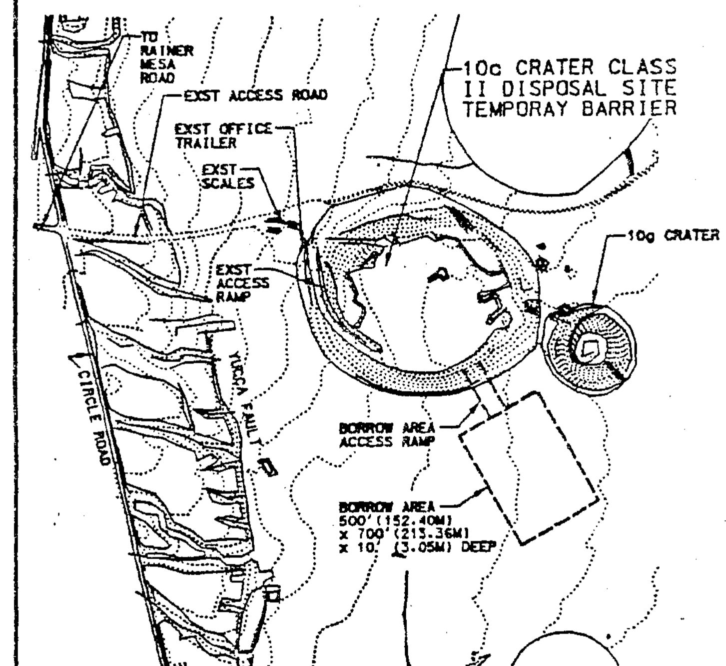
DUAL ENGLISH/METRIC DRAWING

ALL METRIC DIMENSIONS AND NOTATIONS ARE SHOWN BELOW THE DIMENSION LINE OR IN PARENTHESIS.

WHOLE NUMBERS INDICATE MILLIMETERS
DECIMAL NUMBERS SHOWN TO TWO (2) PLACES INDICATE METERS
DECIMAL NUMBERS SHOWN TO THREE (3) PLACES INDICATE KILOMETERS

LEGEND

- EXTENT OF EXISTING CLASS II WASTE AREA (APPROXIMATELY 12.9 ACRES)
- NEW EARTHEN BARRIER – LEVEL AREA (APPROXIMATELY 13.5 ACRES)
- NEW EARTHEN BARRIER – SLOPING AREA (APPROXIMATELY 0.75 ACRES)
- NEUTRON ACCESS TUBE (6 REQUIRED)



BORROW AREA SITE PLAN

NOT TO SCALE

REFERENCES

TITLE SHEET	JS-009-10c-T1

NO.	DATE	REVISIONS	BY / CK	SAF / QA	PE / ENV	USA / AE	DOE

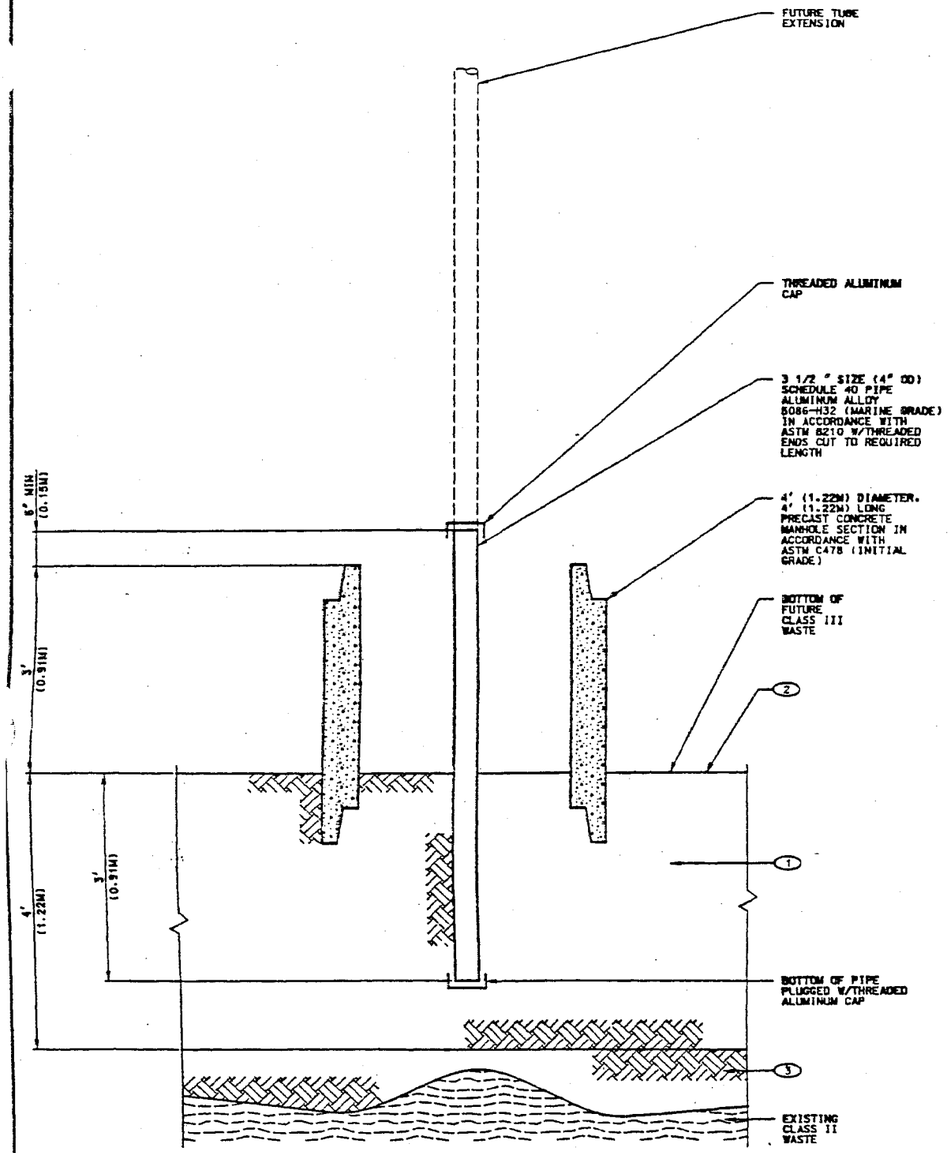
U.S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE — LAS VEGAS, NEVADA

NEVADA TEST SITE — AREA 9
10c CRATER
CLASS II DISPOSAL SITE TEMPORARY BARRIER
SITE PLAN

CIVIL: ARCH: N/A STRL: MECH: ELEC: COMM: ELEC:
DESIGNED/DRAWN: RPS GAO
CHECKED: JAS ENVIR:
SAFETY: QA:
PROJECT ENGINEER:
SUBMITTED: RAYTHEON SERVICES NEVADA
USER:
APPROVAL BLOCK — DEPT. OF ENERGY APPROVAL — PROJECT ENGINEER — DATE: 7/5/95

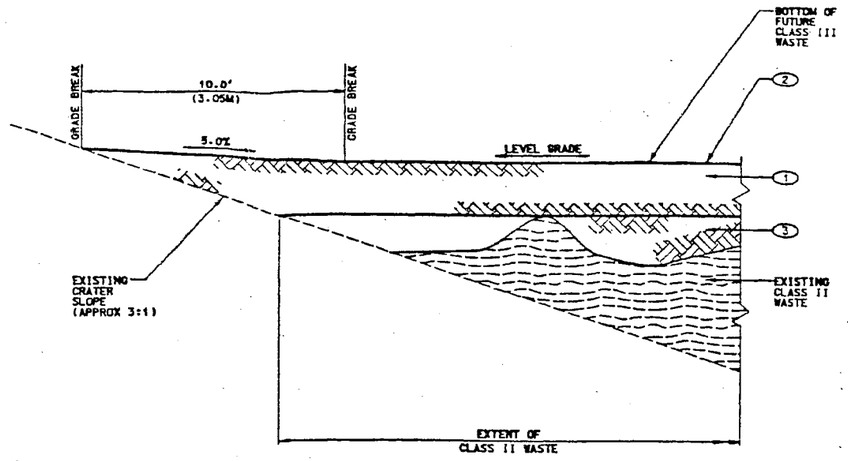
Raytheon Services Nevada
1551 HILLSHIRE DRIVE
LAS VEGAS, NEVADA 89134

P. J. NO. 95-243
J. O. NO. 72432-2000
PROJ. NO. 9401.A10
DRAWING NUMBER JS-009-10c-C1
SHEET ___ OF ___
REVISION: 0A



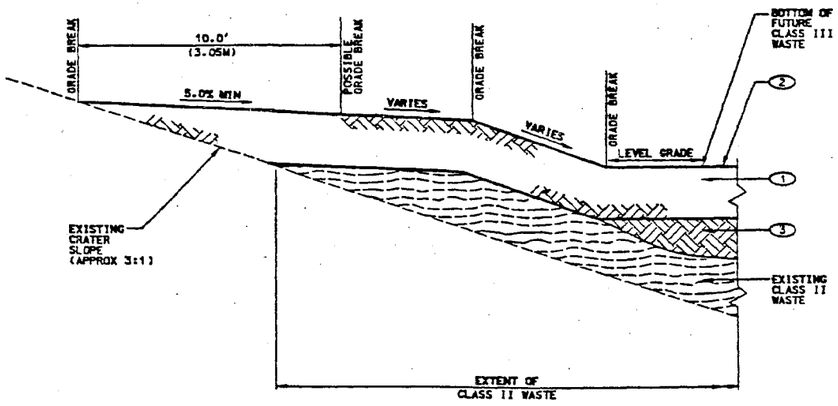
NEUTRON ACCESS TUBE SECTION (A) C1

NOT TO SCALE



TYPICAL SECTION (B) C1

NOT TO SCALE



TYPICAL SECTION (C) C1

NOT TO SCALE

DUAL ENGLISH/METRIC DRAWING

ALL METRIC DIMENSIONS AND NOTATIONS ARE SHOWN BELOW THE DIMENSION LINE OR IN PARENTHESIS.

WHOLE NUMBERS INDICATE MILLIMETERS
DECIMAL NUMBERS SHOWN TO TWO (2) PLACES INDICATE METERS
DECIMAL NUMBERS SHOWN TO THREE (3) PLACES INDICATE KILOMETERS

KEY NOTES

1. NEW EARTHEN BARRIER SHALL BE 4'(1.22M) THICK NATIVE MATERIAL PLACED IN 8" (0.20M) TO 12" (0.30M) LOOSE LIFTS RAKED TO REMOVE MATERIAL GREATER THAN 3" (0.08M) IN SIZE AND COMPACTED TO 90% OF MAXIMUM DENSITY.
2. TOP OF NEW EARTHEN BARRIER ELEVATION SHOWN AT ELEVATION 4225 FOR GRAPHIC PURPOSES ONLY. FINAL DESIGN ELEVATION SHALL BE BASED ON FINAL ELEVATION OF THE CLASS II WASTE AREA AT END OF CLASS II OPERATION.
3. LEVELING MATERIAL SHALL BE NATIVE MATERIAL PLACED IN 8"(0.20M) TO 12" (0.30M) LOOSE LIFTS AND COMPACTED TO 90% OF MAXIMUM DENSITY AS REQUIRED TO PROVIDE LEVEL BASE FOR NEW EARTHEN BARRIER FOR AS LARGE AN AREA AS FEASIBLE.

NO.	DATE	REVISIONS	BY	CK	PE	QSR	SRE
			CE	DH	EWH	JC	

U.S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE — LAS VEGAS, NEVADA

NEVADA TEST SITE — AREA 9
10c CRATER
CLASS II DISPOSAL SITE TEMPORARY BARRIER
SECTIONS

CIVIL			
ARCH	N/A	DESIGNED	
STRUC	AJS	DRAWN	MAD
MECH		CHECKED	
ELECT		SURVEY	
COMM		PROJECT CONTROLS	
CLIENT			

APPROVAL BLOCK
DEPT. OF ENERGY APPROVAL — DATE: 7/17/95
PROJECT ENGINEER
GRAPHIC NUMBER: JS-009-10c-C2

Raytheon Services Nevada
1551 HILLSHIRE DRIVE
LAS VEGAS, NEVADA 89134

P. A. NO.	95-243
I. D. NO.	72432-2000
PROJ. NO.	9401-A10
SHEET	OF
REVISION	0A

/usr2/dgn/009/mic/c2anv.dgn Jan. 26, 1995 02:14:28

Practical Sampling Design

(4265)
(4260)
(4255)
(4250)
(4245)
(4240)
(4235)
(4230)

EXST OFFICE TRAILER

10c CRATER

#7

N 874,340
E 678,265

#8 N 874,145
E 678,124

#6 N 874,145
E 678,406

C
C2

#9

N 874,000
E 677,900

#5

A
C2

N 874,000
E 678,265

#1

N 874,000
E 678,680

#4
N 873,865
E 678,124

#2
N 873,865
E 678,406

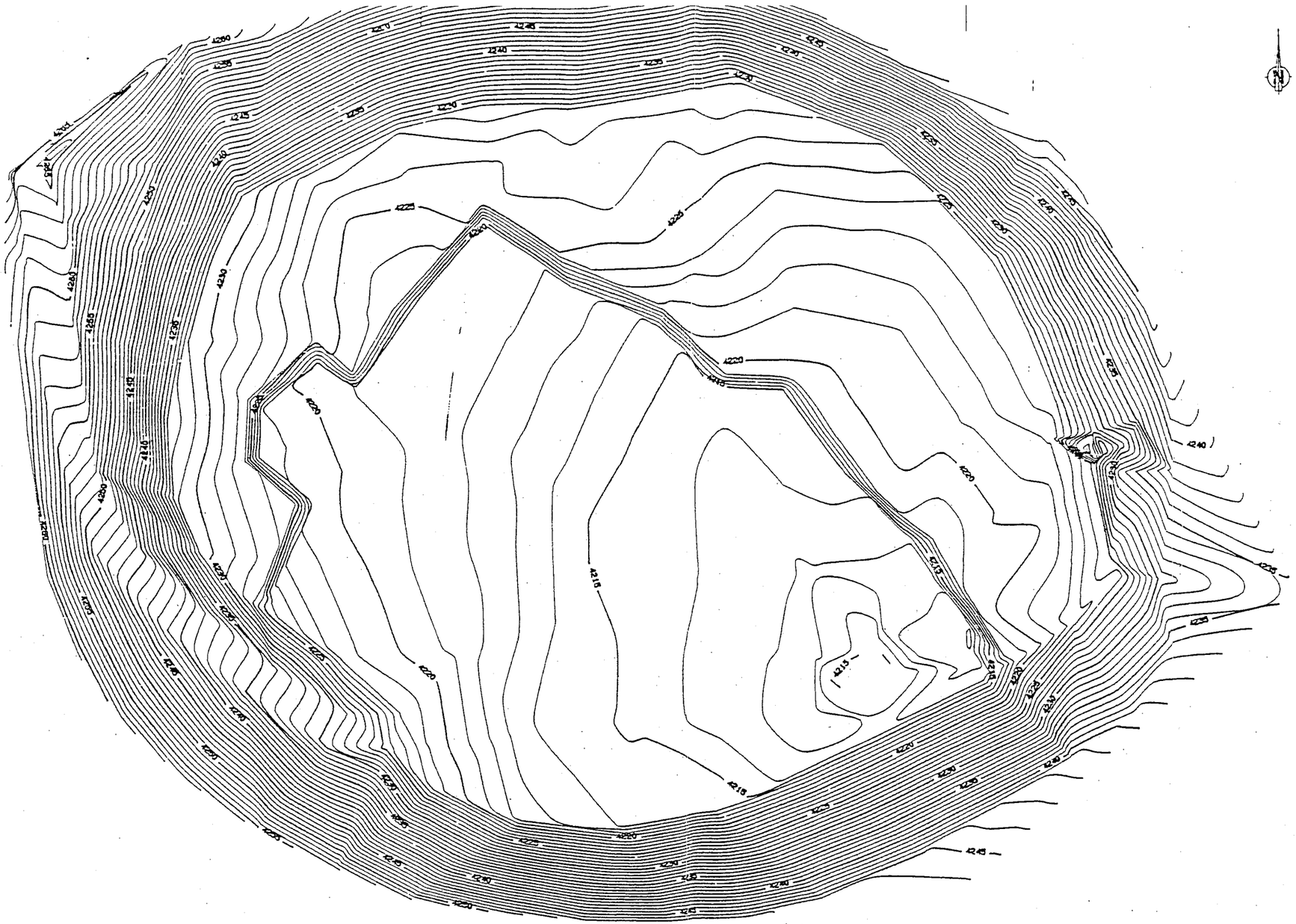
EXST ACCESS RAMP

B
C2

N 873,650
E 678,265

#3

(4230)
(4235)
(4240)
(4245)



SURVEY DEPT.

RAYTHEON SERVICES NEVADA

Notes :

CONTOUR INTERVAL: 1.0 FOOT

10C PRE-CONSTRUCTION TOPO

DRAWN BY: SPW

SURVEY: SPW, KDB, RCC

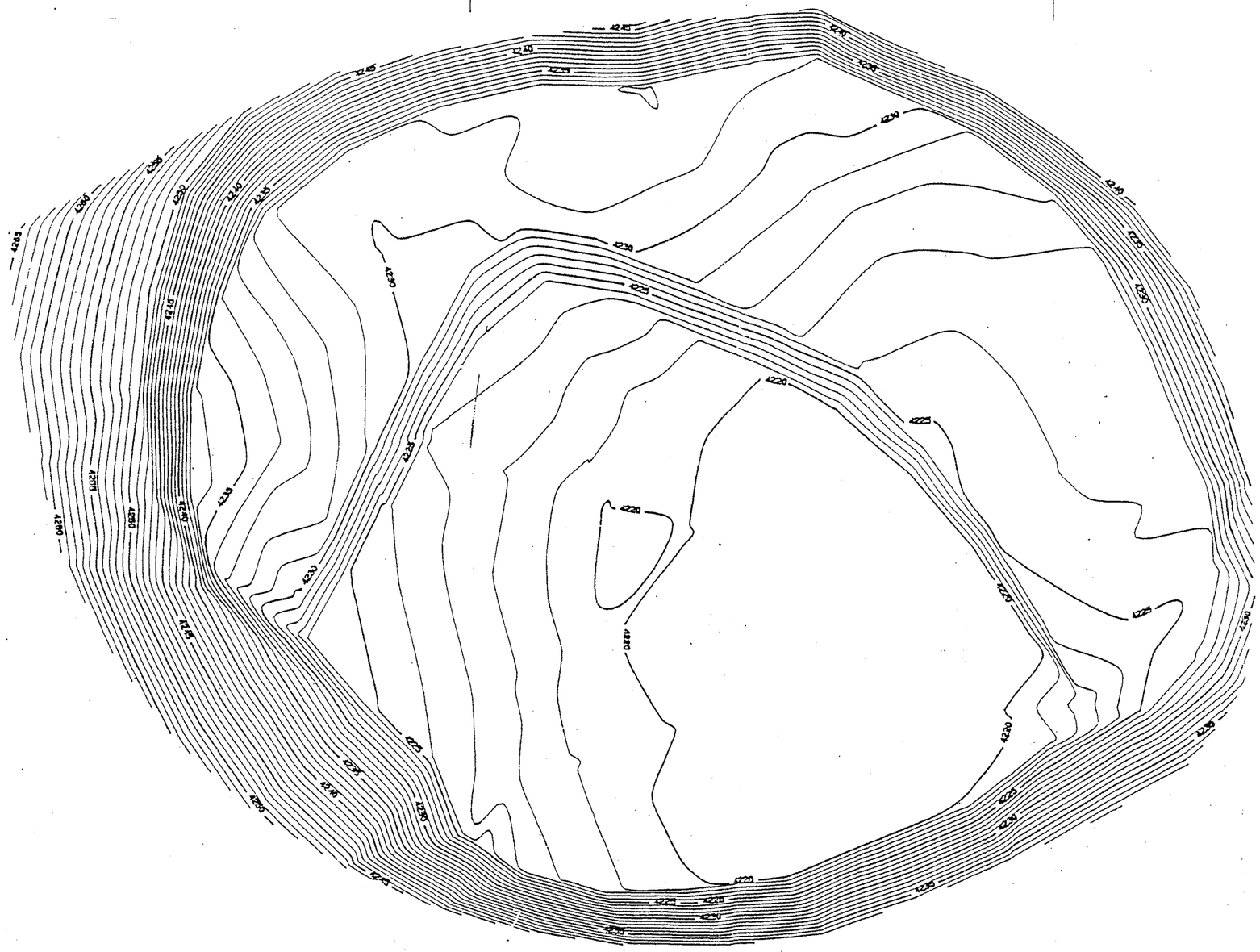
Date : 5 DEC 1995

Files : 10C CRATER

SDR job :

Origin : 873400.000 N 677300.000 E

Scale : 1 inch : 60 feet Rotation 0°



SURVEY DEPT.

RAYTHEON SERVICES NEVADA

Notes :

CONTOUR INTERVAL: 1.0 FOOT

Origin : 873400.000 N 677300.000 E

Scale : 1 inch : 60 feet Rotation 0°

FINAL 10C TOPO

DRAWN BY: SPW SURVEY: SPW, KOB, RCC

Date : 5 DEC 1995

Files : 10C CRATER

SDR job :

Appendix B
"Hydrologic/Hydraulic Assessment of the U10C Landfill in Area 9 of the Nevada Test Site (NTS)"

Bechtel Nevada

Interoffice Memorandum

ID No.: E110-KKV-96-005

Date: January 23, 1996

To: L. S. Sygitowicz

From: K. K. Van Cleave

Subject: HYDROLOGIC/HYDRAULIC ASSESSMENT OF THE U10C LANDFILL IN AREA 9 OF THE NEVADA TEST SITE (NTS)

The Waste Management Program (WMP) requested a hydrologic/hydraulic assessment of the U10C landfill in Area 9 of the NTS, for compliance with new state regulations for disposal sites. These regulations require: (1) an assessment of whether the landfill is in a 100-year flood hazard zone, and (2) protection from run-on associated with a 25-year flood event. This facility is not regulated under the Resource Conservation and Recover Act, which mandates assessment of a 25-year, 24-hour flood event. Therefore, the run-on protection requirement can be met by evaluating at least the 25-year, 6-hour flood. In this case, both requirements were met by assessment of the 100-year, 6-hour flood event.

The assessment was performed using methods described in the Clark County Regional Flood Control District (CCRFCD) Manual (1990) for both hydrologic and hydraulic analyses. The WMP requested that a detention system be evaluated for run-on protection. Guidelines for sizing "local minor detention systems" are outlined in the CCRFCD Manual (1990). Information needed for sizing includes:

- calculation of outlet size;
- discharge rating for outlet; and,
- storage routing.

Field investigations and calculations indicate that a detention system comprised of both the natural topography west of Circle Road and the road grade will provide approximately 48 acre-feet of storage volume (Attachment 1). The road grade will act as an earthen dam for the detention area, with outlet control provided by two existing culverts.

Outlet size is known; existing 24- and 36-inch CMP culverts (one each) will release water from the detention area. Discharge rating data for both culverts were developed using FlowMaster software (Attachment 2). Rating data were combined (both culverts

will be discharging simultaneously) and used to perform storage routing with the HEC-1 model.

Results of the HEC-1 storage routing model indicate storage volume for 35 acre-feet of water is required (Attachment 3); therefore, the natural detention system provides sufficient storage volume. Also, in accordance with guidelines in the CCRFCD Manual (1990), the basin will completely drain in less than 24 hours (Attachment 4).

The HEC-1 storage routing model used the combined discharge rating data for both culverts to calculate a peak discharge of 37 cubic feet per second (*Attachment 3*) from the detention system. Flow released through the culverts will become sheetflow. Sheetflow depth for the peak discharge is 0.03 feet (Attachment 5). This depth is less than the 1 foot regulatory depth; therefore, the landfill is not within a 100-year flood hazard zone from sheetflow.

Existing topography will provide adequate sheetflow runoff protection for the landfill; additional drainage structures will not be required. The majority of the sheetflow will come from north-northwest of the landfill. This flow will be intercepted by an existing channel along the north side of the landfill, channelizing flow to the east, past the landfill. Sheetflow along the west side of the landfill will flow south-southeast past the landfill.

This hydrologic/hydraulic assessment has shown that the U10C landfill is not within a regulatory 100-year flood hazard zone, and that flood protection structures will not be required at the landfill. An "existing" detention system will provide more than adequate storage volume for run-on protection. Existing culverts, if maintained, will provide adequate outlet control and minimize sheetflow depths at the landfill.

KKV:JJM:dm

Enclosures: as stated

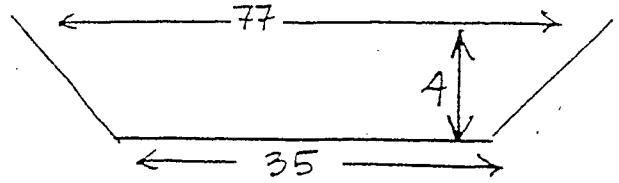
cc: Correspondence Control, w/enc., M/S NLV008
D. L. Foster, w/o enc., M/S 501
J. J. Mattick, w/enc., M/S 738
D. F. Merritt, w/o enc., M/S 580
J. J. Miller, w/enc., M/S 580

Attachment 1.

Detention basin volume calculations.

DETENTION BASIN VOLUME CALCULATIONS

TOTAL OF 4 AREAS:

① 

$a = 77$ FT
$b = 35$ FT
$h = 4$ FT

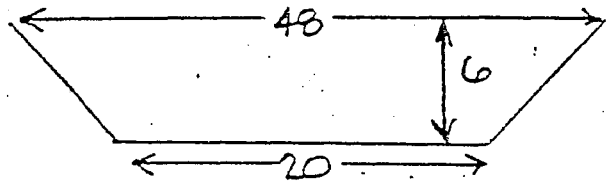
$$A = \frac{(a+b)h}{2}$$

$$A = \frac{(77+35)(4)}{2} = 224 \text{ FT}^2$$

VOLUME = A * L

$A = 224 \text{ FT}^2$
$L = 170$ FT

$$V_1 = 224(170) = 38{,}080 \text{ FT}^3$$

② 

$a = 48$ FT
$b = 20$ FT
$h = 6$ FT

$$A = \frac{(a+b)h}{2}$$

$$A = \frac{(48+20)(6)}{2} = 204 \text{ FT}^2$$

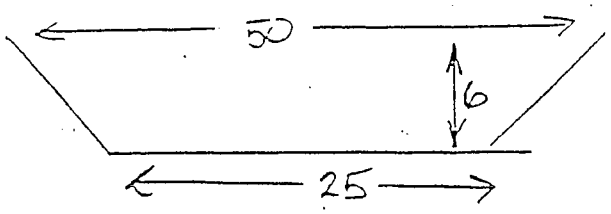
VOLUME = A * L

$A = 204 \text{ FT}^2$
$L = 150$ FT

$$V_2 = (204)(150) = 30{,}600 \text{ FT}^3$$

DETENTION BASIN VOLUME CALCULATIONS, CONT

③



a = 50FT
b = 25 FT
h = 6FT

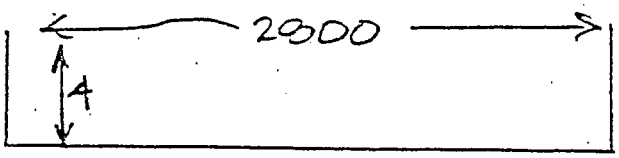
$$A = \frac{(a+b)h}{2}$$

$$A = \frac{(50+25)6}{2} = 225 FT^2$$

VOLUME = A * L A = 225 FT² L = 500 FT

$V_3 = (225)(500) = 112,500 FT^3$

④



W = 2800FT
H = 4

A = W * H

A = 2800(4) = 11,200 FT²

VOLUME = A * L A = 11,200 FT² L = 170 FT

$V_4 = (11,200)(170)$

$V_4 = 1,904,000 FT^3$

DETENTION BASIN VOLUME CALCULATIONS, CONT

TOTAL VOLUME:

$$V_1 + V_2 + V_3 + V_4$$

$$V_T = 38{,}080 + 30{,}600 + 112{,}500 + 1{,}904{,}000$$

$$V_T = 2{,}085{,}180 \text{ FT}^3$$

$$2{,}085{,}180 \text{ FT}^3 \left(\frac{2.296 (10^{-5}) \text{ ACRES}}{\text{FT}^2} \right) = 47.9 \text{ AC-FT}$$

$$V_T = 47.9 \text{ ACRE-FT}$$

Attachment 2.

Discharge rating calculations.

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: DISCHARGE RATINGS

Description: DISCHARGE RATINGS FOR 36" CMP

Solve For Actual Discharge

Given Constant Data;

Diameter.....	3.00
Slope.....	0.0160
Mannings n.....	0.024

ariable Input Data	Minimum	Maximum	Increment By
epth	0.00	3.00	0.30

				VARIABLE	COMPUTED	COMPUTED
iameter ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full cfs
Unable to compute this instance.						
3.00	0.0160	0.024	0.95	0.30	2.59	45.70
3.00	0.0160	0.024	4.00	0.60	3.98	45.70
3.00	0.0160	0.024	8.95	0.90	5.02	45.70
3.00	0.0160	0.024	15.40	1.20	5.83	45.70
3.00	0.0160	0.024	22.85	1.50	6.47	45.70
3.00	0.0160	0.024	30.70	1.80	6.93	45.70
3.00	0.0160	0.024	38.26	2.10	7.24	45.70
3.00	0.0160	0.024	44.67	2.40	7.37	45.70
3.00	0.0160	0.024	48.71	2.70	7.27	45.70
3.00	0.0160	0.024	45.70	3.00	6.47	45.70
Unable to compute this instance.						

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: DISCHARGE RATINGS 24

Description: DISCHARGE RATINGS FOR 24" CMP

Solve For Actual Discharge

Given Constant Data;

Diameter.....	2.00
Slope.....	0.0160
Mannings n.....	0.024

ariable Input Data	Minimum	Maximum	Increment By
epth	0.00	2.00	0.20

				VARIABLE	COMPUTED	COMPUTED
iameter ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full cfs
Unable to compute this instance.						
2.00	0.0160	0.024	0.32	0.20	1.98	15.50
2.00	0.0160	0.024	1.36	0.40	3.03	15.50
2.00	0.0160	0.024	3.04	0.60	3.83	15.50
2.00	0.0160	0.024	5.22	0.80	4.45	15.50
2.00	0.0160	0.024	7.75	1.00	4.93	15.50
2.00	0.0160	0.024	10.41	1.20	5.29	15.50
2.00	0.0160	0.024	12.98	1.40	5.52	15.50
2.00	0.0160	0.024	15.15	1.60	5.62	15.50
2.00	0.0160	0.024	16.52	1.80	5.55	15.50
2.00	0.0160	0.024	15.50	2.00	4.93	15.50
Unable to compute this instance.						

Attachment 3.

Storage routing calculations.

FLOOD HYDROGRAPH PACKAGE (HEC-1)
MAY 1991
VERSION 4.0.1E

RUN DATE 01/11/96 TIME 13:05:18

U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 551-1748

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  1           ID  AREA 9 DETENTION POND OUTLET SIZING
  2           ID  COMBINATION OF BOTH CULVERTS (DISCHARGES ADDED TOGETHER ON SQ CARD)
  3           IT     10       0       0     300
  4           IO      2       0       0
  5           QI      0       2      16      46      94     154     204     234     247     243
  6           QI    232     218     208     198     184     165     143     119      97      78
  7           QI     62      49      39      30      23      18      13      10       8       6
  8           QI      4       3       2       2       1       1       1       0
              *

  9           KK   CULV
 10           KM   COMBINED DISCHARGE RATING OF BOTH CULVERTS
 11           RS      1     STD       0
 12           SA      0    1.88    3.75    5.63    9.38   13.13   16.88   20.63   28.13   35.63
 13           SA  45.00
 14           SE   4305    4306    4307    4308    4309    4310    4311    4312    4313    4314
 15           SE   4315
 16           SQ      0    1.27    5.36   11.99   20.62   30.60   41.11   51.24   59.82   65.23
 17           SQ  61.20
 18           ZZ
```

FLOOD HYDROGRAPH PACKAGE (HEC-1)
MAY 1991
VERSION 4.0.1E

RUN DATE 01/11/96 TIME 13:05:18

U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 551-1748

AREA 9 DETENTION POND OUTLET SIZING
COMBINATION OF BOTH CULVERTS (DISCHARGES ADDED TOGETHER ON SQ CARD)

```
4 IO          OUTPUT CONTROL VARIABLES
                   IPRNT         2  PRINT CONTROL
```

```
                OSCAL          0.  HYDROGRAPH PLOT SCALE

 IT          HYDROGRAPH TIME DATA
                NMIN          10  MINUTES IN COMPUTATION INTERVAL
               IDATE       1    0  STARTING DATE
               ITIME         0000  STARTING TIME
                  NQ          300  NUMBER OF HYDROGRAPH ORDINATES
              NQDATE       3    0  ENDING DATE
              NQTIME         0150  ENDING TIME
               ICENT           19  CENTURY MARK

            COMPUTATION INTERVAL     0.17 HOURS
                TOTAL TIME BASE     49.83 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

           SUBBASIN RUNOFF DATA

 D BA          SUBBASIN CHARACTERISTICS
                 TAREA        0.00  SUBBASIN AREA

                                  ***
```

HYDROGRAPH AT STATION CULV

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		1230	76	1.	*	2		0100	151	1.	*	2		1330	226	1.
1		0010	2	2.	*	1		1240	77	1.	*	2		0110	152	1.	*	2		1340	227	1.
1		0020	3	16.	*	1		1250	78	1.	*	2		0120	153	1.	*	2		1350	228	1.
1		0030	4	46.	*	1		1300	79	1.	*	2		0130	154	1.	*	2		1400	229	1.
1		0040	5	94.	*	1		1310	80	1.	*	2		0140	155	1.	*	2		1410	230	1.
1		0050	6	154.	*	1		1320	81	1.	*	2		0150	156	1.	*	2		1420	231	1.
1		0100	7	204.	*	1		1330	82	1.	*	2		0200	157	1.	*	2		1430	232	1.
1		0110	8	234.	*	1		1340	83	1.	*	2		0210	158	1.	*	2		1440	233	1.
1		0120	9	247.	*	1		1350	84	1.	*	2		0220	159	1.	*	2		1450	234	1.
1		0130	10	243.	*	1		1400	85	1.	*	2		0230	160	1.	*	2		1500	235	1.
1		0140	11	232.	*	1		1410	86	1.	*	2		0240	161	1.	*	2		1510	236	1.
1		0150	12	218.	*	1		1420	87	1.	*	2		0250	162	1.	*	2		1520	237	1.
1		0200	13	208.	*	1		1430	88	1.	*	2		0300	163	1.	*	2		1530	238	1.
1		0210	14	198.	*	1		1440	89	1.	*	2		0310	164	1.	*	2		1540	239	1.
1		0220	15	184.	*	1		1450	90	1.	*	2		0320	165	1.	*	2		1550	240	1.
1		0230	16	165.	*	1		1500	91	1.	*	2		0330	166	1.	*	2		1600	241	1.
1		0240	17	143.	*	1		1510	92	1.	*	2		0340	167	1.	*	2		1610	242	1.
1		0250	18	119.	*	1		1520	93	1.	*	2		0350	168	1.	*	2		1620	243	1.
1		0300	19	97.	*	1		1530	94	1.	*	2		0400	169	1.	*	2		1630	244	1.
1		0310	20	78.	*	1		1540	95	1.	*	2		0410	170	1.	*	2		1640	245	1.
1		0320	21	62.	*	1		1550	96	1.	*	2		0420	171	1.	*	2		1650	246	1.
1		0330	22	49.	*	1		1600	97	1.	*	2		0430	172	1.	*	2		1700	247	1.
1		0340	23	39.	*	1		1610	98	1.	*	2		0440	173	1.	*	2		1710	248	1.
1		0350	24	30.	*	1		1620	99	1.	*	2		0450	174	1.	*	2		1720	249	1.
1		0400	25	23.	*	1		1630	100	1.	*	2		0500	175	1.	*	2		1730	250	1.
1		0410	26	18.	*	1		1640	101	1.	*	2		0510	176	1.	*	2		1740	251	1.
1		0420	27	13.	*	1		1650	102	1.	*	2		0520	177	1.	*	2		1750	252	1.
1		0430	28	10.	*	1		1700	103	1.	*	2		0530	178	1.	*	2		1800	253	1.
1		0440	29	8.	*	1		1710	104	1.	*	2		0540	179	1.	*	2		1810	254	1.
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1		0500	31	4.	*	1		1730	106	1.	*	2		0600	181	1.	*	2		1830	256	1.
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1		0520	33	2.	*	1		1750	108	1.	*	2		0620	183	1.	*	2		1850	258	1.
1		0530	34	2.	*	1		1800	109	1.	*	2		0630	184	1.	*	2		1900	259	1.
1		0540	35	1.	*	1		1810	110	1.	*	2		0640	185	1.	*	2		1910	260	1.
1		0550	36	1.	*	1		1820	111	1.	*	2		0650	186	1.	*	2		1920	261	1.
1		0600	37	1.	*	1		1830	112	1.	*	2		0700	187	1.	*	2		1930	262	1.
1		0610	38	1.	*	1		1840	113	1.	*	2		0710	188	1.	*	2		1940	263	1.
1		0620	39	1.	*	1		1850	114	1.	*	2		0720	189	1.	*	2		1950	264	1.
1		0630	40	1.	*	1		1900	115	1.	*	2		0730	190	1.	*	2		2000	265	1.

1	0640	41	1.	*	1	1910	116	1.	*	2	0740	191	1.	*	2	2010	266	1.													
1	0650	42	1.	*	1	1920	117	1.	*	2	0750	192	1.	*	2	2020	267	1.													
1	0700	43	1.	*	1	1930	118	1.	*	2	0800	193	1.	*	2	2030	268	1.													
1	0710	44	1.	*	1	1940	119	1.	*	2	0810	194	1.	*	2	2040	269	1.													
1	0720	45	1.	*	1	1950	120	1.	*	2	0820	195	1.	*	2	2050	270	1.													
1	0730	46	1.	*	1	2000	121	1.	*	2	0830	196	1.	*	2	2100	271	1.													
1	0740	47	1.	*	1	2010	122	1.	*	2	0840	197	1.	*	2	2110	272	1.													
1	0750	48	1.	*	1	2020	123	1.	*	2	0850	198	1.	*	2	2120	273	1.													
1	0800	49	1.	*	1	2030	124	1.	*	2	0900	199	1.	*	2	2130	274	1.													
1	0810	50	1.	*	1	2040	125	1.	*	2	0910	200	1.	*	2	2140	275	1.													
1	0820	51	1.	*	1	2050	126	1.	*	2	0920	201	1.	*	2	2150	276	1.													
1	0830	52	1.	*	1	2100	127	1.	*	2	0930	202	1.	*	2	2200	277	1.													
1	0840	53	1.	*	1	2110	128	1.	*	2	0940	203	1.	*	2	2210	278	1.													
1	0850	54	1.	*	1	2120	129	1.	*	2	0950	204	1.	*	2	2220	279	1.													
1	0900	55	1.	*	1	2130	130	1.	*	2	1000	205	1.	*	2	2230	280	1.													
1	0910	56	1.	*	1	2140	131	1.	*	2	1010	206	1.	*	2	2240	281	1.													
1	0920	57	1.	*	1	2150	132	1.	*	2	1020	207	1.	*	2	2250	282	1.													
1	0930	58	1.	*	1	2200	133	1.	*	2	1030	208	1.	*	2	2300	283	1.													
1	0940	59	1.	*	1	2210	134	1.	*	2	1040	209	1.	*	2	2310	284	1.													
1	0950	60	1.	*	1	2220	135	1.	*	2	1050	210	1.	*	2	2320	285	1.													
1	1000	61	1.	*	1	2230	136	1.	*	2	1100	211	1.	*	2	2330	286	1.													
1	1010	62	1.	*	1	2240	137	1.	*	2	1110	212	1.	*	2	2340	287	1.													
1	1020	63	1.	*	1	2250	138	1.	*	2	1120	213	1.	*	2	2350	288	1.													
1	1030	64	1.	*	1	2300	139	1.	*	2	1130	214	1.	*	3	0000	289	1.													
1	1040	65	1.	*	1	2310	140	1.	*	2	1140	215	1.	*	3	0010	290	1.													
1	1050	66	1.	*	1	2320	141	1.	*	2	1150	216	1.	*	3	0020	291	1.													
1	1100	67	1.	*	1	2330	142	1.	*	2	1200	217	1.	*	3	0030	292	1.													
1	1110	68	1.	*	1	2340	143	1.	*	2	1210	218	1.	*	3	0040	293	1.													
1	1120	69	1.	*	1	2350	144	1.	*	2	1220	219	1.	*	3	0050	294	1.													
1	1130	70	1.	*	2	0000	145	1.	*	2	1230	220	1.	*	3	0100	295	1.													
	1140	71	1.	*	2	0010	146	1.	*	2	1240	221	1.	*	3	0110	296	1.													
	1150	72	1.	*	2	0020	147	1.	*	2	1250	222	1.	*	3	0120	297	1.													
	1200	73	1.	*	2	0030	148	1.	*	2	1300	223	1.	*	3	0130	298	1.													
	1210	74	1.	*	2	0040	149	1.	*	2	1310	224	1.	*	3	0140	299	1.													
	1220	75	1.	*	2	0050	150	1.	*	2	1320	225	1.	*	3	0150	300	1.													
				*					*					*																	

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	49.85-HR
+ (CFS)	(HR)					
		(CFS)				
247.	1.33		88.	23.	11.	11.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	43.	45.	47.	47.

CUMULATIVE AREA = .0.00 SQ MI

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*            *
*            *
*     CULV   *
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*            *
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COMBINED DISCHARGE RATING OF BOTH CULVERTS

HYDROGRAPH ROUTING DATA

11 RS	STORAGE ROUTING										
	NSTPS	1	NUMBER OF SUBREACHES								
	ITYP	STO	TYPE OF INITIAL CONDITION								
	RSVRIC	0.00	INITIAL CONDITION								
	X	0.00	WORKING R AND D COEFFICIENT								
SA	AREA	0.0	1.9	3.8	5.6	9.4	13.1	16.9	20.6	28.1	35.6
		45.0									
14 SE	ELEVATION	4305.00	4306.00	4307.00	4308.00	4309.00	4310.00	4311.00	4312.00	4313.00	4314.00
		4315.00									
16 SQ	DISCHARGE	0.	1.	5.	12.	21.	31.	41.	51.	60.	65.

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COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	0.63	3.39	8.05	15.47	26.67	41.64	60.36	84.65	116.45
ELEVATION	4305.00	4306.00	4307.00	4308.00	4309.00	4310.00	4311.00	4312.00	4313.00	4314.00

STORAGE	156.68
ELEVATION	4315.00

HYDROGRAPH AT STATION CULV

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.0	4305.0	1		1640	101	15.	10.5	4308.3	2		0920	201	3.	1.8	4306.4
1		0010	2	0.	0.0	4305.0	1		1650	102	15.	10.3	4308.3	2		0930	202	3.	1.8	4306.4
1		0020	3	0.	0.1	4305.2	1		1700	103	14.	10.1	4308.3	2		0940	203	3.	1.7	4306.4
1		0030	4	1.	0.6	4305.9	1		1710	104	14.	9.9	4308.2	2		0950	204	3.	1.7	4306.4
1		0040	5	3.	1.5	4306.3	1		1720	105	14.	9.7	4308.2	2		1000	205	3.	1.7	4306.4
1		0050	6	5.	3.1	4306.9	1		1730	106	14.	9.5	4308.2	2		1010	206	3.	1.7	4306.4
1		0100	7	8.	5.5	4307.5	1		1740	107	14.	9.4	4308.2	2		1020	207	3.	1.6	4306.4
1		0110	8	12.	8.4	4308.0	1		1750	108	13.	9.2	4308.2	2		1030	208	3.	1.6	4306.4
1		0120	9	16.	11.5	4308.5	1		1800	109	13.	9.0	4308.1	2		1040	209	3.	1.6	4306.3
1		0130	10	20.	14.6	4308.9	1		1810	110	13.	8.9	4308.1	2		1050	210	3.	1.6	4306.3
1		0140	11	23.	17.6	4309.2	1		1820	111	13.	8.7	4308.1	2		1100	211	3.	1.5	4306.3
1		0150	12	25.	20.4	4309.4	1		1830	112	13.	8.5	4308.1	2		1110	212	3.	1.5	4306.3
1		0200	13	27.	23.0	4309.7	1		1840	113	12.	8.4	4308.0	2		1120	213	3.	1.5	4306.3
1		0210	14	29.	25.4	4309.9	1		1850	114	12.	8.2	4308.0	2		1130	214	3.	1.5	4306.3
1		0220	15	31.	27.6	4310.1	1		1900	115	12.	8.1	4308.0	2		1140	215	2.	1.4	4306.3
1		0230	16	33.	29.5	4310.2	1		1910	116	12.	7.9	4308.0	2		1150	216	2.	1.4	4306.3
1		0240	17	34.	31.2	4310.3	1		1920	117	12.	7.8	4307.9	2		1200	217	2.	1.4	4306.3
1		0250	18	35.	32.5	4310.4	1		1930	118	11.	7.6	4307.9	2		1210	218	2.	1.4	4306.3
1		0300	19	35.	33.5	4310.5	1		1940	119	11.	7.5	4307.9	2		1220	219	2.	1.4	4306.3
1		0310	20	36.	34.3	4310.5	1		1950	120	11.	7.3	4307.9	2		1230	220	2.	1.4	4306.3
1		0320	21	36.	34.7	4310.5	1		2000	121	11.	7.2	4307.8	2		1240	221	2.	1.3	4306.3
1		0330	22	36.	35.0	4310.6	1		2010	122	11.	7.1	4307.8	2		1250	222	2.	1.3	4306.2
1		0340	23	37.	35.1	4310.6	1		2020	123	10.	6.9	4307.8	2		1300	223	2.	1.3	4306.2
1		0350	24	36.	35.1	4310.6	1		2030	124	10.	6.8	4307.7	2		1310	224	2.	1.3	4306.2
1		0400	25	36.	34.9	4310.6	1		2040	125	10.	6.7	4307.7	2		1320	225	2.	1.3	4306.2
1		0410	26	36.	34.7	4310.5	1		2050	126	10.	6.6	4307.7	2		1330	226	2.	1.2	4306.2
1		0420	27	36.	34.4	4310.5	1		2100	127	10.	6.4	4307.7	2		1340	227	2.	1.2	4306.2
1		0430	28	36.	34.1	4310.5	1		2110	128	10.	6.3	4307.6	2		1350	228	2.	1.2	4306.2
1		0440	29	36.	33.7	4310.5	1		2120	129	9.	6.2	4307.6	2		1400	229	2.	1.2	4306.2
1		0450	30	35.	33.3	4310.4	1		2130	130	9.	6.1	4307.6	2		1410	230	2.	1.2	4306.2
1		0500	31	35.	32.9	4310.4	1		2140	131	9.	6.0	4307.6	2		1420	231	2.	1.2	4306.2
1		0510	32	35.	32.5	4310.4	1		2150	132	9.	5.9	4307.5	2		1430	232	2.	1.2	4306.2
1		0520	33	34.	32.0	4310.4	1		2200	133	9.	5.8	4307.5	2		1440	233	2.	1.1	4306.2
1		0530	34	34.	31.6	4310.3	1		2210	134	9.	5.7	4307.5	2		1450	234	2.	1.1	4306.2
1		0540	35	34.	31.2	4310.3	1		2220	135	8.	5.6	4307.5	2		1500	235	2.	1.1	4306.2
1		0550	36	33.	30.7	4310.3	1		2230	136	8.	5.5	4307.4	2		1510	236	2.	1.1	4306.2
1		0600	37	33.	30.3	4310.2	1		2240	137	8.	5.4	4307.4	2		1520	237	2.	1.1	4306.2
1		0610	38	33.	29.8	4310.2	1		2250	138	8.	5.3	4307.4	2		1530	238	2.	1.1	4306.2
1		0620	39	33.	29.4	4310.2	1		2300	139	8.	5.2	4307.4	2		1540	239	2.	1.1	4306.2
1		0630	40	32.	29.0	4310.2	1		2310	140	8.	5.1	4307.4	2		1550	240	2.	1.0	4306.2
1		0640	41	32.	28.5	4310.1	1		2320	141	8.	5.0	4307.3	2		1600	241	2.	1.0	4306.1
1		0650	42	32.	28.1	4310.1	1		2330	142	7.	4.9	4307.3	2		1610	242	2.	1.0	4306.
1		0700	43	31.	27.7	4310.1	1		2340	143	7.	4.8	4307.3	2		1620	243	2.	1.0	4306.
1		0710	44	31.	27.3	4310.0	1		2350	144	7.	4.7	4307.3	2		1630	244	2.	1.0	4306.
1		0720	45	31.	26.9	4310.0	2		0000	145	7.	4.6	4307.3	2		1640	245	2.	1.0	4306.1
1		0730	46	30.	26.5	4310.0	2		0010	146	7.	4.5	4307.2	2		1650	246	2.	1.0	4306.1
1		0740	47	30.	26.0	4309.9	2		0020	147	7.	4.5	4307.2	2		1700	247	2.	1.0	4306.
1		0750	48	30.	25.7	4309.9	2		0030	148	7.	4.4	4307.2	2		1710	248	2.	1.0	4306.
1		0800	49	29.	25.3	4309.9	2		0040	149	7.	4.3	4307.2	2		1720	249	2.	0.9	4306.1
1		0810	50	29.	24.9	4309.8	2		0050	150	7.	4.2	4307.2	2		1730	250	2.	0.9	4306.1
1		0820	51	29.	24.5	4309.8	2		0100	151	6.	4.1	4307.2	2		1740	251	2.	0.9	4306.
1		0830	52	28.	24.1	4309.8	2		0110	152	6.	4.1	4307.1	2		1750	252	2.	0.9	4306.
1		0840	53	28.	23.7	4309.7	2		0120	153	6.	4.0	4307.1	2		1800	253	2.	0.9	4306.
1		0850	54	28.	23.4	4309.7	2		0130	154	6.	3.9	4307.1	2		1810	254	2.	0.9	4306.
1		0900	55	27.	23.0	4309.7	2		0140	155	6.	3.9	4307.1	2		1820	255	2.	0.9	4306.
1		0910	56	27.	22.6	4309.6	2		0150	156	6.	3.8	4307.1	2		1830	256	2.	0.9	4306.
1		0920	57	27.	22.3	4309.6	2		0200	157	6.	3.7	4307.1	2		1840	257	2.	0.9	4306.
1		0930	58	26.	21.9	4309.6	2		0210	158	6.	3.7	4307.1	2		1850	258	2.	0.9	4306.
1		0940	59	26.	21.6	4309.5	2		0220	159	6.	3.6	4307.0	2		1900	259	2.	0.9	4306.
																1910	260	2.	0.8	4306.

	1000	61	25.	20.9	4309.5	*	2	0240	161	5.	3.5	4307.0	*	2	1920	261	2.	0.8	4306.1
1	1010	62	25.	20.6	4309.5	*	2	0250	162	5.	3.4	4307.0	*	2	1930	262	2.	0.8	4306.1
1	1020	63	25.	20.2	4309.4	*	2	0300	163	5.	3.3	4307.0	*	2	1940	263	2.	0.8	4306.1
1	1030	64	25.	19.9	4309.4	*	2	0310	164	5.	3.3	4307.0	*	2	1950	264	2.	0.8	4306.1
1	1040	65	24.	19.6	4309.4	*	2	0320	165	5.	3.2	4306.9	*	2	2000	265	2.	0.8	4306.1
1	1050	66	24.	19.3	4309.3	*	2	0330	166	5.	3.2	4306.9	*	2	2010	266	2.	0.8	4306.1
1	1100	67	24.	19.0	4309.3	*	2	0340	167	5.	3.1	4306.9	*	2	2020	267	2.	0.8	4306.1
1	1110	68	23.	18.6	4309.3	*	2	0350	168	5.	3.1	4306.9	*	2	2030	268	2.	0.8	4306.1
1	1120	69	23.	18.3	4309.3	*	2	0400	169	5.	3.0	4306.9	*	2	2040	269	1.	0.8	4306.1
1	1130	70	23.	18.0	4309.2	*	2	0410	170	5.	3.0	4306.8	*	2	2050	270	1.	0.8	4306.1
1	1140	71	23.	17.7	4309.2	*	2	0420	171	5.	2.9	4306.8	*	2	2100	271	1.	0.8	4306.1
1	1150	72	22.	17.4	4309.2	*	2	0430	172	5.	2.9	4306.8	*	2	2110	272	1.	0.8	4306.0
1	1200	73	22.	17.1	4309.1	*	2	0440	173	5.	2.8	4306.8	*	2	2120	273	1.	0.8	4306.0
1	1210	74	22.	16.9	4309.1	*	2	0450	174	4.	2.8	4306.8	*	2	2130	274	1.	0.7	4306.0
1	1220	75	22.	16.6	4309.1	*	2	0500	175	4.	2.7	4306.8	*	2	2140	275	1.	0.7	4306.0
1	1230	76	21.	16.3	4309.1	*	2	0510	176	4.	2.7	4306.7	*	2	2150	276	1.	0.7	4306.0
1	1240	77	21.	16.0	4309.0	*	2	0520	177	4.	2.6	4306.7	*	2	2200	277	1.	0.7	4306.0
1	1250	78	21.	15.7	4309.0	*	2	0530	178	4.	2.6	4306.7	*	2	2210	278	1.	0.7	4306.0
1	1300	79	21.	15.5	4309.0	*	2	0540	179	4.	2.5	4306.7	*	2	2220	279	1.	0.7	4306.0
1	1310	80	20.	15.2	4309.0	*	2	0550	180	4.	2.5	4306.7	*	2	2230	280	1.	0.7	4306.0
1	1320	81	20.	14.9	4308.9	*	2	0600	181	4.	2.5	4306.7	*	2	2240	281	1.	0.7	4306.0
1	1330	82	20.	14.7	4308.9	*	2	0610	182	4.	2.4	4306.6	*	2	2250	282	1.	0.7	4306.0
1	1340	83	19.	14.4	4308.9	*	2	0620	183	4.	2.4	4306.6	*	2	2300	283	1.	0.7	4306.0
1	1350	84	19.	14.2	4308.8	*	2	0630	184	4.	2.3	4306.6	*	2	2310	284	1.	0.7	4306.0
1	1400	85	19.	13.9	4308.8	*	2	0640	185	4.	2.3	4306.6	*	2	2320	285	1.	0.7	4306.0
1	1410	86	19.	13.7	4308.8	*	2	0650	186	4.	2.3	4306.6	*	2	2330	286	1.	0.7	4306.0
1	1420	87	18.	13.4	4308.7	*	2	0700	187	4.	2.2	4306.6	*	2	2340	287	1.	0.7	4306.0
1	1430	88	18.	13.2	4308.7	*	2	0710	188	4.	2.2	4306.6	*	2	2350	288	1.	0.7	4306.0
1	1440	89	18.	13.0	4308.7	*	2	0720	189	4.	2.2	4306.6	*	3	0000	289	1.	0.7	4306.0
1	1450	90	17.	12.7	4308.6	*	2	0730	190	3.	2.1	4306.5	*	3	0010	290	1.	0.7	4306.0
1	1500	91	17.	12.5	4308.6	*	2	0740	191	3.	2.1	4306.5	*	3	0020	291	1.	0.7	4306.0
1	1510	92	17.	12.3	4308.6	*	2	0750	192	3.	2.1	4306.5	*	3	0030	292	1.	0.7	4306.0
1	1520	93	17.	12.1	4308.5	*	2	0800	193	3.	2.0	4306.5	*	3	0040	293	1.	0.6	4306.0
1	1530	94	16.	11.9	4308.5	*	2	0810	194	3.	2.0	4306.5	*	3	0050	294	1.	0.6	4306.0
1	1540	95	16.	11.6	4308.5	*	2	0820	195	3.	2.0	4306.5	*	3	0100	295	1.	0.6	4306.0
1	1550	96	16.	11.4	4308.5	*	2	0830	196	3.	1.9	4306.5	*	3	0110	296	1.	0.6	4306.
1	1600	97	16.	11.2	4308.4	*	2	0840	197	3.	1.9	4306.5	*	3	0120	297	1.	0.6	4306.
1	1610	98	15.	11.0	4308.4	*	2	0850	198	3.	1.9	4306.4	*	3	0130	298	1.	0.6	4306.
1	1620	99	15.	10.8	4308.4	*	2	0900	199	3.	1.8	4306.4	*	3	0140	299	1.	0.6	4306.
1	1630	100	15.	10.6	4308.4	*	2	0910	200	3.	1.8	4306.4	*	3	0150	300	1.	0.6	4306.

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	49.83-HR
+ (CFS)	(HR)					
		(CFS)				
+ 37.	3.67		33.	21.	11.	11.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	17.	41.	46.	46.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	49.83-HR
+ (AC-FT)	(HR)				
35.	3.67	31.	17.	9.	9.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	49.83-HR
+ (FEET)	(HR)				
4310.56	3.67	4310.28	4308.89	4307.57	4307.57

CUMULATIVE AREA = 0.00 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	CULV	247.	1.33	88.	23.	11.	0.00		
+	ROUTED TO	CULV	37.	3.67	33.	21.	11.	0.00	4310.56	3.67

Attachment 4.

Drainage time calculations.

TIME TO DRAIN DETENTION BASIN

$$35 \text{ ACRE FT} \left(\frac{4.356(10^4)\text{ FT}^2}{\text{ACRE}}\right) = 1{,}524{,}600 \text{ FT}^3$$

$$1{,}524{,}600 \text{ FT}^3 \left(\frac{\text{SEC}}{37 \text{ FT}^3}\right)\left(\frac{\text{HR}}{3600 \text{ SEC}}\right) = 11.45 \text{ HOURS}$$

Attachment 5.

Sheetflow depth calculations.

SHEETFLOW DEPTH CALCULATION

$$d = \left[\frac{Q\,n}{(1.49)(S^{1/2})(W)}\right]^{3/5}$$

$Q_{CULV} = 37$ cfs

$n = 0.04$

$S = 0.016$ FT/FT

$W = 3500$ FT

$$d_{CULV} = \left[\frac{37(0.04)}{(1.49)(0.016)^{1/2}(3500)}\right]^{3/5}$$

$d_{CULV} = 0.03$ FT

Appendix D

"10C Crater, Landfill Closure" - Soil Testing Data

SEP 22 [illegible]

September 21, 1994

NTS:Q&I:MTL:101-94

Richard Ziegenbein
Raytheon Services Nevada
Post Office Box 328, M/S 608
Mercury, NV. 89023

10C CRATER, LANDFILL CLOSURE

As requested, the Materials Testing Laboratory performed Angle of Repose, Atterberg Limits, Consolidation (8TSF), Direct Shear (4 points), Gradation, Hydrometer, Moisture, Percent Porosity, Permability, Modified Proctor, Soil Classification, Specific Gravity, and Unit Weight on the bag samples taken in four areas (see location sketch) designated by Julie Sorola from Engineering. Samples were remolded to about 95% of Modified Proctor at optimum moisture for the Consolidation, Direct Shear, and Permability tests. All four Atterberg limits were too sandy to run the plastic limit and one sample was too sandy to run the liquid limit between 20 & 30 blows as per ASTM requirements. All four Atterberg limits are listed as non-plastic. All tests are listed in the Appendix.

If you have any further questions concerning this matter or need additional tests, please contact Mr. Dale Herrington at 295-6813.

Charles Dale Herrington

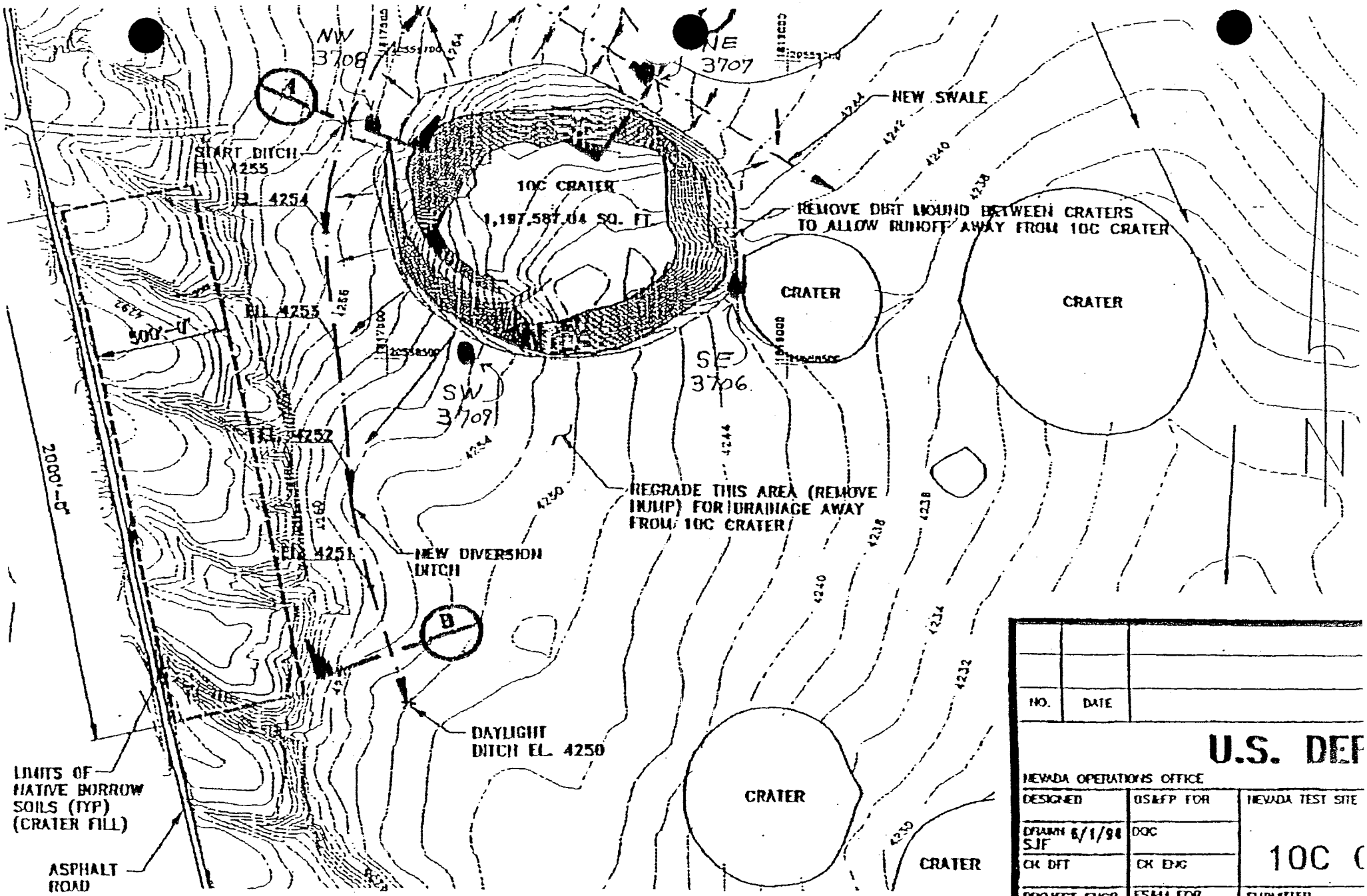
Charles Dale Herrington
Senior Specialist

Enclosures
As Stated

bc: N. Rohach, w/o encl.
V. Thummala, w/encl.
D. Herrington, w/encl.
CHRON Files
MTL Files, w/encl. (00808)

APPENDIX

1. LOCATION SKETCH
2. ANGLE OF REPOSE
3. LIQUID LIMIT, PLASTIC LIMIT, AND PLASTIC INDEX
4. CONSOLIDATION
5. CONSOLIDATION GRAPHS
6. DIRECT SHEAR
7. DIRECT SHEAR GRAPHS
8. GRADATION, MOISTURE, UNIT WEIGHT, & % POROSITY
9. HYDROMETER - TABLE 1
10. HYDROMETER - TABLE 2
11. HYDROMETER - TABLE 3
12. HYDROMETER - TABLE 4
13. HYDROMETER GRAPHS
14. PERMABILITY
15. PROCTOR (MODIFIED)
16. SOILS CLASSIFICATION CURVE
17. SPECIFIC GRAVITY



10C CRATER – STORM WATER DIVERSION

SCALE: 1"=500'

NO.	DATE	

U.S. DEP

NEVADA OPERATIONS OFFICE

DESIGNED	OS&FP FOR	NEVADA TEST SITE
DRAWN 6/1/98 SJF	DOE	10C (
CK DFT	CK ENG	
PROJECT ENGR.	ES&H FOR	SUBMITTED

Reynolds Electrical & Engineering

P.O. Box 98521 • Las Vegas, NV 89193

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

ANGLE OF REPOSE

Project:	10C CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Tested by:	R. STROTE	Test date:	08/30/94
Checked by:	D. HERRINGTON DLH	Check date:	9-20-94

Lab #	ANGLE OF REPOSE (Degrees)
3706	28.0
3707	25.5
3708	26.0
3709	27.5

NO CALIBRATED EQUIPMENT USED

Remarks:

NO SPECIFICATION, INFORMATION ONLY

Liquid Limit
Plastic Limit
ASTM D-4318-84

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
P. O. BOX 328
MERCURY NV. 89023

ID# 00808
DATE TYPED 09/13/94
PAGE 1 of 1

Requested by R. ZIEGENBEIN | User/Agency RSN | Material EXISTING

Project 10C CRATER, LANDFILL CLOSURE | Test Location AREA 10

Tested by D. ANDERSON | Date Tested 09/12/94 | Checked by D. HERRINGTON

LIQUID LIMIT

Laboratory No.	3706	3707	3708	3709	N/A
No. of Blows	28	27	12	25	
Correction Factor	1.014	1.009	0.916	1.000	
Adjusted Moisture Content %	20.6%	23.2%	N/A	22.5%	
Tare No.	4	20	9	10	
1. Wt. Wet Soil + Tare:	13.992	12.019	15.709	15.936	
2. Wt. Dry Doil + Tare:	11.883	10.077	13.171	13.294	
3. Wt. of Moisture:	2.109	1.942	2.538	2.642	
4. Wt. of Tare:	1.509	1.634	1.638	1.570	
5. Wt of Dry Soil:	10.374	8.443	11.533	11.724	
6. Moisture Content %:	20.3%	23.0%	22.0%	22.5%	

PLASTIC LIMIT

Laboratory No.	3706	3707	3708	3709	N/A
Tare No.	N/A	N/A	N/A	N/A	N/A
1. Wt. Wet Soil + Tare:	N/A	N/A	N/A	N/A	N/A
2. Wt. Dry Doil + Tare:	N/A	N/A	N/A	N/A	N/A
3. Wt. of Moisture:	N/A	N/A	N/A	N/A	N/A
4. Wt. of Tare:	N/A	N/A	N/A	N/A	N/A
5. Wt of Dry Soil:	N/A	N/A	N/A	N/A	N/A
6. Moisture Content %:	N/A	N/A	N/A	N/A	N/A

PLASTIC INDEX

Laboratory No.	3706	3707	3708	3709	N/A
Adjusted Liquid Limit %	20.6%	23.2%	N/A	22.5%	N/A
Plastic Limit %	N/A	N/A	N/A	N/A	N/A
Plastic Index	NON PLASTIC	NON PLASTIC	NON PLASTIC	NON PLASTIC	N/A

Equipment used: PM 400, PTL # 1255, Calibration Due:12/07/94
Information only, no specifications given

REMARKS: SAMPLE NON PLASTIC AS PER ASTM D 4318-93 19.1.1

CC: R. ZIEGENBEIN RSN
MTL GPP FILES

CONSOLIDATION
OF SOILS
ASTM D2435-90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Location:	AREA 10	Sample:	S.E. EXISTING
Tested by:	D. ANDERSON	Checked by:	D. HERRINGTON

MOISTURE CONTENT (BEFORE)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3706	5	329.90	310.80	19.10	149.70	161.10	11.9

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3706	6	316.40	292.90	23.50	156.70	136.20	17.3

RING & SAMPLE WT.(grm)	673.30	RING WT.(grm)	520.10	WIEGHT OF SOIL IN RING (grm)	153.80
RING = DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = 1.0")	0.0028407052
SAMPLE WET UNIT WEIGHT:	119.4			SAMPLE DRY UNIT WEIGHT:	106.7

DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS	DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS
09/14/94				08:03	1/2	2	0.0829
07:57	1/16	0	0.0800				
		1/10	0.0806	08:03	1	0	0.0829
07:58		1	0.0806			1/10	0.0843
07:59		2	0.0806			1/2	0.0845
				08:04		1	0.0845
07:59	1/8	0	0.0806	08:05		2	0.0845
		1/10	0.0808				
		1/2	0.0808	08:05	2	0	0.0845
08:00		1	0.0808			1/10	0.0866
						1/2	0.0867
08:00	1/4	0	0.0808	08:06		1	0.0867
		1/10	0.0814	08:07		2	0.0868
		1/2	0.0814				
08:01		1	0.0814	08:07	4	0	0.0868
						1/10	0.0903
08:01	1/2	0	0.0814			1/2	0.0904
		1/10	0.0826	08:08		1	0.0904
		1/2	0.0826	08:09		2	0.0905
08:02		1	0.0828	08:11		4	0.0905

Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # Y11273 Calibration due: 03/01/95

REMARKS: WATER ADDED DURING 1/16 TSF LOAD BEFORE 1 MIN. READING

Dial readings = .0000"
Information only, no specification given

CONSOLIDATION
OF SOILS
ASTM D 2435–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Location:	AREA 10	Sample:	S.E. EXISTING
Tested by:	D. ANDERSON	Checked by:	D. HERRINGTON D.L.H.

DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS	DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS
09/14/94							
08:11	8	0	0.0905				
		1/10	0.0937				
		1/2	0.0939				
08:12		1	0.0940				
08:13		2	0.0941				
08:15		4	0.0942				
08:19		8	0.0943				
08:26		15	0.0944				
08:41		30	0.0945				
09:11		60	0.0946				
10:11		120	0.0948				
12:11		240	0.0949				
16:31		500	0.0951				
09/15/94							
07:06		1375	0.0953				
07:35	1/16	0	0.0953				
07:36		1	0.0883				
07:55		20	0.0882				
08:15		40	0.0881				
08:35		60	0.0880				
08:55		80	0.0879				
09:15		100	0.0879				
09:35		120.0	0.0878				
09:55		140.0	0.0878				
10:15		160.0	0.0877				
10:35		180.0	0.0877				
N/A	N/A	N/A	N/A				

Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # Y11273 Calibration due: 03/01/95

REMARKS:

Information only, no specification given

LAB # 3706 PAGE NO. 2 OF 2

CONSOLIDATION OF SOILS
ASTM D2435-90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Location:	AREA 10	Sample:	N.E. EXISTING
Tested by:	D. ANDERSON	Checked by:	D. HERRINGTON DLH

MOISTURE CONTENT (BEFORE)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3707	4	416.00	386.00	30.00	156.60	229.40	13.1

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3707	21	300.20	277.20	23.00	143.30	133.90	17.2

RING & SAMPLE WT.(grm)	670.60	RING WT.(grm)	520.10	WIEGHT OF SOIL IN RING (grm)	153.80
RING = DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = 1.0")	0.0028407052
SAMPLE WET UNIT WEIGHT:	119.4			SAMPLE DRY UNIT WEIGHT:	105.6

DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS	DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS
09/08/94				10:33	1/2	1	0.0635
10:27	1/16	0	0.0600	10:34		2	0.0635
		1/10	0.0611				
10:28		1	0.0611	10:34	1	0	0.0635
10:29		2	0.0610			1/10	0.0651
						1/2	0.0652
10:29	1/8	0	0.0610	10:35		1	0.0653
		1/10	0.0612	10:36		2	0.0653
		1/2	0.0612	10:38		4	0.0653
10:30		1	0.0612				
				10:38	2	0	0.0653
10:30	1/4	0	0.0612			1/10	0.0676
		1/10	0.0619			1/2	0.0677
		1/2	0.0620	10:39		1	0.0678
10:31		1	0.0620	10:40		2	0.0678
10:32		2	0.0620	10:42		4	0.0680
				10:46		8	0.0680
10:32	1/2	0	0.0620				
		1/10	0.0634				
		1/2	0.0635				

Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # Y11273 Calibration due: 03/01/95

REMARKS: WATER ADDED DURING 1/16 TSF LOAD BEFORE 1 MIN. READING

Dial readings = .0000"

Information only, no specification given

CONSOLIDATION
OF SOILS
ASTM D 2435–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Location:	AREA 10	Sample:	N.E. EXISTING
Tested by:	D. ANDERSON	Checked by:	D. HERRINGTON

DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS	DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS
09/08/94							
10:46	4	0	0.0680				
		1/10	0.0712				
		1/2	0.0713				
10:47		1	0.0714				
10:48		2	0.0715				
10:50		4	0.0715				
10:54		8	0.0716				
11:01		15	0.0717				
11:01	8	0	0.0717				
		1/10	0.0753				
		1/2	0.0755				
11:02		1	0.0756				
11:03		2	0.0757				
11:05		4	0.0758				
11:09		8	0.0760				
11:16		15	0.0761				
11:31		30	0.0761				
12:01		60	0.0762				
13:01		120	0.0763				
15:01		240	0.0763				
15:20	1/16	0	0.0763				
15:22		2.0	0.0689				
15:25		5.0	0.0686				
15:30		10.0	0.0682				
16:20		60.0	0.0682				
N/A	N/A	N/A	N/A				

Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # Y11273 Calibration due: 03/01/95

REMARKS:

Information only, no specification given

LAB # 3707 PAGE NO. 2 OF 2

CONSOLIDATION OF SOILS
ASTM D2435–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Location:	AREA 10	Sample:	N.W. EXISTING
Tested by:	D. ANDERSON	Checked by:	D. HERRINGTON DLH

MOISTURE CONTENT (BEFORE)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3708	1	359.90	335.00	24.90	113.30	221.70	11.2

MOISTURE CONTENT

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3708	2	321.80	300.70	21.10	159.20	141.50	14.9

RING & SAMPLE WT.(grm)	679.40	RING WT.(grm)	520.10	WIEGHT OF SOIL IN RING (grm)	153.80
RING = DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = 1.0")	0.0028407052
SAMPLE WET UNIT WEIGHT:	119.4			SAMPLE DRY UNIT WEIGHT:	107.3

DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS	DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS
09/12/94				10:05	1	0	0.0836
10:00	1/16	0	0.0800			1/10	0.0860
		1/10	0.0807			1/2	0.0861
10:01		1	0.0807	10:06		1	0.0862
10:02		2	0.0807	10:07		2	0.0863
				10:09		4	0.0864
10:02	1/8	0	0.0807				
		1/10	0.0811	10:09	2	0	0.0864
		1/2	0.0811			1/10	0.0889
10:03		1	0.0811			1/2	0.0891
				10:10		1	0.0892
10:03	1/4	0	0.0811	10:11		2	0.0893
		1/10	0.0818	10:13		4	0.0894
		1/2	0.0819	10:17		8	0.0894
10:04		1	0.0819				
				10:17	4	0	0.0894
10:04	1/2	0	0.0819			1/10	0.0924
		1/10	0.0835			1/2	0.0927
		1/2	0.0836	10:18		1	0.0928
10:05		1	0.0836	10:19		2	0.0928

Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # Y11273 Calibration due: 03/01/95

REMARKS: WATER ADDED DURING 1/16 TSF
LOAD BEFORE 1 MIN. READING

ial readings = .0000"
ormation only, no specification given

CONSOLIDATION
OF SOILS
ASTM D 2435-90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Location:	AREA 10	Sample:	N.W. EXISTING
Tested by:	D. ANDERSON	Checked by:	D. HERRINGTON

DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS	DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS
09/12/94							
10:21	4	4	0.0929				
10:21	8	0	0.0929				
		1/10	0.0973				
		1/2	0.0976				
10:22		1	0.0978				
10:23		2	0.0979				
10:25		4	0.0980				
10:29		8	0.0981				
10:36		15	0.0982				
10:51		30	0.0985				
11:21		60	0.0986				
12:21		120	0.0988				
14:21		240	0.0989				
17:01		400	0.0990				
09/13/94							
07:01		1240	0.0993				
07:01	1/16	0	0.0993				
07:03		2	0.0918				
07:16		15	0.0918				
N/A	N/A	N/A	N/A				

Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # Y11273 Calibration due: 03/01/95

REMARKS:

information only, no specification given

CONSOLIDATION
OF SOILS
ASTM D2435-90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C-CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Location:	AREA 10	Sample:	S.W. EXISTING
Tested by:	D. ANDERSON	Checked by:	D. HERRINGTON Dah Z.

MOISTURE CONTENT (BEFORE)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3709	4	435.50	403.50	32.00	158.30	245.20	13.1

MOISTURE CONTENT

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3709	2	318.50	295.50	23.00	160.30	135.20	17.0

RING & SAMPLE WT.(grm)	673.40	RING WT.(grm)	520.10	WIEGHT OF SOIL IN RING (grm)	153.80
RING = DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = 1.0")	0.0028407052
SAMPLE WET UNIT WEIGHT:	119.4			SAMPLE DRY UNIT WEIGHT:	105.6

DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS	DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS
09/13/94				08:30	1/2	1/10	0.0829
08:22	1/16	0	0.0800			1/2	0.0830
		1/10	0.0806	08:31		1	0.0831
08:23		1	0.0806	08:32		2	0.0831
08:24		2	0.0806				
				08:32	1	0	0.0831
08:24	1/8	0	0.0806			1/10	0.0847
		1/10	0.0808			1/2	0.0848
		1/2	0.0809	08:33		1	0.0848
08:25		1	0.0810	08:34		2	0.0848
08:26		2	0.0810				
08:28		4	0.0810	08:34	2	0	0.0848
						1/10	0.0868
08:28	1/4	0	0.0810			1/2	0.0870
		1/10	0.0817	08:35		1	0.0871
		1/2	0.0818	08:36		2	0.0871
08:29		1	0.0818				
08:30		2	0.0818	08:36	4	0	0.0871
						1/10	0.0898
08:30	1/2	0	0.0818			1/2	0.0899

Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # Y11273 Calibration due: 03/01/95

REMARKS: WATER ADDED DURING 1/16 TSF LOAD BEFORE 1 MIN. READING

Dial readings = .0000"

Information only, no specification given

CONSOLIDATION
OF SOILS
ASTM D 2435-90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	RSN ID #:	00808
Requestor:	R. ZIEGENBEIN	Organization:	RSN
Location:	AREA 10	Sample:	S.W. EXISTING
Tested by:	D. ANDERSON	Checked by:	D. HERRINGTON

DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS	DATE / TIME	LOAD (TSF)	ELAPSED TIME	DIAL READINGS
09/13/94							
08:37	4	1	0.0900				
08:38		2	0.0901				
08:38	8	0	0.0901				
		1/10	0.0936				
		1/2	0.0938				
08:39		1	0.0940				
08:40		2	0.0940				
08:42		4	0.0941				
08:46		8	0.0942				
08:53		15	0.0943				
09:08		45	0.0946				
09:38		60	0.0947				
10:38		120	0.0948				
12:38		240	0.0949				
16:58		500	0.0951				
06:58		1340	0.0953				
07:00	1/16	0	0.0953				
07:01		1.0	0.0887				
07:10		10.0	0.0886				
07:15		20.0	0.0885				
N/A	N/A	N/A	N/A				

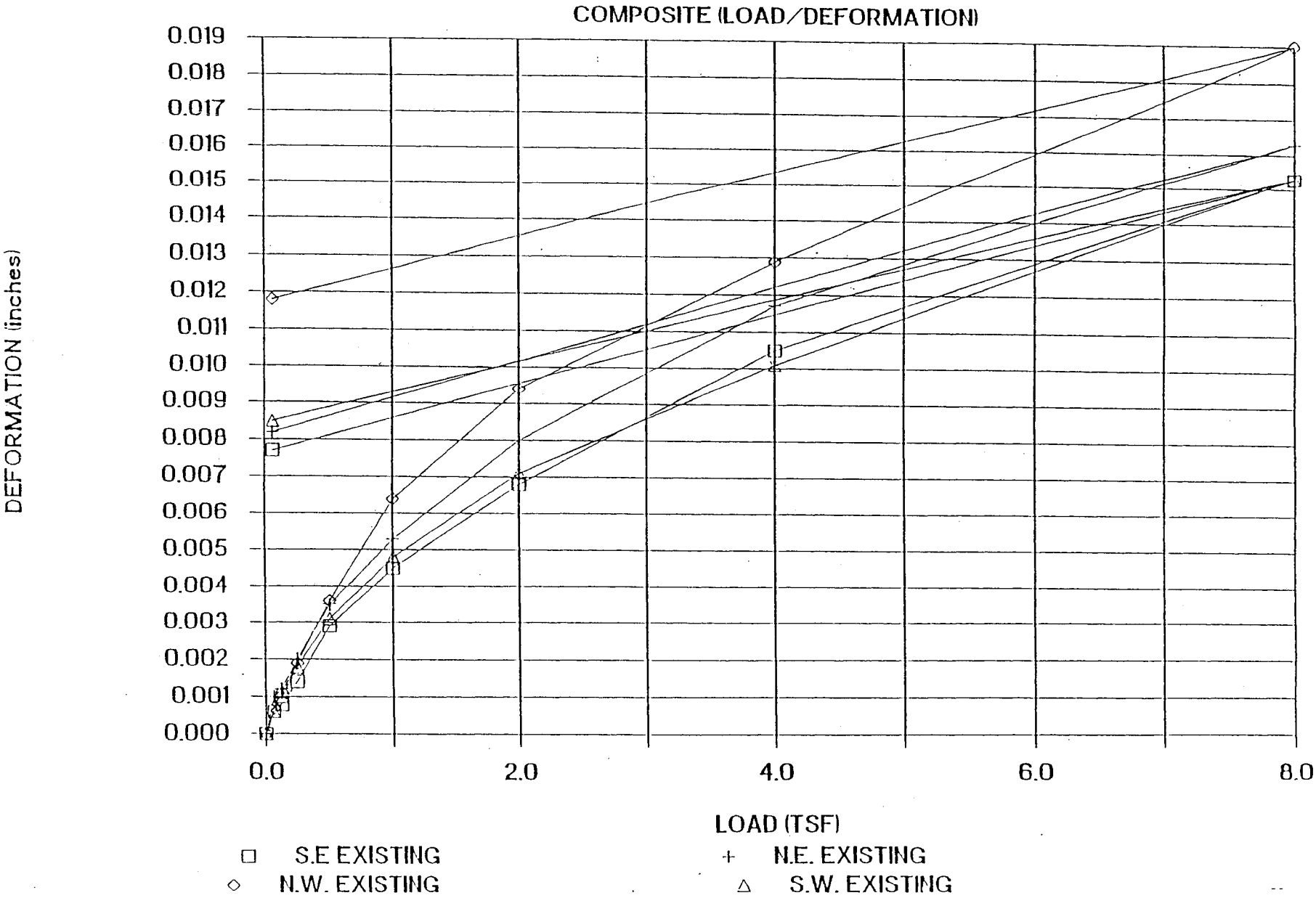
Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # Y11273 Calibration due: 03/01/95

REMARKS:

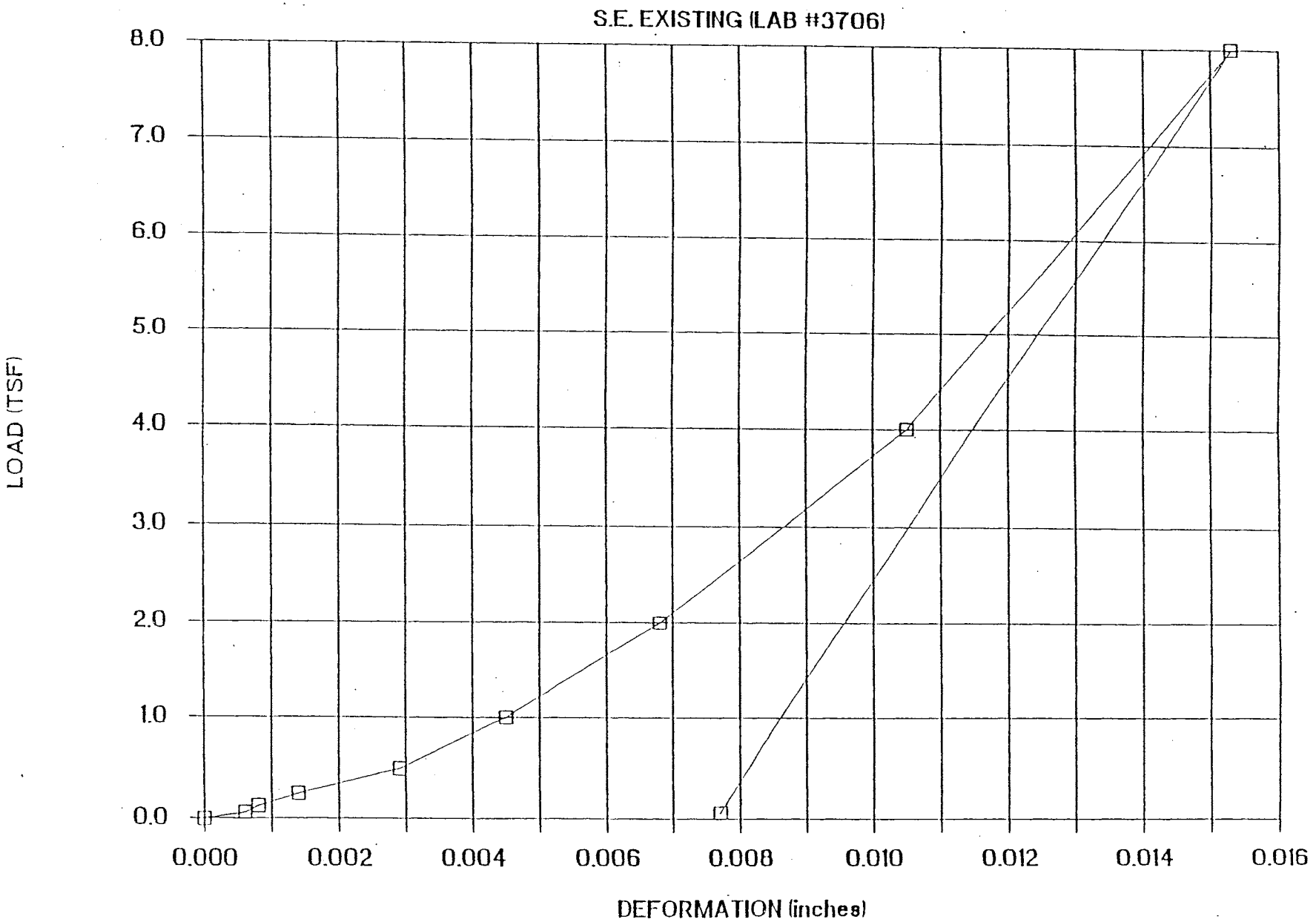
Information only, no specification given

LAB # 3709 PAGE NO. 2 OF 2

CONSOLIDATION (ASTM D2435-90)



CONSOLIDATION (ASTM D2435-90)



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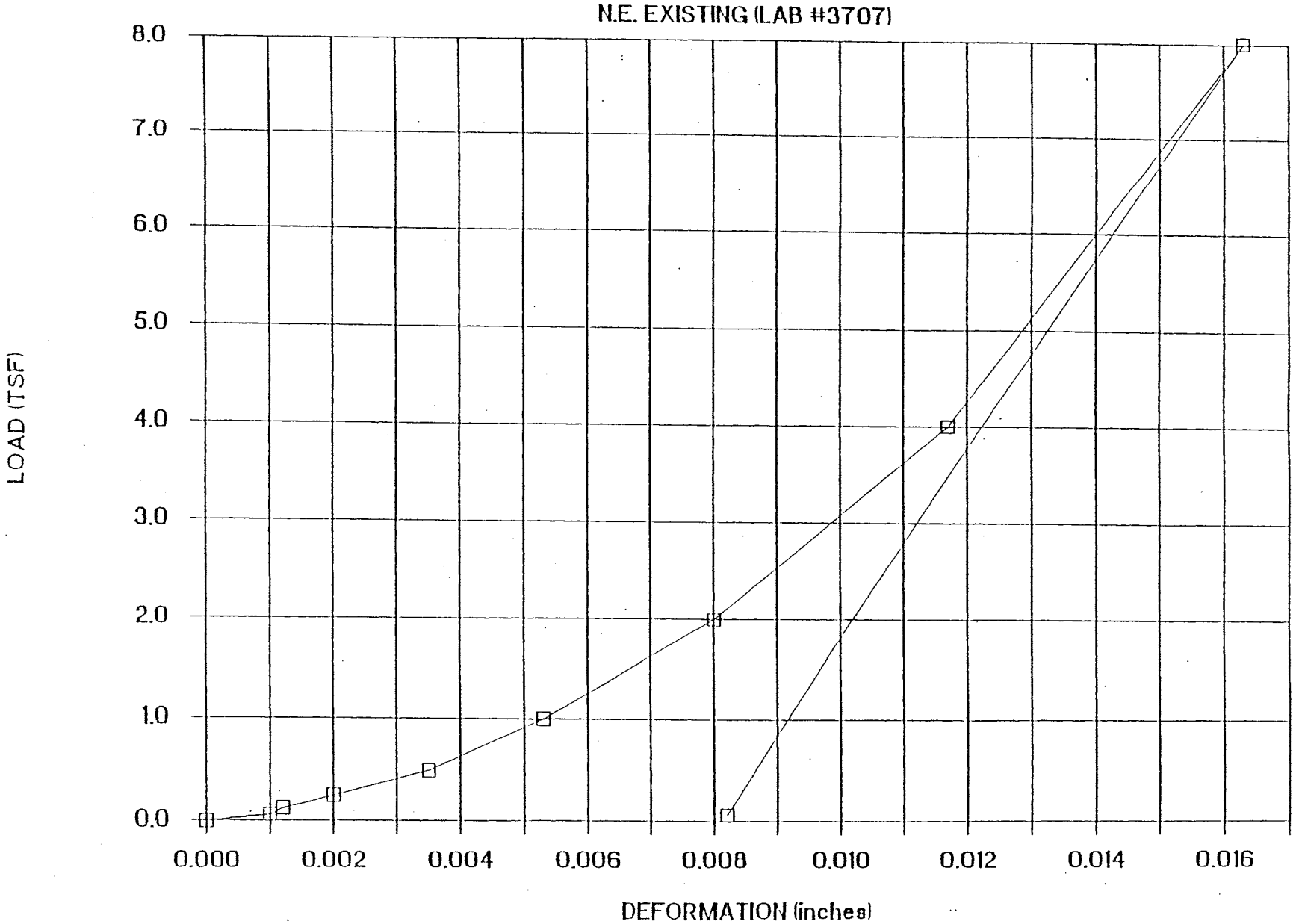

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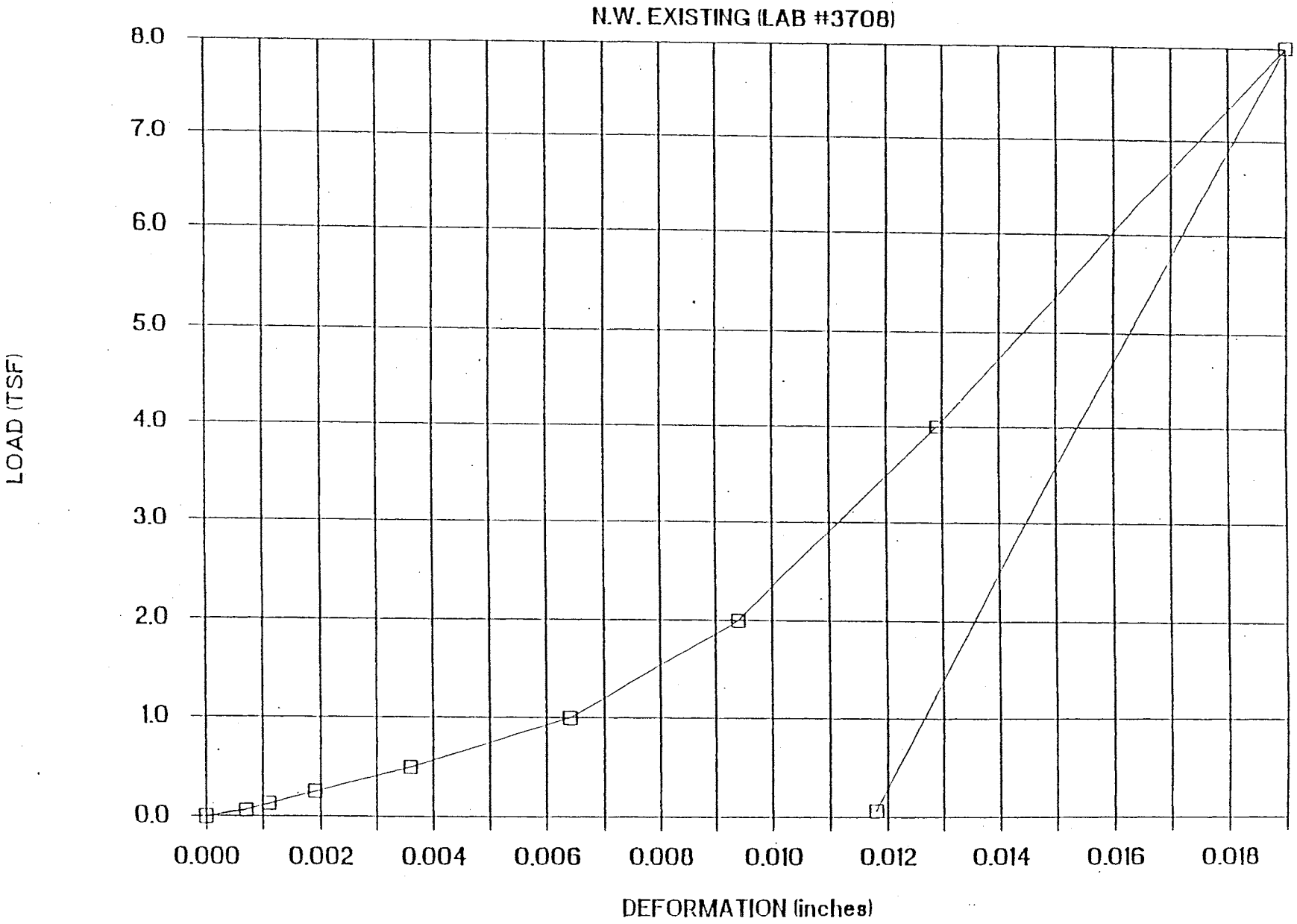
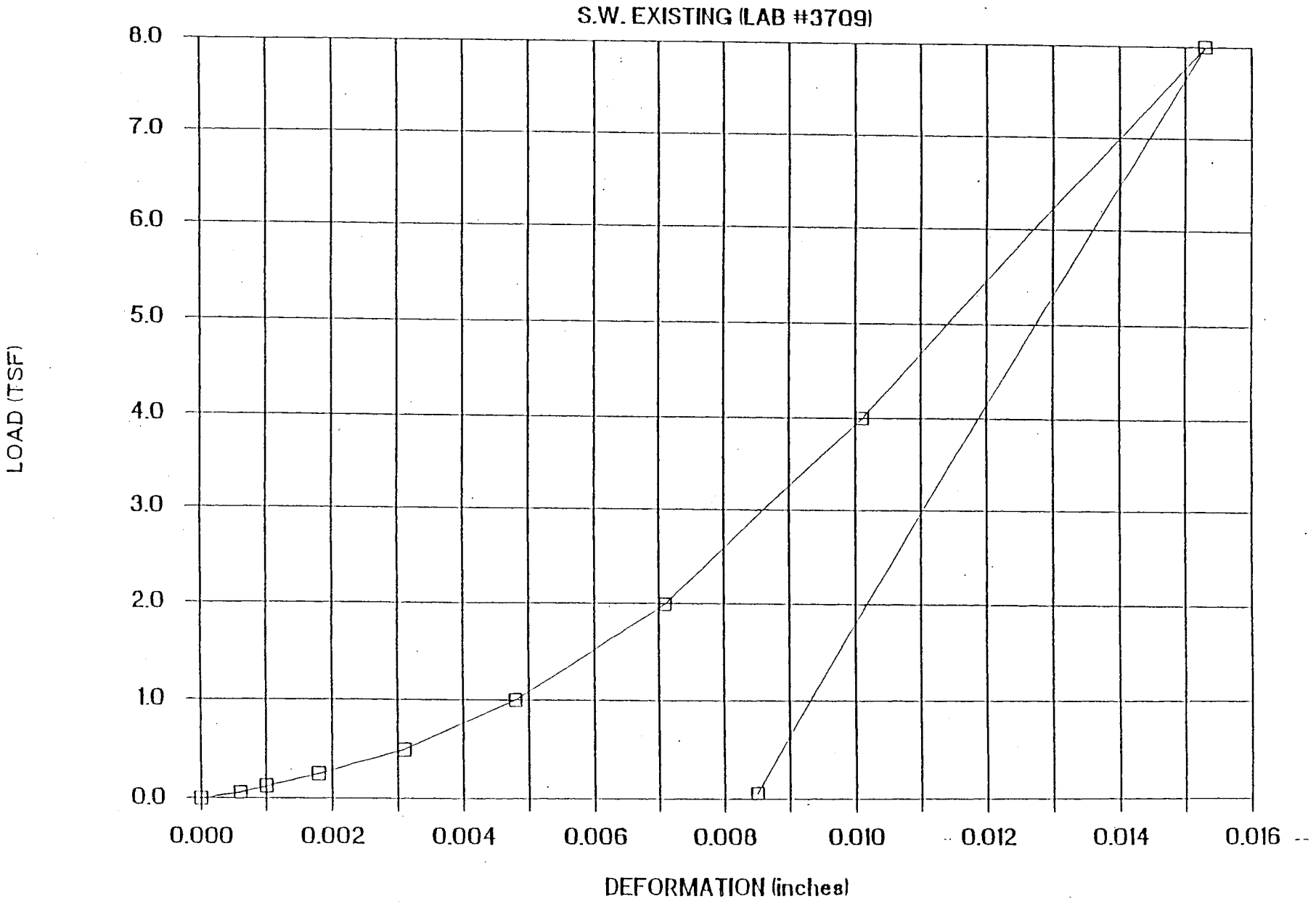


CONSOLIDATION (ASTM D2435-90)



DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	08/31/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	S.E. EXISTING	Checked by:	D. HERRINGTON Dah 34.
Unit Wieght:	119.4 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3706	2	278.6	260.4	18.2	160.3	100.1	18.2

NORMAL =	LOAD (grm)	2834.5	STRESS (psf)	1088.8	WIEGHT IN SHEAR RING (grm)	115.064430111
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
17:37			0.000	0.000			
1			0.020	0.020			
5			0.021	0.021			
10	0.000	0.000	0.022	0.022	0.0		
	0.005	0.005	0.022	0.022	23.0	9.010	264.3
	0.010	0.010	0.023	0.023	26.0	9.948	291.8
	0.015	0.015	0.023	0.023	27.0	10.260	301.0
	0.020	0.020	0.023	0.023	46.0	16.198	475.2
	0.025	0.025	0.023	0.023	54.0	18.698	548.5
	0.030	0.030	0.023	0.023	56.0	19.323	566.8
	0.040	0.040	0.022	0.022	56.0	19.323	566.8
	0.050	0.050	0.022	0.022	56.0	19.323	566.8
	0.055	0.055	0.021	0.021	51.0	17.760	521.0
17:53	0.060	0.060	0.021	0.021	45.0	15.885	466.0

Equipment used:	Mettler PM16 balance, PTL # Y1256	Calibration due:	12/07/94	REMARKS: WATER ADDED BETWEEN 1MIN.
	Dial Gauge # PTL # 7012	Calibration due:	02/20/95	AND 5 MIN. READING
	Dial Gauge # PTL # 5523	Calibration due:	09/16/94	SHEAR STARTED AFTER 10 MIN
	Dial Gauge # PTL # 5864	Calibration due:	09/16/94	CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080-90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	08/31/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	S.E. EXISTING	Checked by:	D. HERRINGTON
Unit Wieght:	119.4 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3706	3	280.8	261.2	19.6	160.3	100.9	19.4

NORMAL =	LOAD (grm)	4834.5	STRESS (psf)	2123.5	WIEGHT IN SHEAR RING (grm)	115.064430111
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
19:04			0.000	0.000			
1			0.020	0.020			
5			0.024	0.024			
10	0.000	0.000	0.025	0.025	0.0		
	0.005	0.005	0.033	0.033	25.0	9.635	282.7
	0.010	0.010	0.034	0.034	42.0	14.948	438.5
	0.015	0.015	0.034	0.034	52.0	18.073	530.2
	0.020	0.020	0.035	0.035	66.0	22.448	658.5
	0.025	0.025	0.035	0.035	78.0	26.198	768.5
	0.030	0.030	0.035	0.035	84.0	28.073	823.5
	0.040	0.040	0.035	0.035	90.0	29.948	878.5
	0.045	0.045	0.035	0.035	91.0	30.260	887.7
	0.050	0.050	0.035	0.035	90.0	29.948	878.5
	0.055	0.055	0.035	0.035	90.0	29.948	878.5
	0.060	0.060	0.035	0.035	89.0	29.635	869.4
19:20	0.065	0.065	0.035	0.035	86.0	28.698	841.9

Equipment used:	Mettler PM16 balance,	PTL # Y1256	Calibration due:	12/07/94
	Dial Gauge #	PTL # 7012	Calibration due:	02/20/95
	Dial Gauge #	PTL # 5523	Calibration due:	09/16/94
	Dial Gauge #	PTL # 5864	Calibration due:	09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN.
AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN
CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	S.E. EXISTING	Checked by:	D. HERRINGTON DLH
Unit Wieght:	119.4 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3706	4	278.5	257.0	21.5	158.4	98.6	21.8

NORMAL =	LOAD (grm)	6834.5	STRESS (psf)	3158.3	WIEGHT IN SHEAR RING (grm)	115.064430111
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
08:11			0.000	0.000			
1			0.024	0.024			
5			0.027	0.027			
10	0.000	0.000	0.027	0.027	0.0		
	0.005	0.005	0.032	0.032	15.0	6.510	191.0
	0.010	0.010	0.033	0.033	121.0	39.635	1162.7
	0.015	0.015	0.034	0.034	143.0	46.510	1364.4
	0.020	0.020	0.035	0.035	175.0	56.510	1657.8
	0.030	0.030	0.036	0.036	209.0	67.135	1969.4
	0.035	0.035	0.036	0.036	221.0	70.885	2079.5
	0.040	0.040	0.036	0.036	232.0	74.323	2180.3
	0.050	0.050	0.036	0.036	247.0	79.010	2317.8
	0.060	0.060	0.036	0.036	261.0	83.385	2446.1
	0.080	0.080	0.037	0.037	269.0	85.885	2519.5
	0.100	0.100	0.036	0.036	272.0	86.823	2547.0
	0.125	0.125	0.035	0.035	276.0	88.073	2583.7
	0.175	0.175	0.035	0.035	288.0	91.823	2693.7
	0.200	0.200	0.035	0.035	297.0	94.635	2776.2
	0.225	0.225	0.035	0.035	300.0	95.573	2803.7
	0.275	0.275	0.034	0.034	305.0	97.135	2849.5
	0.300	0.300	0.033	0.033	310.0	98.698	2895.3
	0.325	0.325	0.032	0.032	314.0	99.948	2932.0
	0.350	0.350	0.032	0.032	314.0	99.948	2932.0
08:50	0.360	0.360	0.032	0.032	311.0	99.010	2904.5

Equipment used:	Mettler PM16 balance,	PTL # Y1256	Calibration due:	12/07/94
	Dial Gauge #	PTL # 7012	Calibration due:	02/20/95
	Dial Gauge #	PTL # 5523	Calibration due:	09/16/94
	Dial Gauge #	PTL # 5864	Calibration due:	09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN. AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN
CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	S.E. EXISTING	Checked by:	D. HERRINGTON
Unit Wieght:	119.4 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3706	5	270.6	250.8	19.8	149.8	101.0	19.6

NORMAL =	LOAD (grm)	8834.5	STRESS (psf)	4193.1	WIEGHT IN SHEAR RING (grm)	115.064430111
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
09:12			0.000	0.000			
1			0.022	0.022			
5			0.024	0.024			
10	0.000	0.000	0.025	0.025	0.0		
	0.005	0.005	0.032	0.032	165.0	53.385	1566.1
	0.010	0.010	0.032	0.032	231.0	74.010	2171.1
	0.015	0.015	0.032	0.032	261.0	83.385	2446.1
	0.020	0.020	0.032	0.032	294.0	93.698	2748.7
	0.025	0.025	0.033	0.033	306.0	97.448	2858.7
	0.030	0.030	0.033	0.033	308.0	98.073	2877.0
	0.035	0.035	0.033	0.033	311.0	99.010	2904.5
	0.040	0.040	0.033	0.033	326.0	103.698	3042.0
	0.045	0.045	0.033	0.033	336.0	106.823	3133.7
	0.050	0.050	0.033	0.033	340.0	108.073	3170.4
	0.060	0.060	0.033	0.033	345.0	109.635	3216.2
	0.070	0.070	0.033	0.033	346.0	109.948	3225.4
	0.080	0.080	0.032	0.032	348.0	110.573	3243.7
	0.090	0.090	0.032	0.032	350.0	111.198	3262.0
	0.100	0.100	0.032	0.032	350.0	111.198	3262.0
	0.125	0.125	0.032	0.032	354.0	112.448	3298.7
	0.150	0.150	0.032	0.032	354.0	112.448	3298.7
	0.156	0.156	0.032	0.032	353.0	112.135	3289.5
09:32	0.165	0.165	0.032	0.032	351.0	111.510	3271.2

Equipment used:	Mettler PM16 balance, PTL # Y1256	Calibration due:	12/07/94
	Dial Gauge # PTL # 7012	Calibration due:	02/20/95
	Dial Gauge # PTL # 5523	Calibration due:	09/16/94
	Dial Gauge # PTL # 5864	Calibration due:	09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN.
AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN
CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	N.E. EXISTING	Checked by:	D. HERRINGTON DLH
Unit Wieght:	117.7 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3707	7	278.0	257.3	20.7	159.2	98.1	21.1

NORMAL =	LOAD (grm)	2834.5	STRESS (psf)	1088.8	WIEGHT IN SHEAR RING (grm)	113.44516187
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
09:59			0.000	0.000			
1			0.013	0.013			
5			0.014	0.014			
10	0.000	0.000	0.015	0.015	0.0		
	0.005	0.005	0.022	0.022	75.0	25.260	741.0
	0.010	0.010	0.022	0.022	94.0	31.198	915.2
	0.015	0.015	0.022	0.022	103.0	34.010	997.7
	0.020	0.020	0.022	0.022	114.0	37.448	1098.6
	0.025	0.025	0.021	0.021	116.0	38.073	1116.9
	0.030	0.030	0.021	0.021	122.0	39.948	1171.9
	0.035	0.035	0.020	0.020	124.0	40.573	1190.2
	0.040	0.040	0.019	0.019	126.0	41.198	1208.6
	0.045	0.045	0.020	0.020	126.0	41.198	1208.6
	0.050	0.050	0.019	0.019	126.0	41.198	1208.6
	0.060	0.060	0.017	0.017	126.0	41.198	1208.6
	0.066	0.066	0.016	0.016	125.0	40.885	1199.4
10:15	0.070	0.070	0.016	0.016	122.0	39.948	1171.9

Equipment used:	Mettler PM16 balance, PTL # Y1256	Calibration due:	12/07/94	REMARKS: WATER ADDED BETWEEN 1MIN.
	Dial Gauge # PTL # 7012	Calibration due:	02/20/95	AND 5 MIN. READING
	Dial Gauge # PTL # 5523	Calibration due:	09/16/94	SHEAR STARTED AFTER 10 MIN
	Dial Gauge # PTL # 5864	Calibration due:	09/16/94	CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	N.E. EXISTING	Checked by:	D. HERRINGTON Dal H.
Unit Wieght:	117.7 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3707	8	276.3	255.3	21.0	158.4	96.9	21.7

NORMAL =	LOAD (grm)	4834.5	STRESS (psf)	2123.5	WIEGHT IN SHEAR RING (grm)	113.44516187
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
10:36			0.000	0.000			
1			0.014	0.014			
5			0.018	0.018			
10	0.000	0.000	0.018	0.018	0.0		
	0.015	0.015	0.025	0.025	6.0	3.698	108.5
	0.020	0.020	0.025	0.025	15.0	6.510	191.0
	0.025	0.025	0.026	0.026	25.0	9.635	282.7
	0.030	0.030	0.026	0.026	33.0	12.135	356.0
	0.040	0.040	0.027	0.027	43.0	15.260	447.7
	0.045	0.045	0.027	0.027	48.0	16.823	493.5
	0.050	0.050	0.028	0.028	53.0	18.385	539.3
	0.060	0.060	0.029	0.029	63.0	21.510	631.0
	0.080	0.080	0.030	0.030	67.0	22.760	667.7
	0.100	0.100	0.031	0.031	65.0	22.135	649.4
	0.150	0.150	0.032	0.032	74.0	24.948	731.9
	0.175	0.175	0.033	0.033	88.0	29.323	860.2
	0.200	0.200	0.033	0.033	98.0	32.448	951.9
	0.225	0.225	0.034	0.034	105.0	34.635	1016.0
	0.275	0.275	0.034	0.034	111.0	36.510	1071.0
	0.300	0.300	0.034	0.034	114.0	37.448	1098.6
	0.350	0.350	0.034	0.034	117.0	38.385	1126.1
	0.375	0.375	0.034	0.034	124.0	40.573	1190.2
	0.394	0.394	0.034	0.034	123.0	40.260	1181.1
11:07	0.400	0.400	0.034	0.034	120.0	39.323	1153.6

Equipment used:	Mettler PM16 balance, PTL # Y1256	Calibration due:	12/07/94	REMARKS: WATER ADDED BETWEEN 1MIN.
	Dial Gauge # PTL # 7012	Calibration due:	02/20/95	AND 5 MIN. READING
	Dial Gauge # PTL # 5523	Calibration due:	09/16/94	SHEAR STARTED AFTER 10 MIN
	Dial Gauge # PTL # 5864	Calibration due:	09/16/94	CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	N.E. EXISTING	Checked by:	D. HERRINGTON
Unit Wieght:	117.7 PCF	Check date:	

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3707	9	278.1	257.3	20.8	158.4	98.9	21.0

NORMAL =	LOAD (grm)	6834.5	STRESS (psf)	3158.3	WIEGHT IN SHEAR RING (grm)	113.44516187
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
12:24			0.000	0.000			
1			0.022	0.022			
5			0.022	0.022			
10	0.000	0.000	0.022	0.022	0.0		
	0.005	0.005	0.032	0.032	105.0	34.635	1016.0
	0.010	0.010	0.032	0.032	147.0	47.760	1401.1
	0.015	0.015	0.033	0.033	174.0	56.198	1648.6
	0.020	0.020	0.033	0.033	198.0	63.698	1868.6
	0.025	0.025	0.035	0.035	215.0	69.010	2024.5
	0.030	0.030	0.035	0.035	226.0	72.448	2125.3
	0.035	0.035	0.035	0.035	237.0	75.885	2226.1
	0.040	0.040	0.036	0.036	247.0	79.010	2317.8
	0.045	0.045	0.036	0.036	255.0	81.510	2391.1
	0.050	0.050	0.036	0.036	258.0	82.448	2418.6
	0.060	0.060	0.036	0.036	264.0	84.323	2473.6
	0.070	0.070	0.036	0.036	264.0	84.323	2473.6
	0.080	0.080	0.036	0.036	265.0	84.635	2482.8
	0.090	0.090	0.036	0.036	268.0	85.573	2510.3
	0.100	0.100	0.037	0.037	273.0	87.135	2556.2
	0.125	0.125	0.037	0.037	280.0	89.323	2620.3
	0.150	0.150	0.037	0.037	293.0	93.385	2739.5
	0.175	0.175	0.037	0.037	299.0	95.260	2794.5
	0.184	0.184	0.037	0.037	290.0	92.448	2712.0
12:45	0.190	0.190	0.037	0.037	285.0	90.885	2666.2

Equipment used:	Mettler PM16 balance,	PTL # Y1256	Calibration due:	12/07/94
	Dial Gauge #	PTL # 7012	Calibration due:	02/20/95
	Dial Gauge #	PTL # 5523	Calibration due:	09/16/94
	Dial Gauge #	PTL # 5864	Calibration due:	09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN. AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	N.E. EXISTING	Checked by:	D. HERRINGTON Dal H.
Unit Wieght:	117.7 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3707	10	242.0	219.9	22.1	124.7	95.2	23.2

NORMAL =	LOAD (grm)	8834.5	STRESS (psf)	4193.1	WIEGHT IN SHEAR RING (grm)	113.44516187
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
13:02			0.000	0.000			
1			0.024	0.024			
5			0.026	0.026			
10	0.000	0.000	0.026	0.026	0.0		
	0.005	0.005	0.032	0.032	133.0	43.385	1272.7
	0.010	0.010	0.033	0.033	184.0	59.323	1740.3
	0.015	0.015	0.034	0.034	206.0	66.198	1941.9
	0.020	0.020	0.034	0.034	236.0	75.573	2217.0
	0.025	0.025	0.034	0.034	242.0	77.448	2272.0
	0.030	0.030	0.034	0.034	252.0	80.573	2363.6
	0.040	0.040	0.035	0.035	265.0	84.635	2482.8
	0.050	0.050	0.035	0.035	280.0	89.323	2620.3
	0.070	0.070	0.034	0.034	288.0	91.823	2693.7
	0.090	0.090	0.033	0.033	290.0	92.448	2712.0
	0.100	0.100	0.033	0.033	287.0	91.510	2684.5
	0.150	0.150	0.033	0.033	298.0	94.948	2785.3
	0.200	0.200	0.034	0.034	313.0	99.635	2922.8
	0.225	0.225	0.034	0.034	320.0	101.823	2987.0
	0.275	0.275	0.034	0.034	335.0	106.510	3124.5
	0.325	0.325	0.033	0.033	341.0	108.385	3179.5
	0.350	0.350	0.032	0.032	346.0	109.948	3225.4
	0.375	0.375	0.031	0.031	352.0	111.823	3280.4
	0.389	0.389	0.030	0.030	345.0	109.635	3216.2
13:41	0.400	0.400	0.029	0.029	341.0	108.385	3179.5

Equipment used: Mettler PM16 balance, PTL # Y1256 Calibration due: 12/07/94
Dial Gauge # PTL # 7012 Calibration due: 02/20/95
Dial Gauge # PTL # 5523 Calibration due: 09/16/94
Dial Gauge # PTL # 5864 Calibration due: 09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN. AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080-90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	N.W. EXISTING	Checked by:	D. HERRINGTON DLH
Unit Wieght:	123.8 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3708	11	231.9	214.7	17.2	118.4	96.3	17.9

NORMAL =	LOAD (grm)	2834.5	STRESS (psf)	1088.8	WIEGHT IN SHEAR RING (grm)	119.324647745
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
14:01			0.000	0.000			
1			0.002	0.002			
5			0.002	0.002			
10	0.000	0.000	0.002	0.002	0.0		
	0.005	0.005	0.009	0.009	35.0	12.760	374.3
	0.010	0.010	0.009	0.009	52.0	18.073	530.2
	0.015	0.015	0.009	0.009	56.0	19.323	566.8
	0.020	0.020	0.009	0.009	66.0	22.448	658.5
	0.030	0.030	0.009	0.009	71.0	24.010	704.4
	0.040	0.040	0.009	0.009	77.0	25.885	759.4
	0.050	0.050	0.009	0.009	84.0	28.073	823.5
	0.060	0.060	0.009	0.009	89.0	29.635	869.4
	0.070	0.070	0.009	0.009	97.0	32.135	942.7
	0.090	0.090	0.009	0.009	99.0	32.760	961.0
	0.125	0.125	0.009	0.009	99.0	32.760	961.0
	0.150	0.150	0.009	0.009	100.0	33.073	970.2
	0.200	0.200	0.009	0.009	105.0	34.635	1016.0
	0.250	0.250	0.010	0.010	113.0	37.135	1089.4
	0.350	0.350	0.005	0.005	116.0	38.073	1116.9
	0.375	0.375	0.005	0.005	132.0	43.073	1263.6
	0.425	0.425	0.001	0.001	143.0	46.510	1364.4
	0.450	0.450	0.000	0.000	146.0	47.448	1391.9
	0.475	0.475	0.000	0.000	147.0	47.760	1401.1
14:31	0.500	0.500	0.000	0.000	143.0	46.510	1364.4

Equipment used:	Mettler PM16 balance,	PTL # Y1256	Calibration due:	12/07/94
	Dial Gauge #	PTL # 7012	Calibration due:	02/20/95
	Dial Gauge #	PTL # 5523	Calibration due:	09/16/94
	Dial Gauge #	PTL # 5864	Calibration due:	09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN.
AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN
CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	N.W. EXISTING	Checked by:	D. HERRINGTON Dal H.
Unit Wieght:	123.8 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3708	12	269.5	250.7	18.8	153.3	97.4	19.3

NORMAL =	LOAD (grm)	4834.5	STRESS (psf)	2123.5	WIEGHT IN SHEAR RING (grm)	119.324647745
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
14:47			0.000	0.000			
1			0.018	0.018			
5			0.019	0.019			
10	0.000	0.000	0.018	0.018	0.0		
	0.005	0.005	0.025	0.025	76.0	25.573	750.2
	0.010	0.010	0.026	0.026	92.0	30.573	896.9
	0.015	0.015	0.027	0.027	105.0	34.635	1016.0
	0.020	0.020	0.028	0.028	110.0	36.198	1061.9
	0.030	0.030	0.029	0.029	126.0	41.198	1208.6
	0.035	0.035	0.028	0.028	135.0	44.010	1291.1
	0.040	0.040	0.029	0.029	139.0	45.260	1327.7
	0.050	0.050	0.030	0.030	149.0	48.385	1419.4
	0.060	0.060	0.030	0.030	158.0	51.198	1501.9
	0.080	0.080	0.030	0.030	166.0	53.698	1575.3
	0.150	0.150	0.032	0.032	169.0	54.635	1602.8
	0.200	0.200	0.032	0.032	183.0	59.010	1731.1
	0.250	0.250	0.030	0.030	190.0	61.198	1795.3
	0.300	0.300	0.029	0.029	205.0	65.885	1932.8
	0.350	0.350	0.027	0.027	224.0	71.823	2107.0
	0.400	0.400	0.025	0.025	243.0	77.760	2281.1
	0.425	0.425	0.024	0.024	251.0	80.260	2354.5
	0.475	0.475	0.022	0.022	255.0	81.510	2391.1
	0.525	0.525	0.017	0.017	256.0	81.823	2400.3
15:20	0.550	0.550	0.015	0.015	253.0	80.885	2372.8

Equipment used:	Mettler PM16 balance, PTL # Y1256	Calibration due:	12/07/94	REMARKS: WATER ADDED BETWEEN 1MIN.
	Dial Gauge # PTL # 7012	Calibration due:	02/20/95	AND 5 MIN. READING
	Dial Gauge # PTL # 5523	Calibration due:	09/16/94	SHEAR STARTED AFTER 10 MIN
	Dial Gauge # PTL # 5864	Calibration due:	09/16/94	CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	N.W. EXISTING	Checked by:	D. HERRINGTON DLH
Unit Wieght:	123.8 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3708	13	282.3	264.6	17.7	159.0	105.6	16.8

NORMAL =	LOAD (grm)	6834.5	STRESS (psf)	3158.3	WIEGHT IN SHEAR RING (grm)	119.324647745
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
15:42			0.000	0.000			
1			0.020	0.020			
5			0.022	0.022			
10	0.000	0.000	0.023	0.023	0.0		
	0.005	0.005	0.032	0.032	123.0	40.260	1181.1
	0.010	0.010	0.032	0.032	167.0	54.010	1584.4
	0.015	0.015	0.032	0.032	200.0	64.323	1886.9
	0.020	0.020	0.033	0.033	225.0	72.135	2116.1
	0.025	0.025	0.033	0.033	249.0	79.635	2336.1
	0.030	0.030	0.033	0.033	265.0	84.635	2482.8
	0.035	0.035	0.033	0.033	284.0	90.573	2657.0
	0.040	0.040	0.033	0.033	289.0	92.135	2702.8
	0.045	0.045	0.033	0.033	297.0	94.635	2776.2
	0.050	0.050	0.033	0.033	304.0	96.823	2840.3
	0.060	0.060	0.032	0.032	313.0	99.635	2922.8
	0.070	0.070	0.031	0.031	314.0	99.948	2932.0
	0.080	0.080	0.030	0.030	313.0	99.635	2922.8
	0.085	0.085	0.029	0.029	312.0	99.323	2913.7
15:59	0.090	0.090	0.029	0.029	311.0	99.010	2904.5

Equipment used:	Mettler PM16 balance,	PTL # Y1256	Calibration due:	12/07/94
	Dial Gauge #	PTL # 7012	Calibration due:	02/20/95
	Dial Gauge #	PTL # 5523	Calibration due:	09/16/94
	Dial Gauge #	PTL # 5864	Calibration due:	09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN. AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/01/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	N.W. EXISTING	Checked by:	D. HERRINGTON
Unit Wieght:	123.8 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3708	14	275.5	257.5	18.0	152.5	105.0	17.1

NORMAL =	LOAD (grm)	8834.5	STRESS (psf)	4193.1	WIEGHT IN SHEAR RING (grm)	119.324647745
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
16:24			0.000	0.000			
1			0.027	0.027			
5			0.029	0.029			
10	0.000	0.000	0.030	0.030	0.0		
	0.005	0.005	0.039	0.039	135.0	44.010	1291.1
	0.010	0.010	0.040	0.040	145.0	47.135	1382.7
	0.020	0.020	0.040	0.040	160.0	51.823	1520.2
	0.030	0.030	0.040	0.040	185.0	59.635	1749.4
	0.040	0.040	0.041	0.041	213.0	68.385	2006.1
	0.050	0.050	0.041	0.041	230.0	73.698	2162.0
	0.060	0.060	0.041	0.041	241.0	77.135	2262.8
	0.075	0.075	0.041	0.041	252.0	80.573	2363.6
	0.100	0.100	0.040	0.040	262.0	83.698	2455.3
	0.125	0.125	0.040	0.040	265.0	84.635	2482.8
	0.150	0.150	0.039	0.039	264.0	84.323	2473.6
	0.175	0.175	0.038	0.038	263.0	84.010	2464.5
14:45	0.200	0.200	0.038	0.038	263.0	84.010	2464.5

Equipment used:	Mettler PM16 balance.	PTL # Y1256	Calibration due:	12/07/94
	Dial Gauge #	PTL # 7012	Calibration due:	02/20/95
	Dial Gauge #	PTL # 5523	Calibration due:	09/16/94
	Dial Gauge #	PTL # 5864	Calibration due:	09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN. AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/09/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	S.W. EXISTING	Checked by:	D. HERRINGTON DLH.
Unit Wieght:	119.2 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3709	17	233.2	213.1	20.1	113.5	99.6	20.2

NORMAL =	LOAD (grm)	2834.5	STRESS (psf)	1088.8	WIEGHT IN SHEAR RING (grm)	114.890937085
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
12:40			0.000	0.000			
1			0.001	0.001			
5			0.009	0.009			
10	0.000	0.000	0.019	0.019	0.0		
	0.005	0.005	0.019	0.019	66.0	22.448	658.5
	0.010	0.010	0.019	0.019	94.0	31.198	915.2
	0.015	0.015	0.019	0.019	112.0	36.823	1080.2
	0.020	0.020	0.019	0.019	125.0	40.885	1199.4
	0.025	0.025	0.019	0.019	134.0	43.698	1281.9
	0.030	0.030	0.018	0.018	138.0	44.948	1318.6
	0.035	0.035	0.017	0.017	143.0	46.510	1364.4
	0.040	0.040	0.017	0.017	144.0	46.823	1373.6
	0.045	0.045	0.015	0.015	145.0	47.135	1382.7
	0.050	0.050	0.014	0.014	145.0	47.135	1382.7
	0.054	0.054	0.014	0.014	143.0	46.510	1364.4
12:56	0.060	0.060	0.013	0.013	142.0	46.198	1355.2

Equipment used:	Mettler PM16 balance.	PTL # Y1256	Calibration due:	12/07/94
	Dial Gauge #	PTL # 7012	Calibration due:	02/20/95
	Dial Gauge #	PTL # 5523	Calibration due:	09/16/94
	Dial Gauge #	PTL # 5864	Calibration due:	09/16/94

REMARKS: WATER ADDED BETWEEN 1MIN.
AND 5 MIN. READING
SHEAR STARTED AFTER 10 MIN
CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/09/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	S.W. EXISTING	Checked by:	D. HERRINGTON
Unit Wieght:	119.2 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3709	18	239.9	221.5	18.4	121.2	100.3	18.3

NORMAL =	LOAD (grm)	4834.5	STRESS (psf)	2123.5	WIEGHT IN SHEAR RING (grm)	114.890937085
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
13:15			0.000	0.000			
1			0.016	0.016			
5			0.017	0.017			
10	0.000	0.000	0.026	0.026	0.0		
	0.005	0.005	0.027	0.027	89.0	29.635	869.4
	0.010	0.010	0.027	0.027	117.0	38.385	1126.1
	0.015	0.015	0.027	0.027	143.0	46.510	1364.4
	0.020	0.020	0.027	0.027	164.0	53.073	1556.9
	0.025	0.025	0.027	0.027	184.0	59.323	1740.3
	0.030	0.030	0.027	0.027	199.0	64.010	1877.8
	0.035	0.035	0.027	0.027	204.0	65.573	1923.6
	0.040	0.040	0.027	0.027	211.0	67.760	1987.8
	0.045	0.045	0.027	0.027	217.0	69.635	2042.8
	0.050	0.050	0.026	0.026	221.0	70.885	2079.5
	0.060	0.060	0.025	0.025	224.0	71.823	2107.0
	0.065	0.065	0.025	0.025	224.0	71.823	2107.0
13:59	0.075	0.075	0.025	0.025	217.0	69.635	2042.8

Equipment used:	Mettler PM16 balance, PTL # Y1256	Calibration due:	12/07/94	REMARKS: WATER ADDED BETWEEN 1MIN.
	Dial Gauge # PTL # 7012	Calibration due:	02/20/95	AND 5 MIN. READING
	Dial Gauge # PTL # 5523	Calibration due:	09/16/94	SHEAR STARTED AFTER 10 MIN
	Dial Gauge # PTL # 5864	Calibration due:	09/16/94	CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080-90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/09/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	S.W. EXISTING	Checked by:	D. HERRINGTON DLH
Unit Wieght:	119.2 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3709	19	234.0	215.4	18.6	115.1	100.3	18.5

NORMAL =	LOAD (grm)	6834.5	STRESS (psf)	3158.3	WIEGHT IN SHEAR RING (grm)	114.890937085
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
13:52			0.000	0.000			
1			0.019	0.019			
5			0.021	0.021			
10	0.000	0.000	0.022	0.022	0.0		
	0.005	0.005	0.027	0.027	118.0	38.698	1135.2
	0.010	0.010	0.028	0.028	182.0	58.698	1721.9
	0.015	0.015	0.028	0.028	223.0	71.510	2097.8
	0.020	0.020	0.029	0.029	260.0	83.073	2437.0
	0.025	0.025	0.029	0.029	277.0	88.385	2592.8
	0.030	0.030	0.029	0.029	295.0	94.010	2757.8
	0.035	0.035	0.029	0.029	307.0	97.760	2867.8
	0.040	0.040	0.029	0.029	314.0	99.948	2932.0
	0.045	0.045	0.029	0.029	321.0	102.135	2996.2
	0.050	0.050	0.028	0.028	323.0	102.760	3014.5
	0.055	0.055	0.027	0.027	321.0	102.135	2996.2
14:07	0.065	0.065	0.027	0.027	298.0	94.948	2785.3

Equipment used:	Mettler PM16 balance, PTL # YI256	Calibration due:	12/07/94	REMARKS: WATER ADDED BETWEEN 1MIN.
	Dial Gauge # PTL # 7012	Calibration due:	02/20/95	AND 5 MIN. READING
	Dial Gauge # PTL # 5523	Calibration due:	09/16/94	SHEAR STARTED AFTER 10 MIN
	Dial Gauge # PTL # 5864	Calibration due:	09/16/94	CONSOLIDATION READING

DIRECT SHEAR
OF SOILS
ASTM D 3080–90

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	D. ANDERSON
Requestor:	R. ZIEGENBEIN	Test date:	09/09/94
Organization:	RSN	RSN ID #:	00808
Sample Zone:	S.W. EXISTING	Checked by:	D. HERRINGTON
Unit Wieght:	119.2 PCF	Check date:	9-20-94

MOISTURE CONTENT (AFTER)

LAB #	TARE #	WET WT.	DRY WT.	WATER	TARE WT.	DRY SOIL	MOISTURE %
3709	20	280.6	261.1	19.5	160.8	100.3	19.4

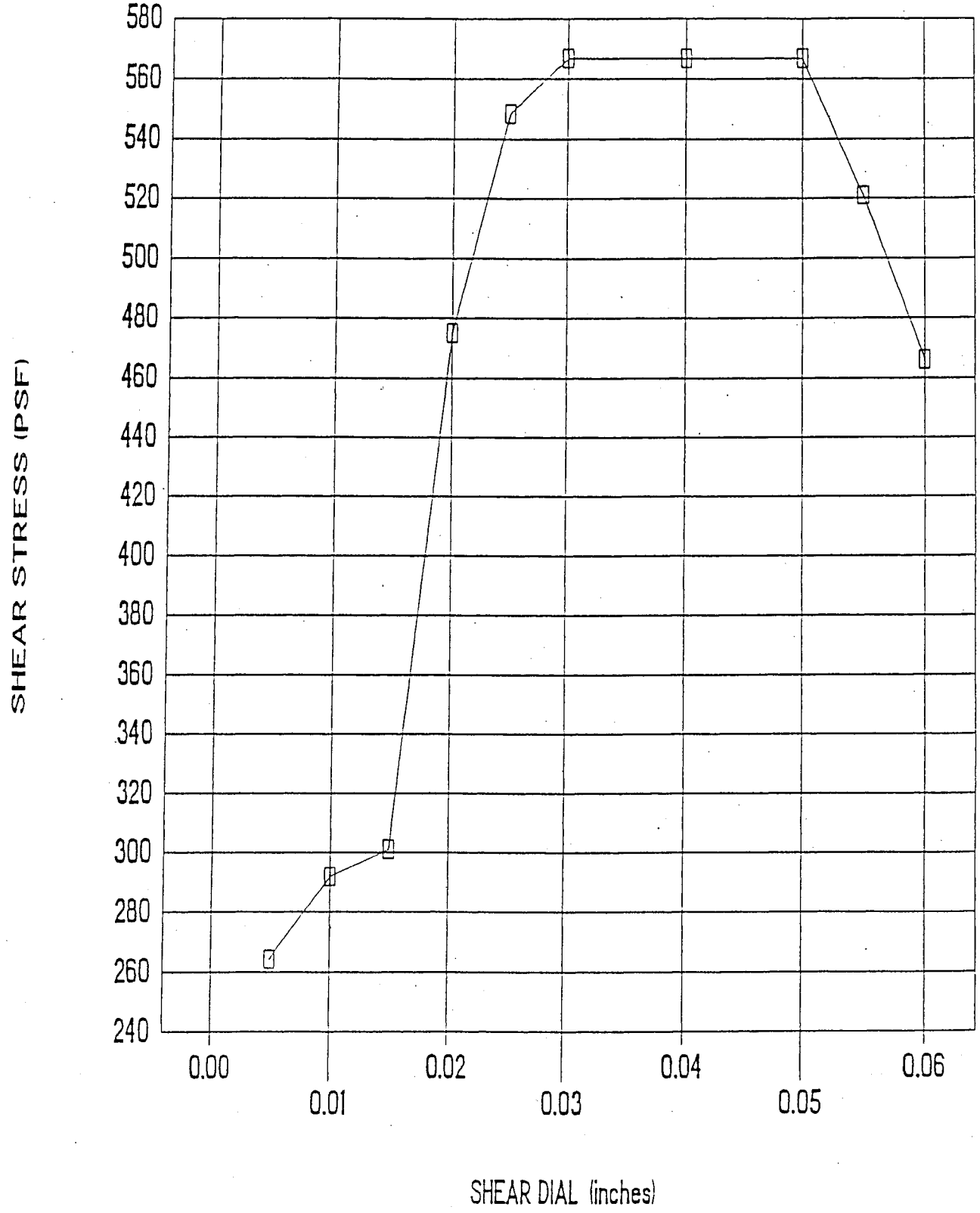
NORMAL =	LOAD (grm)	8834.5	STRESS (psf)	4193.1	WIEGHT IN SHEAR RING (grm)	114.890937085
RING =	DIAMETER	2.5 "	AREA (ft2)	0.034088462	VOLUME (ft3) (HT = .748")	0.0021249369

ELAPSED TIME (min)	SHEAR DIAL (inches)	SHEAR DISPLACEMENT (inches)	NORMAL DIAL (inches)	NORMAL DISPLACEMENT (inches)	PROVING RING (inches)*10000	SHEAR FORCE (lbs)	SHEAR STRESS (psf)
14:24			0.000	0.000			
1			0.026	0.026			
5			0.027	0.027			
10	0.000	0.000	0.033	0.033	0.0		
	0.005	0.005	0.034	0.034	145.0	47.135	1382.7
	0.010	0.010	0.035	0.035	203.0	65.260	1914.4
	0.015	0.015	0.036	0.036	232.0	74.323	2180.3
	0.020	0.020	0.036	0.036	257.0	82.135	2409.5
	0.025	0.025	0.036	0.036	275.0	87.760	2574.5
	0.030	0.030	0.037	0.037	307.0	97.760	2867.8
	0.035	0.035	0.037	0.037	308.0	98.073	2877.0
	0.040	0.040	0.037	0.037	317.0	100.885	2959.5
	0.045	0.045	0.036	0.036	324.0	103.073	3023.7
	0.050	0.050	0.036	0.036	329.0	104.635	3069.5
	0.060	0.060	0.036	0.036	336.0	106.823	3133.7
	0.070	0.070	0.036	0.036	343.0	109.010	3197.9
	0.080	0.080	0.036	0.036	347.0	110.260	3234.5
	0.090	0.090	0.035	0.035	348.0	110.573	3243.7
	0.100	0.100	0.035	0.035	346.0	109.948	3225.4
14:43	0.110	0.110	0.034	0.034	343.0	109.010	3197.9

Equipment used:	Mettler PM16 balance, PTL # Y1256	Calibration due:	12/07/94	REMARKS: WATER ADDED BETWEEN 1MIN.
	Dial Gauge # PTL # 7012	Calibration due:	02/20/95	AND 5 MIN. READING
	Dial Gauge # PTL # 5523	Calibration due:	09/16/94	SHEAR STARTED AFTER 10 MIN
	Dial Gauge # PTL # 5864	Calibration due:	09/16/94	CONSOLIDATION READING

10C CRATER (S.E. EXISTING)

LOAD = 2834.5



10C CRATER (S.E. EXISTING)

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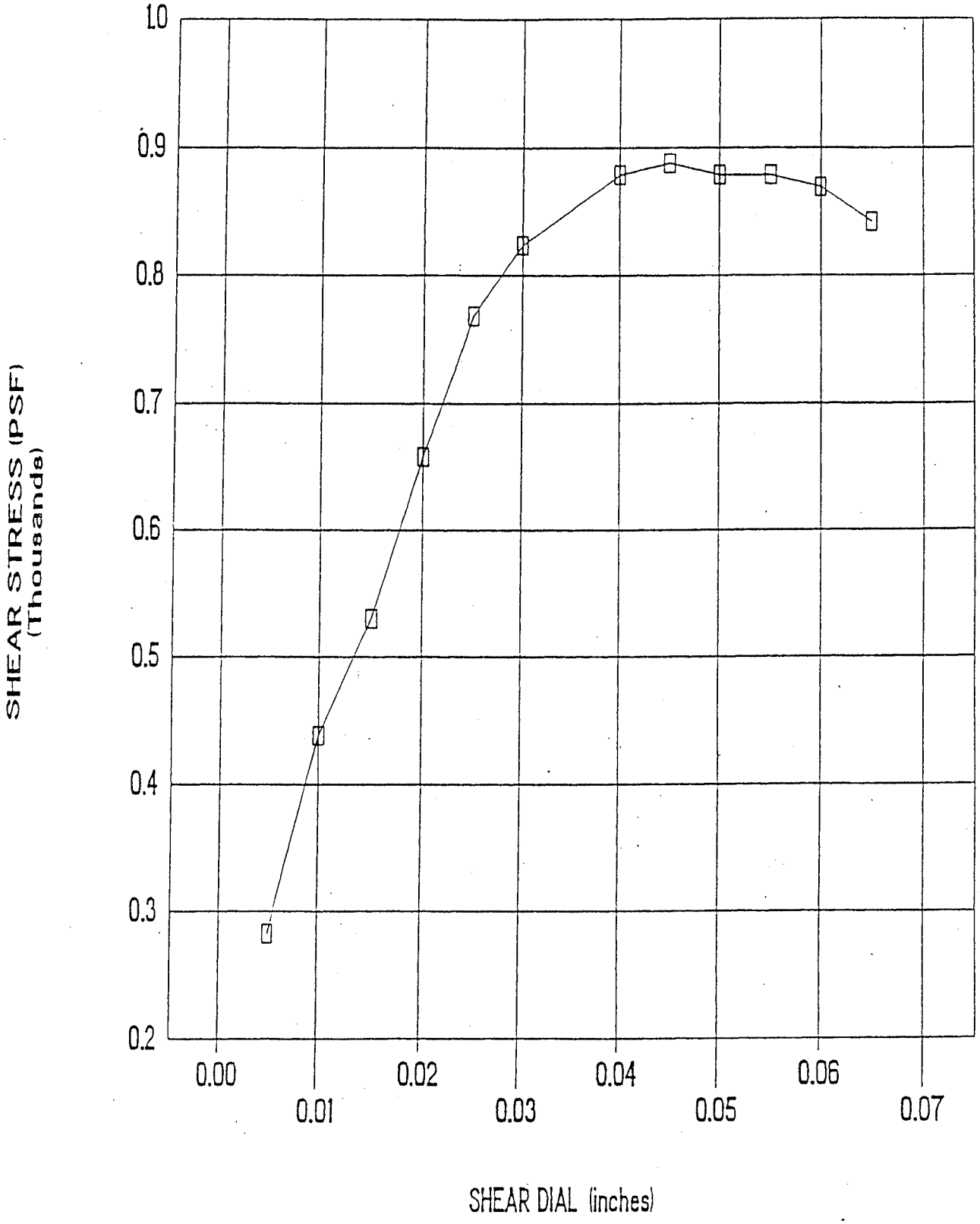

10C CRATER (S.E. EXISTING)

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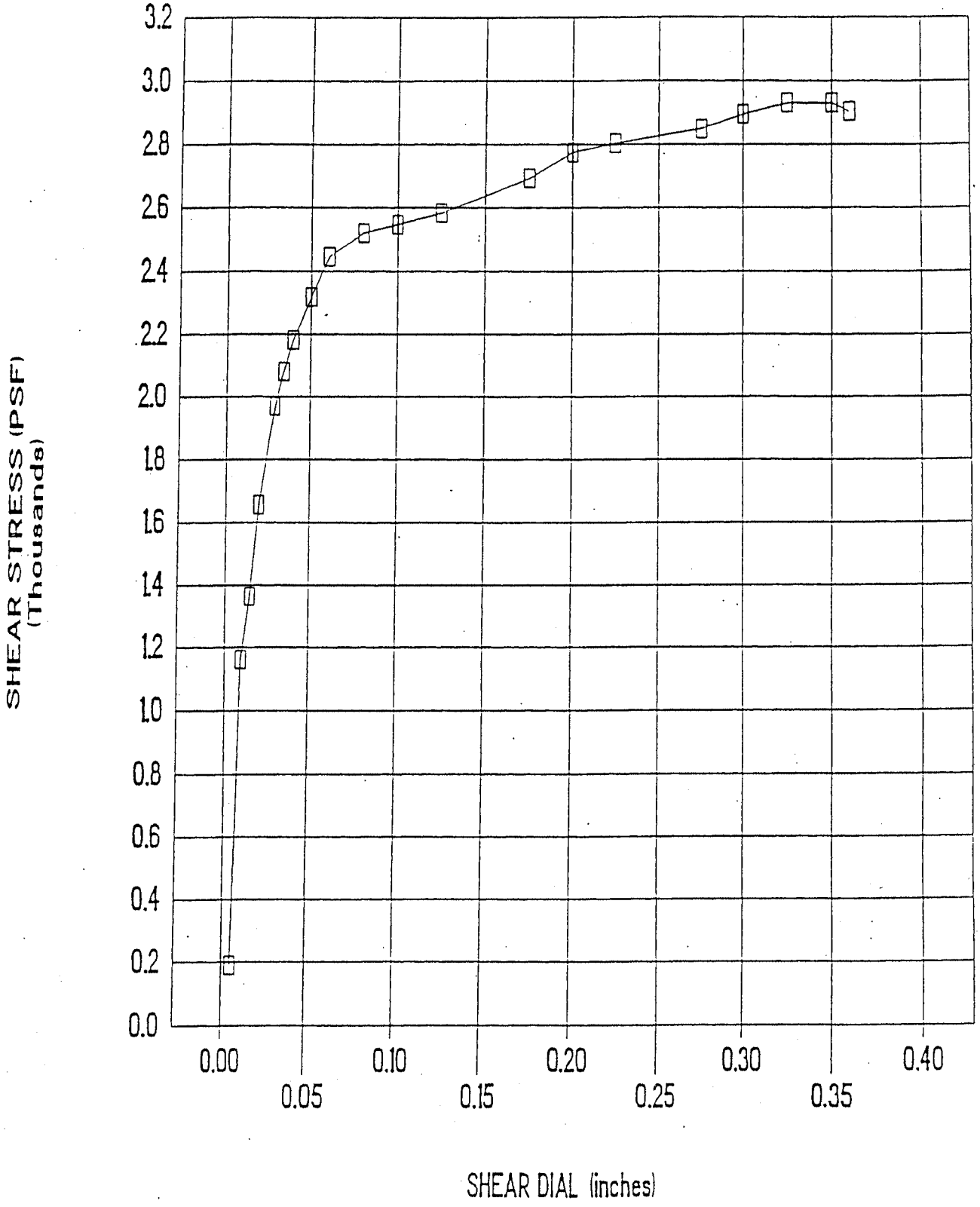

10C CRATER (S.E. EXISTING)

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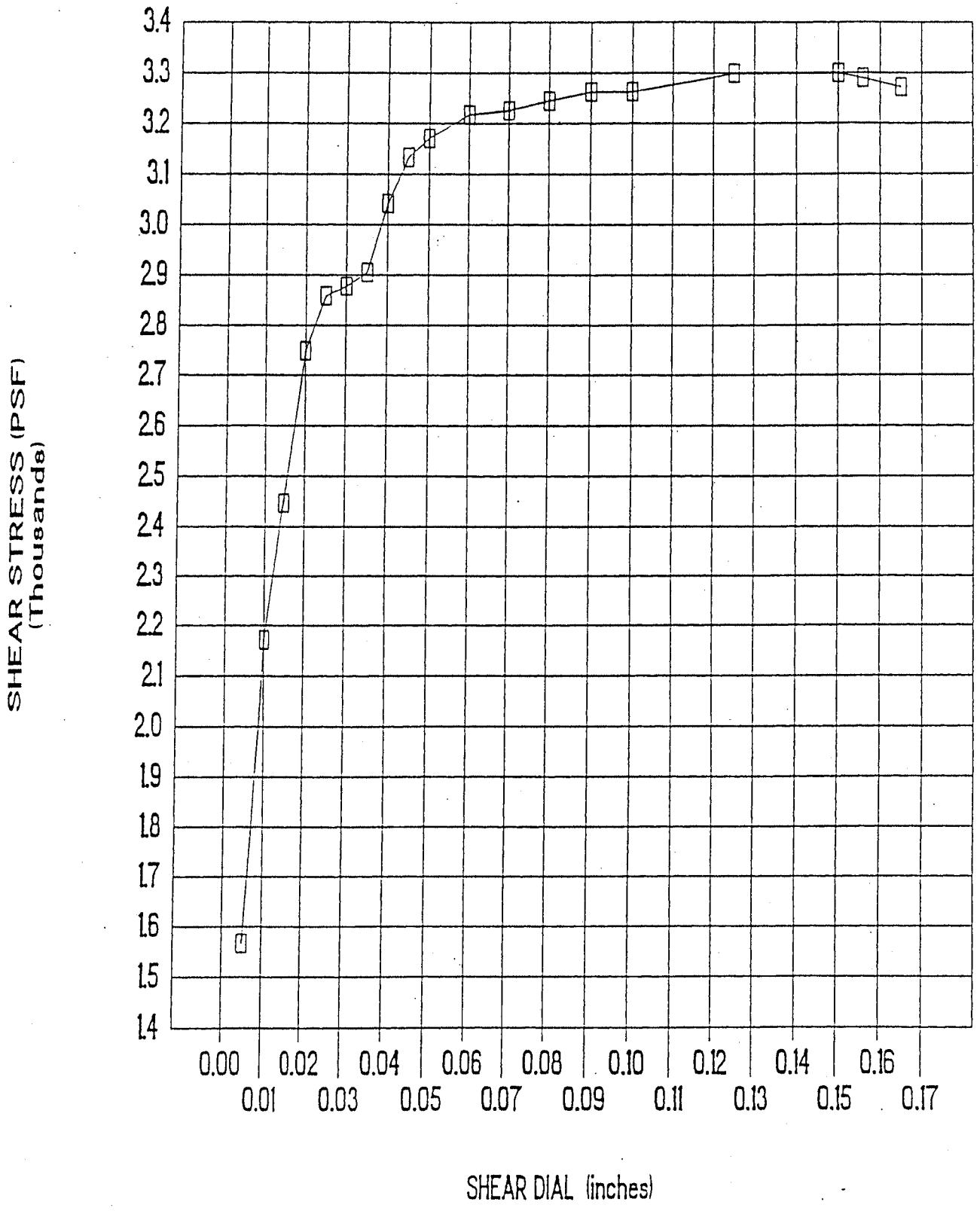

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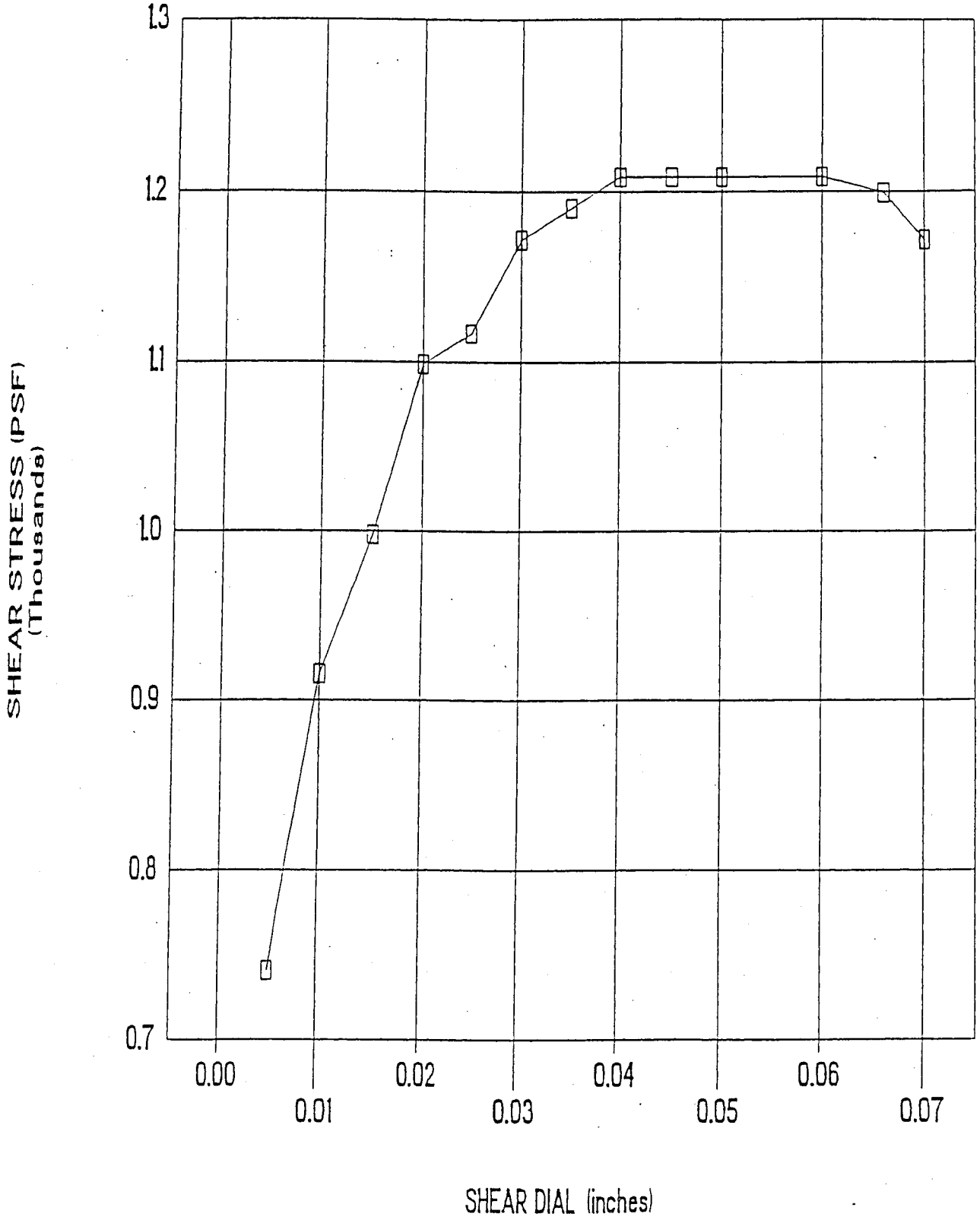

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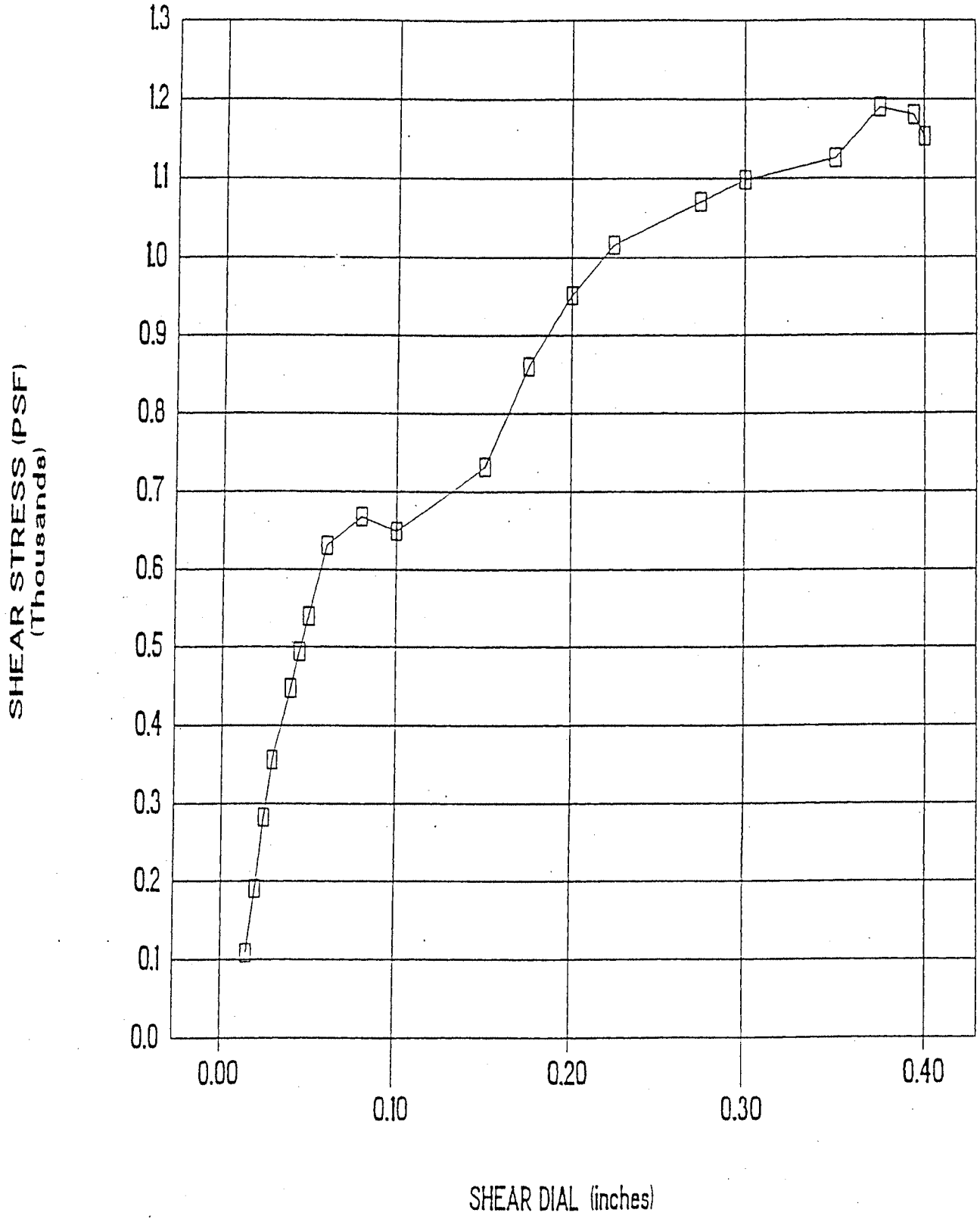

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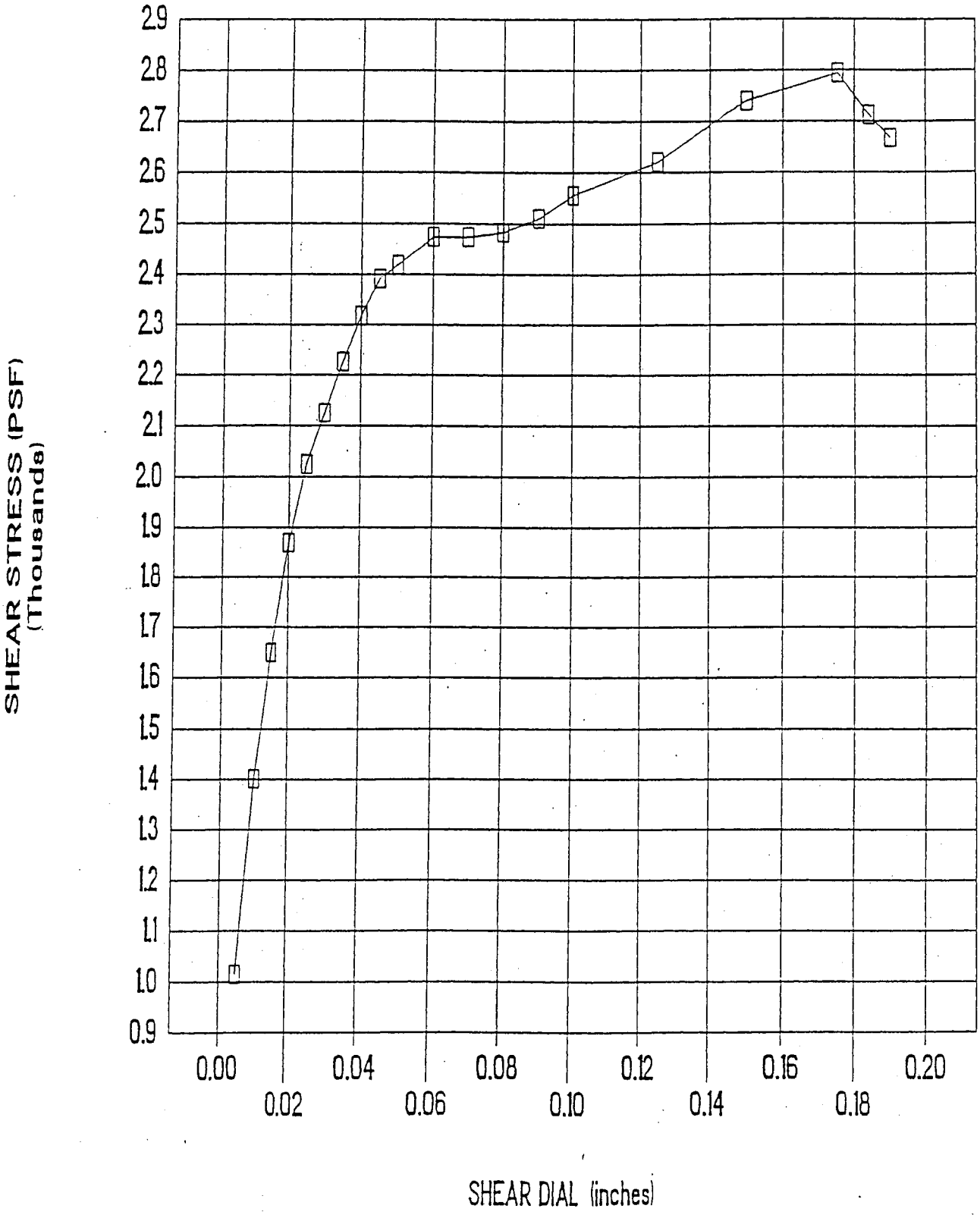

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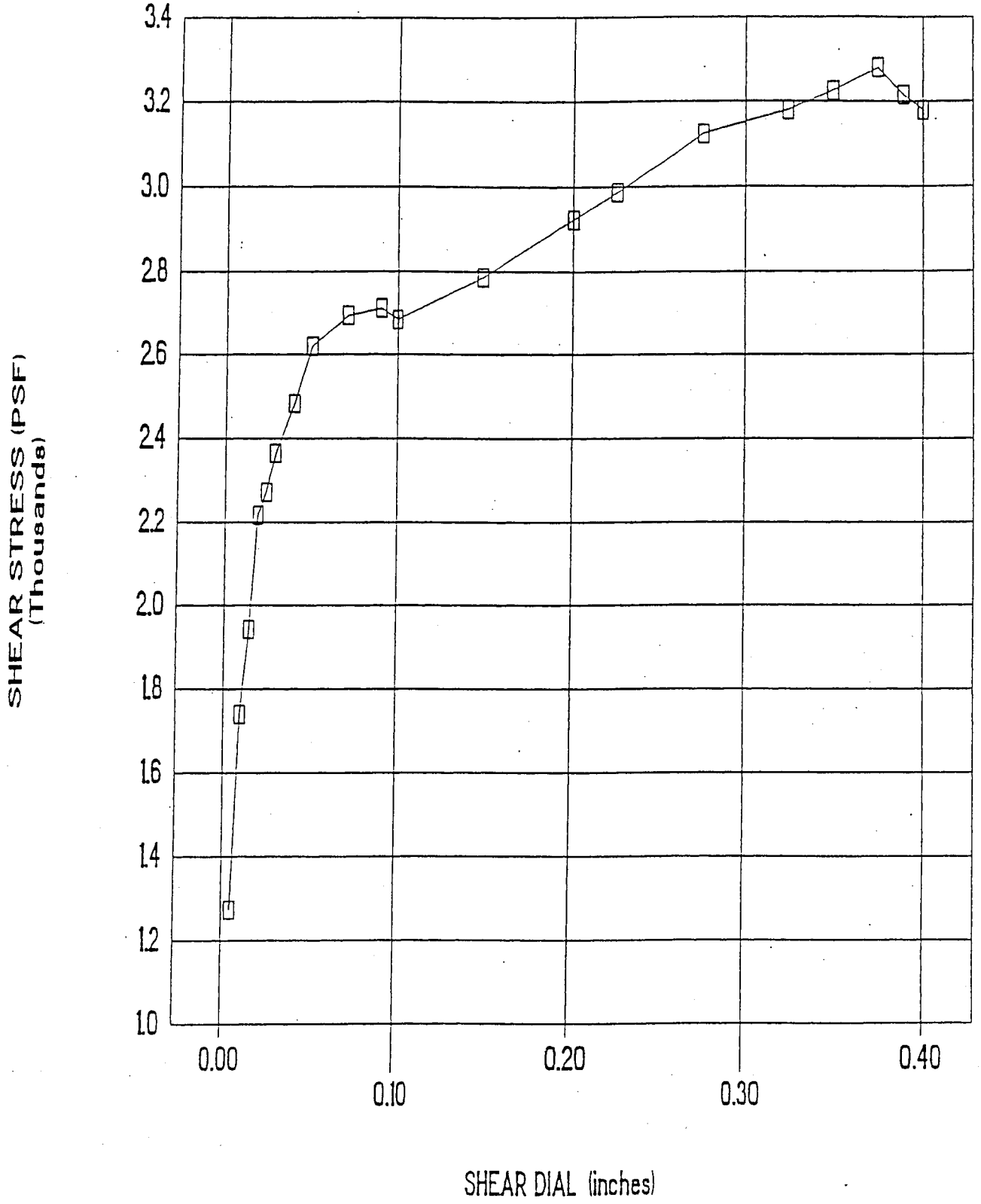

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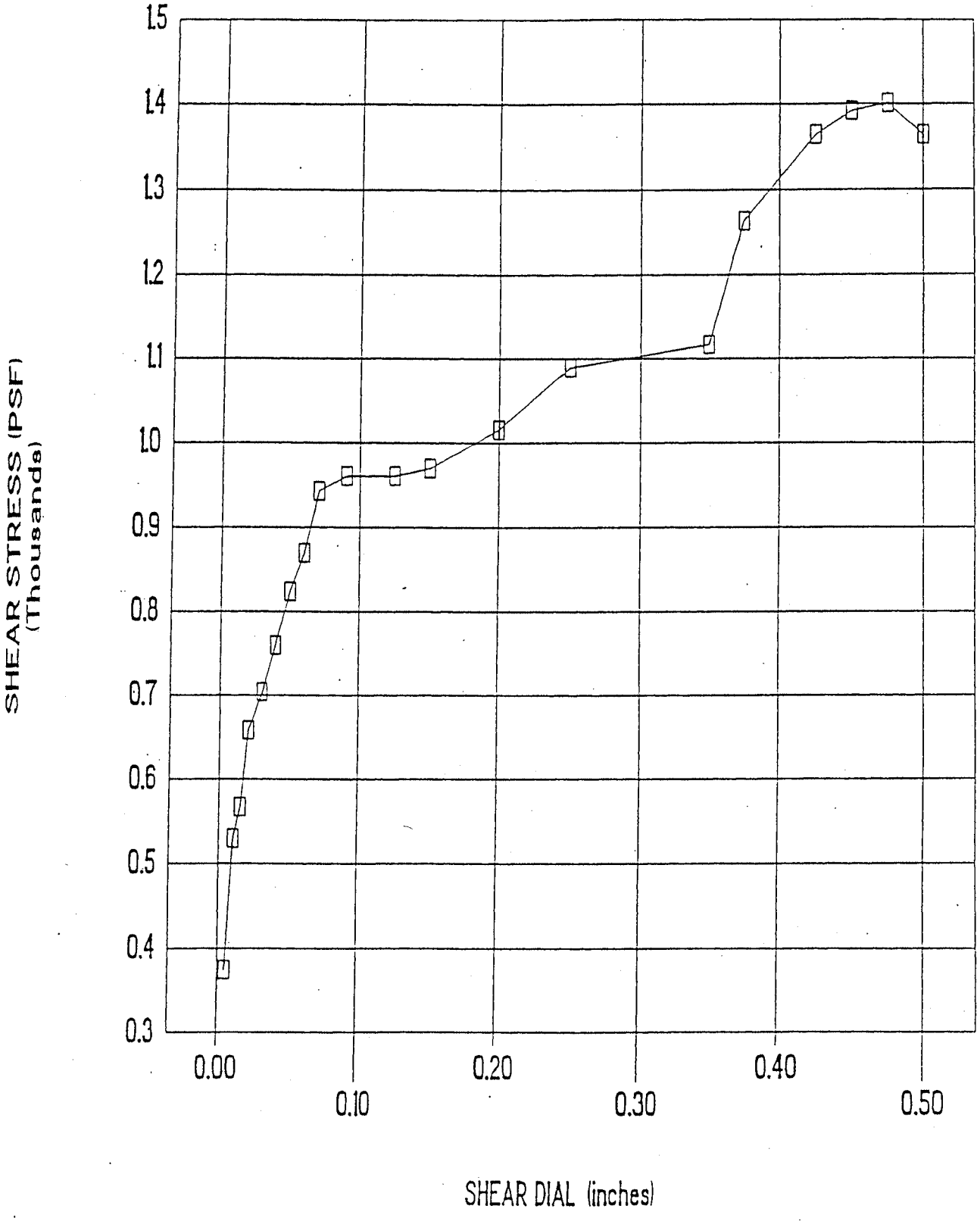
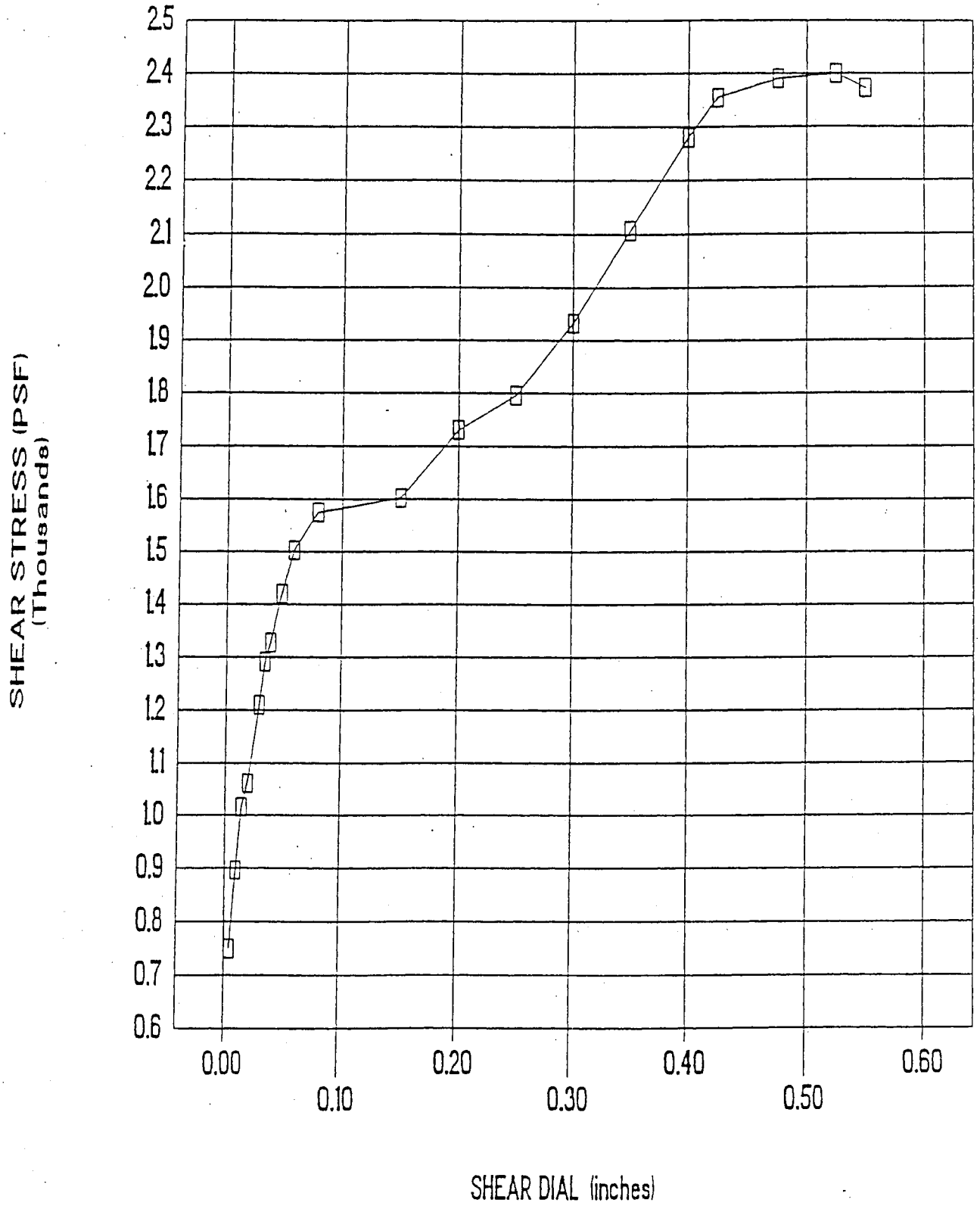


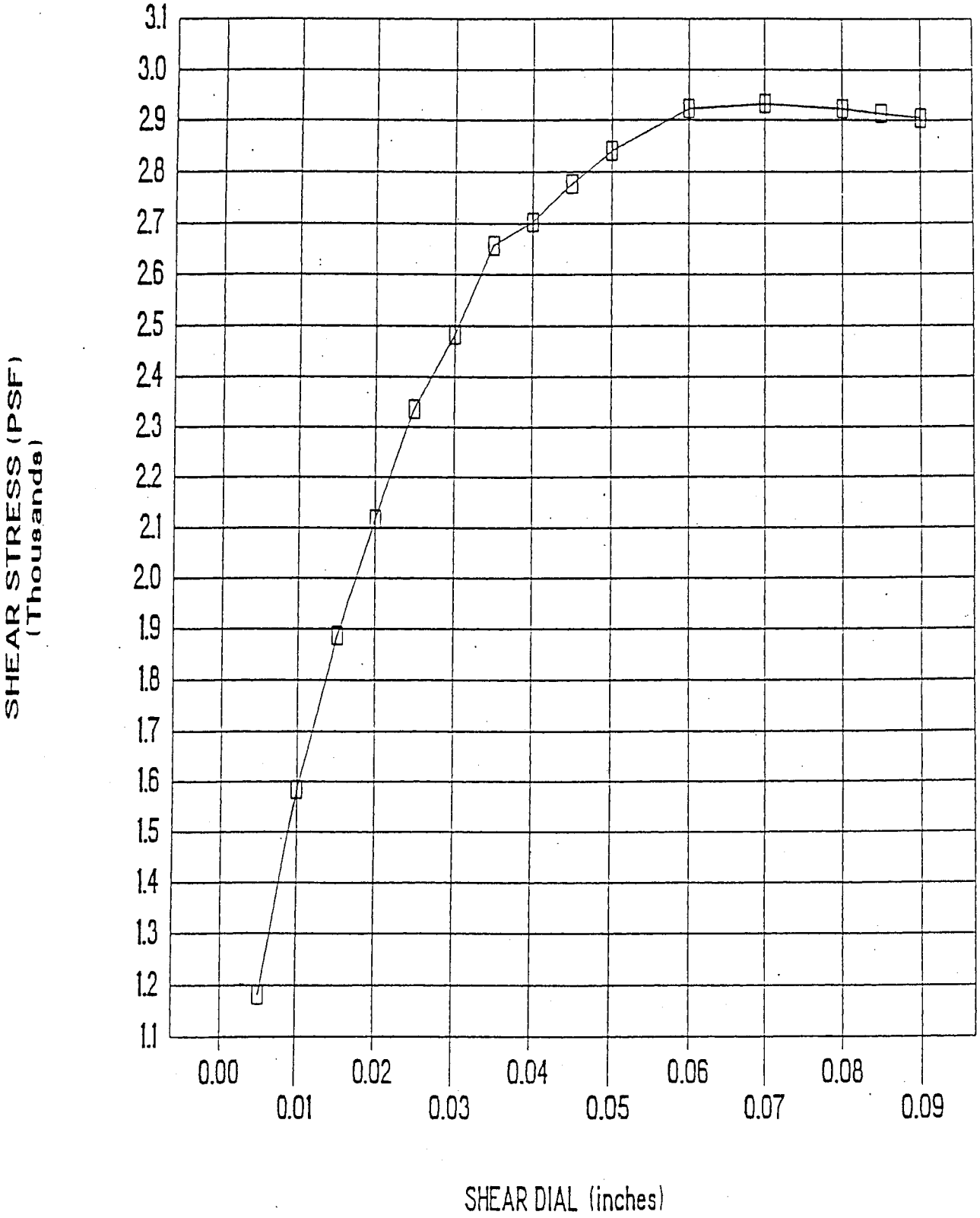
10C CRATER (N.W. EXISTING)

LOAD = 4834.5



10C CRATER (N.W. EXISTING)

LOAD = 6834.5



10C CRATER (N.W. EXISTING)

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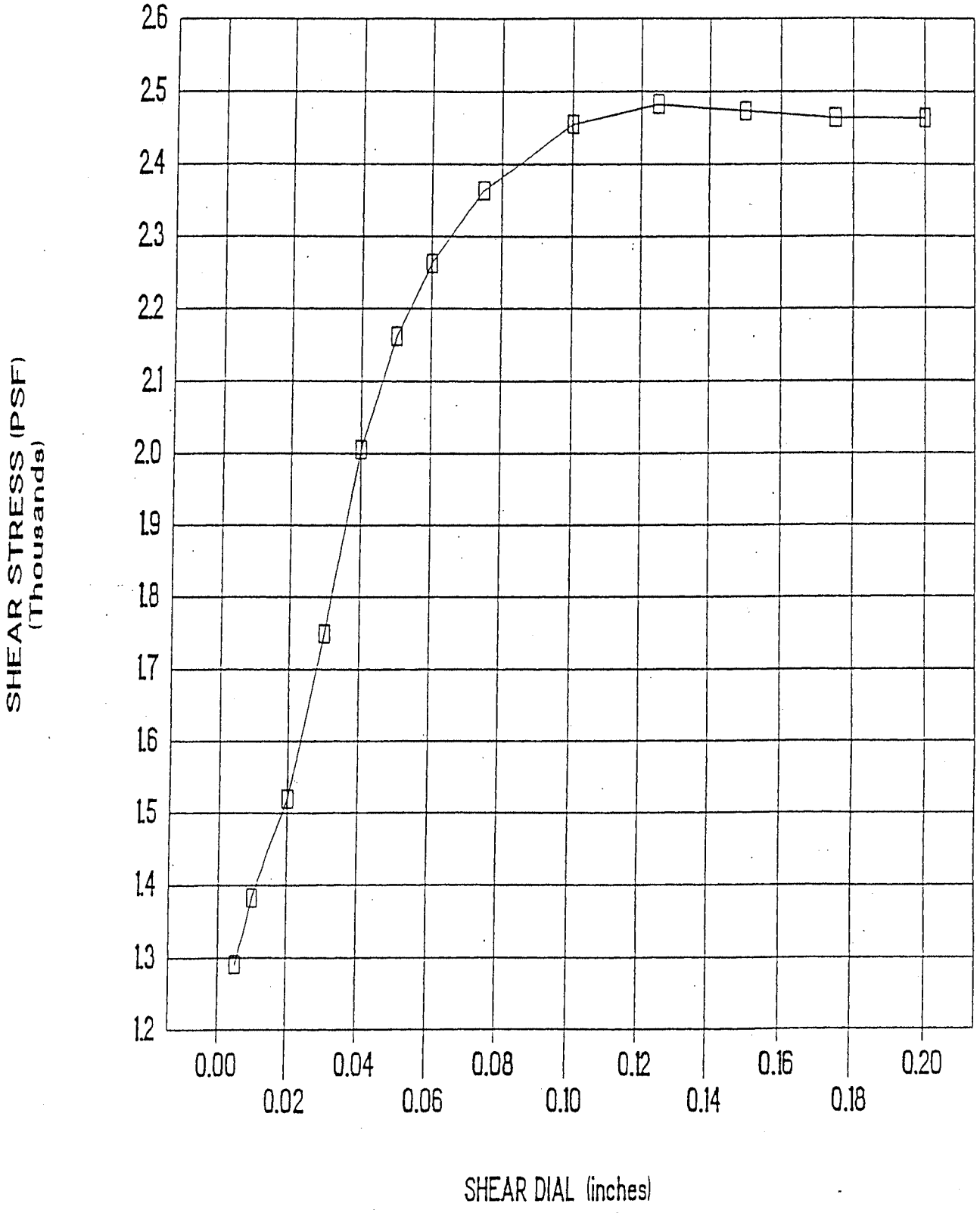

10C CRATER (S.W. EXISTING)

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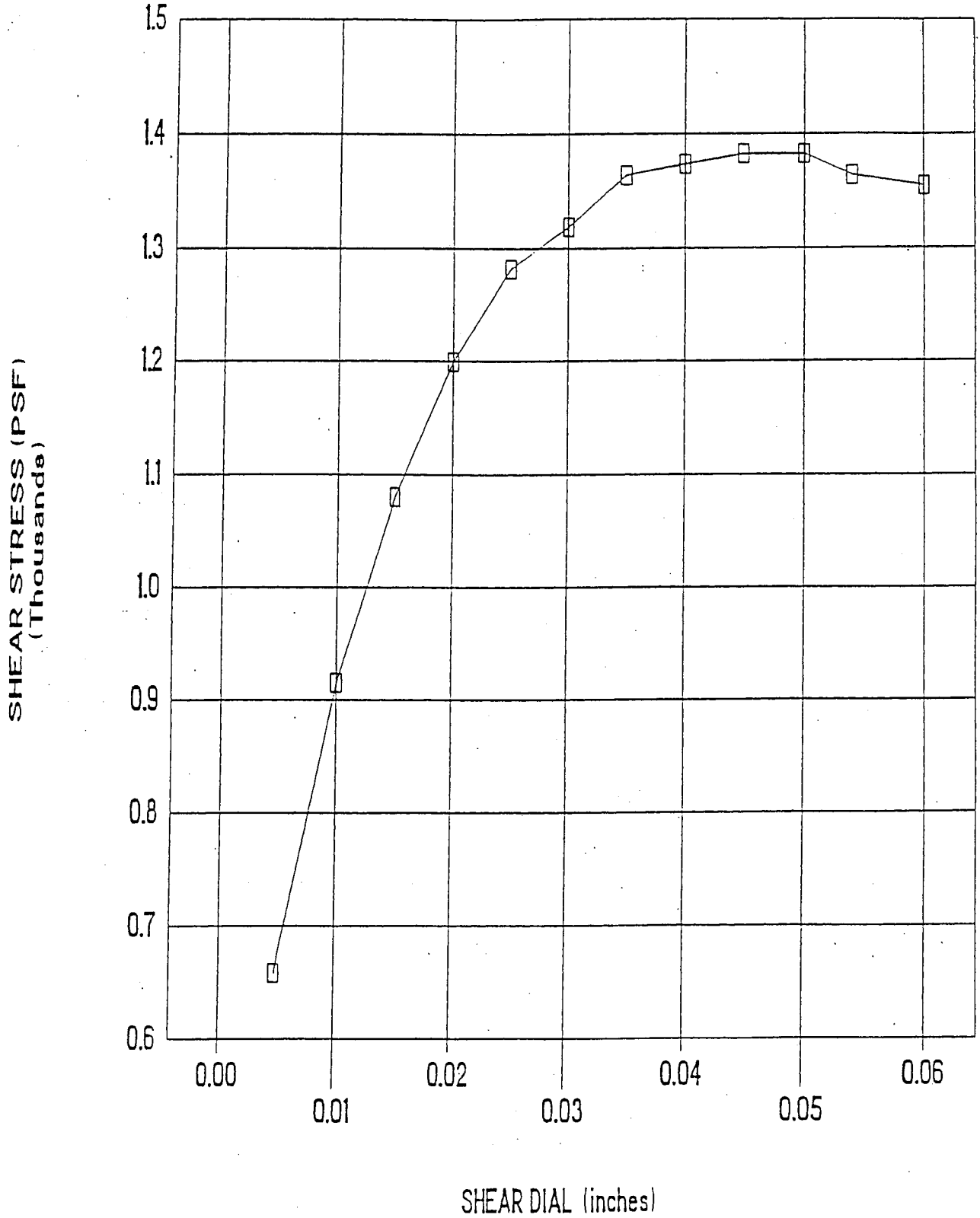

10C CRATER (S.W. EXISTING)

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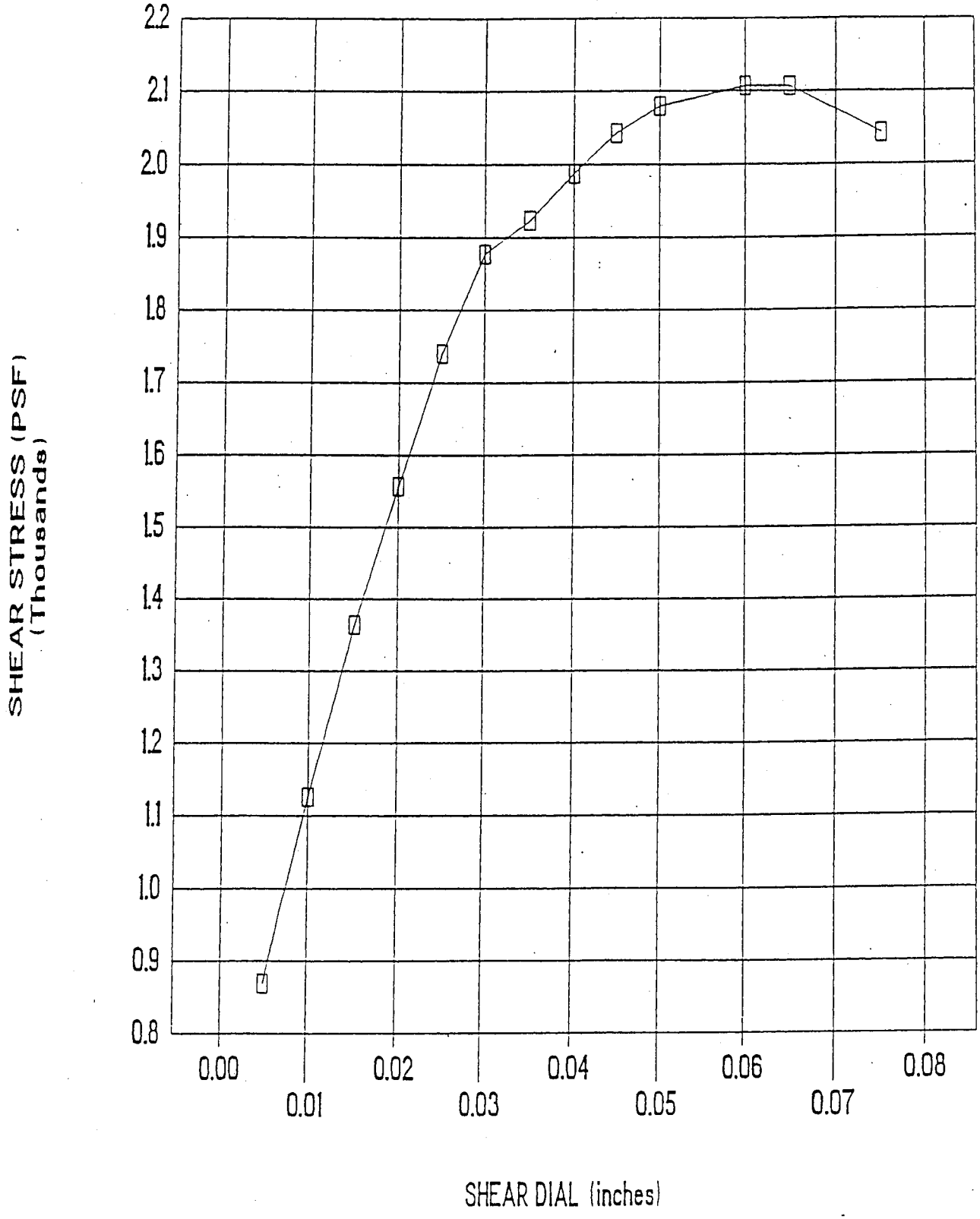

10C CRATER (S.W. EXISTING)

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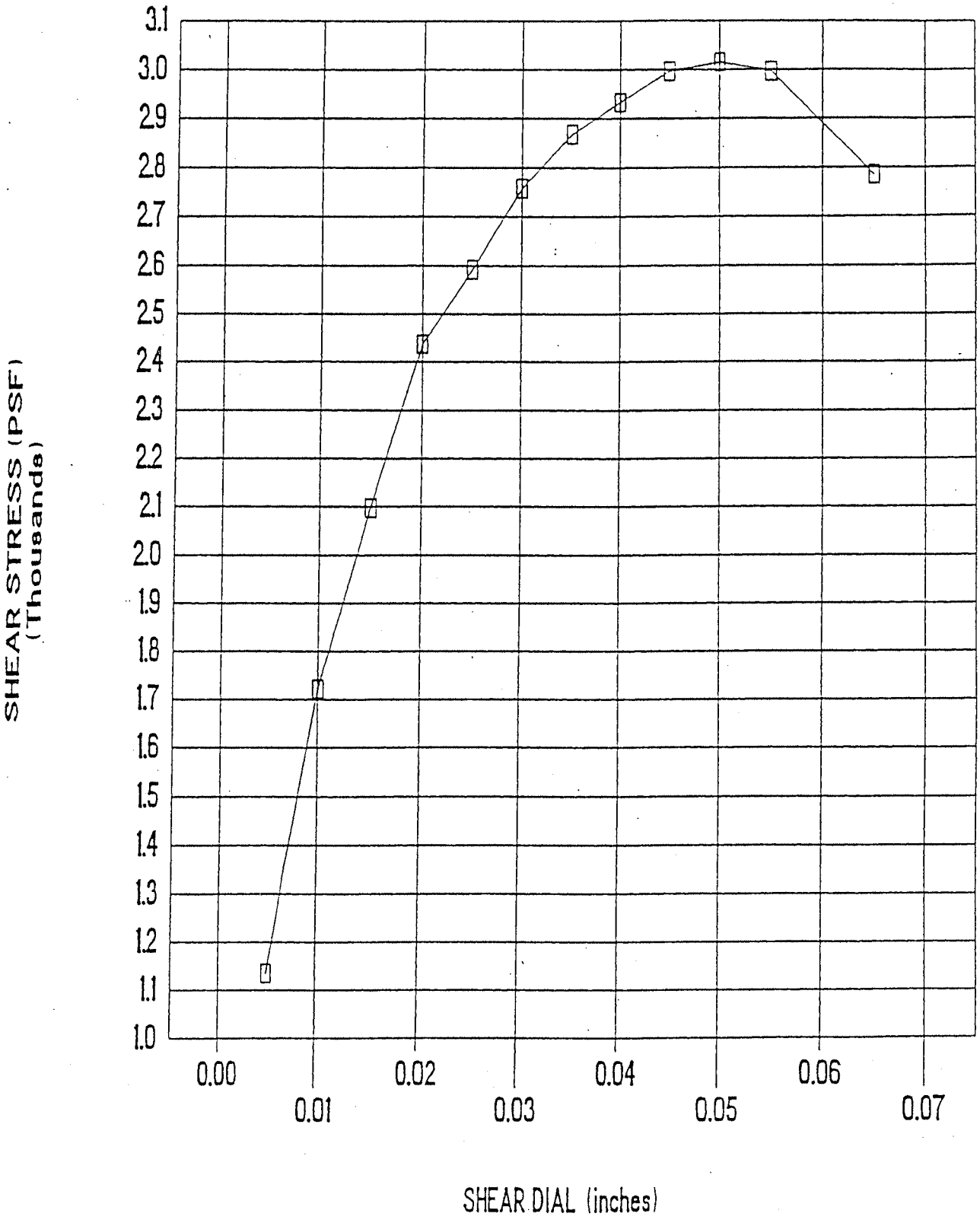
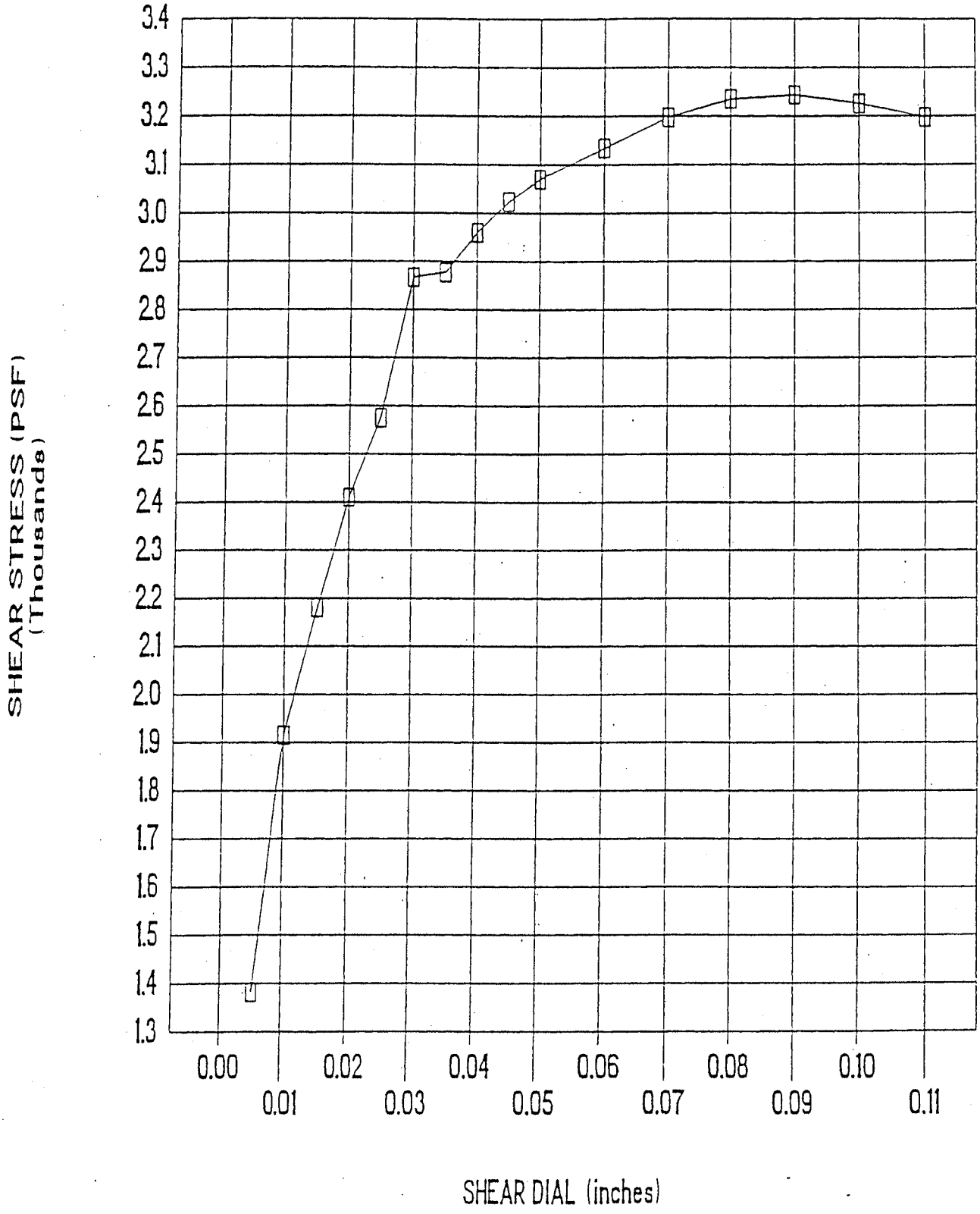


10C CRATER (S.W. EXISTING)

LOAD = 8834.5



Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Request / Test Report
Requested by: R. ZIEGENBEIN
User/Agency: RSN

Log #: N/A
ID #: 00808
MTL Lab #: 3706

Project: 10C CRATER, LANDFILL CLOSURE
Sampled by: D. ANDERSON
Tested By: R. STROTE
Checked by: D. HERRINGTON DLH

Material: S.E. EXISTING (See Map)
Date Sampled: 08/17/94
Date tested: 08/22/94
Date checked: 9-20-94

LABORATORY TEST REQUIRED

Sieve Analysis
- [X] (ASTM C-136-84a)
- [X] (ASTM C-117-90)
- [ ] (ASTM D-422-63)
- [ ] (ASTM D-1140-54)

Moisture Content
- [X] (ASTM C-566-89)
- [ ] (ASTM D-2216-90)

Unit Weight
- [X] (ASTM C-29-91)

- [X] **Soil Classification**
- [X] **Percent Porosity**

Specific Gravity
- [X] (ASTM C-127/128-88)
- [ ] (ASTM D-584-91)

- [ ] Other (as noted)

Soil Class: SM

SIEVE ANALYSIS

U.S. Standard Sieve #	Cumulative Wt Retained	% Retained	% Passing	Spec % Passing
3"	0.0	0%	100%	N/A
1 1/2"	0.0	0%	100%	N/A
3/4"	38.5	1%	99%	N/A
3/8"	138.5	3%	97%	N/A
4	321.6	8%	92%	N/A
10	578.8	14%	86%	N/A
40	1293.0	31%	69%	N/A
100	3162.2	77%	23%	N/A
200	3447.4	83.6%	16.4%	N/A

Sample Wt (g): DRY = 4122.2 WET = 4203.0

MOISTURE CONTENT

	Native	Oversize	Proctor
Wet Weight + Tare	1395.0	509.5	1136.2
Dry Weight + Tare	1368.5	500.7	1069.1
Water	26.5	8.8	67.1
Tare	16.9	16.9	16.9
Dry Weight	1351.6	483.8	1052.2
Moisture %	2.0%	1.8%	6.4%

UNIT WEIGHT

	Loose	Rodded
Container Size(ft^3)	0.0997506	0.0997506
Total Weight (lb)	13.60	14.83
Tare Weight (lb)	5.60	5.60
Material Weight (lb)	8.00	9.23
Unit Weight (P.C.F.)	80.20	92.53
Percent Porosity	49.40	41.62

Oversize Specific Gravity: N/A

Specific Gravity: 2.54

EQUIPMENT USED: PM 16, DOE #708508, Calibration Due: 09/21/94

PM 16, DOE #187007, Calibration Due: 09/21/94

Sieve 3"	PTL # W3221	Calibration Due:	01/05/95
Sieve 1 1/2"	PTL # Y3222	Calibration Due:	01/20/95
Sieve 3/4"	PTL # Y3276	Calibration Due:	01/25/95
Sieve 3/8	PTL # Y10024	Calibration Due:	02/24/95
Sieve # 4	PTL # Y10019	Calibration Due:	02/24/95
Sieve # 10	PTL # Y10018	Calibration Due:	03/01/95
Sieve # 40	PTL # W10013	Calibration Due:	03/24/95
Sieve # 100	PTL # W10035	Calibration Due:	03/10/95
Sieve # 200	PTL # Y2097	Calibration Due:	02/17/95

cc: R. ZIEGENBEIN RSN
MTL GPP FILES

NO SPECIFICATION, INFORMATION ONLY

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Request / Test Report | Log #: N/A
Requested by: R. ZIEGENBEIN | ID #: 00808
User/Agency: RSN | MTL Lab #: 3707

Project: 10C CRATER, LANDFILL CLOSURE | Material: N.E. EXISTING (See Map)
Sampled by: D. ANDERSON | Date Sampled: 08/17/94
Tested By: R. STROTE | Date tested: 08/23/94
Checked by: D. HERRINGTON D.L.H. | Date checked: 9-20-94

LABORATORY TEST REQUIRED

Sieve Analysis
- [X] (ASTM C-136-84a)
- [X] (ASTM C-117-90)
- [ ] (ASTM D-422-63)
- [ ] (ASTM D-1140-54)

Moisture Content
- [X] (ASTM C-566-89)
- [ ] (ASTM D-2216-90)

Unit Weight
- [X] (ASTM C-29-91)

- [X] Soil Classification
- [X] Percent Porosity

Specific Gravity
- [X] (ASTM C-127/128-88)
- [ ] (ASTM D-584-91)

- [ ] Other (as noted)

SIEVE ANALYSIS

U.S. Standard Sieve #	Cumulative Wt Retained	% Retained	% Passing	Spec % Passing
3"	0.0	0%	100%	N/A
1 1/2"	0.0	0%	100%	N/A
3/4"	82.4	3%	97%	N/A
3/8"	195.8	7%	93%	N/A
4	350.0	12%	88%	N/A
10	503.9	18%	82%	N/A
40	864.8	31%	69%	N/A
100	2029.0	72%	28%	N/A
200	2441.4	86.9%	13.1%	N/A

Soil Class: SM | Sample Wt (g): DRY = 2810.0 | WET = 2852.4

MOISTURE CONTENT

	Native	Oversize	Proctor
Wet Weight + Tare	1159.5	1063.3	1707.3
Dry Weight + Tare	1142.5	1051.2	1592.1
Water	17.0	12.1	115.2
Tare	16.9	16.9	17.0
Dry Weight	1125.6	1034.3	1575.1
Moisture %	1.5%	1.2%	7.3%

UNIT WEIGHT

	Loose	Rodded
Container Size(ft^3)	0.0997506	0.0997506
Total Weight (lb)	13.90	15.14
Tare Weight (lb)	5.60	5.60
Material Weight (lb)	8.30	9.54
Unit Weight (P.C.F.)	83.21	95.64
Percent Porosity	47.50	39.66

Oversize Specific Gravity: N/A

Specific Gravity: 2.54

EQUIPMENT USED: PM 16, DOE #708508, Calibration Due: 09/21/94 — PM 16, DOE #187007, Calibration Due: 09/21/94

Sieve 3"	PTL # W3221	Calibration Due:	01/05/95
Sieve 1 1/2"	PTL # Y3222	Calibration Due:	01/20/95
Sieve 3/4"	PTL # Y3276	Calibration Due:	01/25/95
Sieve 3/8	PTL # Y10024	Calibration Due:	02/24/95
Sieve # 4	PTL # Y10019	Calibration Due:	02/24/95
Sieve # 10	PTL # Y10018	Calibration Due:	03/01/95
Sieve # 40	PTL # W10013	Calibration Due:	03/24/95
Sieve # 100	PTL # W10035	Calibration Due:	03/10/95
Sieve # 200	PTL # Y2097	Calibration Due:	02/17/95

cc: R. ZIEGENBEIN RSN
MTL GPP FILES

NO SPECIFICATION, INFORMATION ONLY

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Request / Test Report		Log #:	N/A
Requested by:	R. ZIEGENBEIN	ID #:	00808
User/Agency:	RSN	MTL Lab #:	3708

Project:	10C CRATER, LANDFILL CLOSURE	Material:	N.W. EXISTING (See Map)
Sampled by:	D. ANDERSON	Date Sampled:	08/17/94
Tested By:	R. STROTE	Date tested:	08/24/94
Checked by:	D. HERRINGTON DLH	Date checked:	9-20-94

LABORATORY TEST REQUIRED

- [X] Sieve Analysis (ASTM C-136-84a)
- [X] (ASTM C-117-90)
- [ ] (ASTM D-422-63)
- [ ] (ASTM D-1140-54)
- [ ] Moisture Content (ASTM C-566-89)
- [X] (ASTM D-2216-90)
- [ ] Unit Weight (ASTM C-29-91)
- [X] Soil Classification
- [X] Percent Porosity
- [ ] Specific Gravity (ASTM C-127/128-88)
- [ ] (ASTM D-584-91)
- [ ] Other (as noted)

SIEVE ANALYSIS

U.S. Standard Sieve #	Cumulative Wt Retained	% Retained	% Passing	Spec % Passing
3"	0.0	0%	100%	N/A
1 1/2"	0.0	0%	100%	N/A
3/4"	130.0	4%	96%	N/A
3/8"	345.6	9%	91%	N/A
4	580.0	16%	84%	N/A
10	890.6	24%	76%	N/A
40	1652.6	45%	55%	N/A
100	2832.8	77%	23%	N/A
200	3169.4	86.5%	13.5%	N/A

Soil Class: SM | Sample Wt (g): | DRY = 3663.4 | WET = 3724.0

MOISTURE CONTENT

	Native	Oversize	Proctor
Wet Weight + Tare	1037.0	2214.3	1361.4
Dry Weight + Tare	1020.4	2196.1	1266.1
Water	16.6	18.2	95.3
Tare	16.9	16.9	17.0
Dry Weight	1003.5	2179.2	1249.1
Moisture %	1.7%	0.8%	7.6%

UNIT WEIGHT

	Loose	Rodded
Container Size(ft^3)	0.0997506	0.0997506
Total Weight (lb)	14.50	15.52
Tare Weight (lb)	5.60	5.60
Material Weight (lb)	8.90	9.92
Unit Weight (P.C.F.)	89.22	99.45
Percent Porosity	43.71	37.26

Oversize Specific Gravity: N/A

Specific Gravity: 2.54

EQUIPMENT USED: PM 16, DOE #708508, Calibration Due: 09/21/94

PM 16, DOE #187007, Calibration Due: 09/21/94

Sieve 3"	PTL # W3221	Calibration Due:	01/05/95
Sieve 1 1/2"	PTL # Y3222	Calibration Due:	01/20/95
Sieve 3/4"	PTL # Y3276	Calibration Due:	01/25/95
Sieve 3/8	PTL # Y10024	Calibration Due:	02/24/95
Sieve # 4	PTL # Y10019	Calibration Due:	02/24/95
Sieve # 10	PTL # Y10018	Calibration Due:	03/01/95
Sieve # 40	PTL # W10013	Calibration Due:	03/24/95
Sieve # 100	PTL # W10035	Calibration Due:	03/10/95
Sieve # 200	PTL # Y2097	Calibration Due:	02/17/95

cc: R. ZIEGENBEIN RSN

MTL GPP FILES

NO SPECIFICATION, INFORMATION ONLY

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

Request / Test Report

Requested by: R. ZIEGENBEIN

User/Agency: RSN

Log #: N/A

ID #: 00808

MTL Lab #: 3709

Project: 10C CRATER, LANDFILL CLOSURE

Sampled by: D. ANDERSON

Tested By: R. STROTE

Checked by: D. HERRINGTON

Material: S.W. EXISTING (See Map)

Date Sampled: 08/17/94

Date tested: 08/25/94

Date checked: 9-20-94

LABORATORY TEST REQUIRED

Sieve Analysis
- [X] (ASTM C-136-84a)
- [X] (ASTM C-117-90)
- [ ] (ASTM D-422-63)
- [ ] (ASTM D-1140-54)

Moisture Content
- [X] (ASTM C-566-89)
- [ ] (ASTM D-2216-90)

Unit Weight
- [X] (ASTM C-29-91)

- [X] **Soil Classification**
- [X] **Percent Porosity**

Specific Gravity
- [X] (ASTM C-127/128-88)
- [ ] (ASTM D-584-91)

- [ ] Other (as noted)

Soil Class: SM

SIEVE ANALYSIS

U.S. Standard Sieve #	Cumulative Wt Retained	% Retained	% Passing	Spec % Passing
3"	0.0	0%	100%	N/A
1 1/2"	210.2	6%	94%	N/A
3/4"	330.7	10%	90%	N/A
3/8"	475.6	14%	86%	N/A
4	625.6	19%	81%	N/A
10	801.8	24%	76%	N/A
40	1475.5	45%	55%	N/A
100	2484.8	75%	25%	N/A
200	2880.3	87.5%	12.5%	N/A
Sample Wt (g):	DRY =	3291.5	WET =	3347.6

MOISTURE CONTENT

	Native	Oversize	Proctor
Wet Weight + Tare	930.5	7645.0	1215.6
Dry Weight + Tare	915.2	7596.7	1129.3
Water	15.3	48.3	86.3
Tare	16.9	16.9	17.0
Dry Weight	898.3	7579.8	1112.3
Moisture %	1.7%	0.6%	7.8%

UNIT WEIGHT

	Loose	Rodded
Container Size(ft^3)	0.0997506	0.0997506
Total Weight (lb)	14.00	15.52
Tare Weight (lb)	5.60	5.60
Material Weight (lb)	8.40	9.92
Unit Weight (P.C.F.)	**84.21**	99.45
Percent Porosity	**46.23**	36.51

Oversize Specific Gravity: N/A

Specific Gravity: 2.51

EQUIPMENT USED: PM 16, DOE #708508, Calibration Due: 09/21/94

PM 16, DOE #187007, Calibration Due: 09/21/94

Sieve 3"	PTL # W3221	Calibration Due:	01/05/95
Sieve 1 1/2"	PTL # Y3222	Calibration Due:	01/20/95
Sieve 3/4"	PTL # Y3276	Calibration Due:	01/25/95
Sieve 3/8	PTL # Y10024	Calibration Due:	02/24/95
Sieve # 4	PTL # Y10019	Calibration Due:	02/24/95
Sieve # 10	PTL # Y10018	Calibration Due:	03/01/95
Sieve # 40	PTL # W10013	Calibration Due:	03/24/95
Sieve # 100	PTL # W10035	Calibration Due:	03/10/95
Sieve # 200	PTL # Y2097	Calibration Due:	02/17/95

cc: R. ZIEGENBEIN RSN

MTL GPP FILES

NO SPECIFICATION, INFORMATION ONLY

TABLE 1. COMPOSITION OF HYDROMETER (ASTM D422–90)

Project: 10C CRATER, LANDFILL CLOSURE
Requestor: R. ZIEGENBEIN
Organization: RSN
Address: M/S 608
Phone: 295–4395

Tested by: R. STROTE
Test date: 08/24 TH 30/94
Checked by: D. HERRINGTON DLH
Check date: 9-20-94
ID #: 00808

LAB #	PERCENTAGE OF COMPOSITE SAMPLE						HYD. SAMPLE TOTAL (G)	HYD. SAMPLE #200 RET. (G)
	CLAY %	SILT %	FINE SAND %	MED. SAND %	COARSE SAND %	GRAVEL %		
3706	14.2	11.8	44.0	15.9	6.0	8.0	75	52.3
3707	11.6	11.4	46.6	12.5	5.9	12.0	75	54.0
3708	11.3	8.9	37.6	17.9	8.3	16.0	75	55.0
3709	9.7	11.4	38.8	16.3	5.4	19.0	75	54.7

EQUIPMENT USED: BALANCE PM16, DOE #708508, CALIBRATION DUE: 12/07/94

Information compiled from other tables

TABLE 2. PARTICLE–SIZE DETERMINATION BY 152H HYDROMETER (ASTM D422–90)

Project: 10C CRATER, LANDFILL CLOSURE
Requestor: R. ZIEGENBEIN
Organization: RSN
Address: M/S 608
Phone: 295–4395

Tested by: R. STROTE
Test date: 08/24 TH 30/94
Checked by: D. HERRINGTON DLH
Check date: 9-20-94
ID #: 00808

Variable= = = >	T		R	P, "y"	L	n	K	D, "x"	
Lab #	Water Temp. (C)	Time of Reading (min)	Hydrometer Reading (g/l)	Corrected Hydrometer Reading	Soil In Suspension (%)	Effective Depth (D422 Table 2) (cm)	RP27 Water Viscosity (poise)	D422 Table 3 Constant	Particle Diameter (mm)	
3706	27.0	1	25.0	25.0	29.5	12.2	0.00851	0.01302	0.0455	2.54 = G = SG of soil particles (g/cc)
	27.0	2	20.0	20.0	23.6	13.0	0.00851	0.01302	0.0332	75.00 = Air–dry mass of total soil sample (g)
	27.0	5	17.0	17.0	20.0	13.5	0.00851	0.01302	0.0214	85.96 = Percent of total soil sample passing #10
	26.5	15	14.0	14.0	16.5	14.0	0.00861	0.01309	0.0126	0.9958 = Hygroscopic moisture corr. (D422 Sec 8,13)
	26.5	30	13.5	13.5	15.9	14.1	0.00861	0.01309	0.0090	1.02 = a = SG correction (D422 Table 1)
	26.0	60	12.5	12.5	14.7	14.3	0.00870	0.01316	0.0064	1.000 = G1 = SG of suspending medium (g/cc)
	27.0	250	11.0	11.0	13.0	14.5	0.00851	0.01302	0.0031	86.89 = W = Oven–dry mass of total soil sample
	25.0	1440	9.0	9.0	10.6	14.8	0.00890	0.01331	0.0014	rep. by mass of soil dispersed (g)

TABLE 2. PARTICLE-SIZE DETERMINATION BY 152H HYDROMETER (ASTM D422-90)

Project: 10C CRATER, LANDFILL CLOSURE
Requestor: R. ZIEGENBEIN
Organization: RSN
Address: M/S 608
Phone: 295-4395

Tested by: R. STROTE
Test date: 08/24 TH 30/94
Checked by: D. HERRINGTON D.L.H.
Check date: 9-20-94
ID #: 00808

Variable===> T R P, "y" L n K D, "x"

Lab #	Water Temp. (C)	Time of Reading (min)	Hydrometer Reading (g/l)	Corrected Hydrometer Reading	Soil In Suspension (%)	Effective Depth (D422 Table 2) (cm)	RP27 Water Viscosity (poise)	D422 Table 3 Constant	Particle Diameter (mm)	
3707	26.5	1	17.0	17.0	19.2	13.5	0.00861	0.01309	0.0481	2.54 = G = SG of soil particles (g/cc)
	26.0	2	15.0	15.0	17.0	13.8	0.00870	0.01316	0.0346	75.00 = Air-dry mass of total soil sample (g)
	26.0	5	14.0	14.0	15.8	14.0	0.00870	0.01316	0.0220	82.07 = Percent of total soil sample passing #10
	26.0	15	13.5	13.5	15.3	14.1	0.00870	0.01316	0.0128	0.9918 = Hygroscopic moisture corr. (D422 Sec 8,13)
	26.0	30	12.5	12.5	14.1	14.3	0.00870	0.01316	0.0091	1.02 = a = SG correction (D422 Table 1)
	26.0	60	11.0	11.0	12.4	14.5	0.00870	0.01316	0.0065	1.000 = G1 = SG of suspending medium (g/cc)
	27.5	250	9.0	9.0	10.2	14.8	0.00842	0.01295	0.0032	90.64 = W = Oven-dry mass of total soil sample
	25.0	1440	8.5	8.5	9.6	14.9	0.00890	0.01331	0.0014	rep. by mass of soil dispersed (g)

Equipment Used: Balance, PM400 DOE # 708507, Calibration Due: 09/21/94

TABLE 2. PARTICLE–SIZE DETERMINATION BY 152H HYDROMETER (ASTM D422–90)

Project: 10C CRATER, LANDFILL CLOSURE
Requestor: R. ZIEGENBEIN
Organization: RSN
Address: M/S 608
Phone: 295–4395

Tested by: R. STROTE
Test date: 08/24 TH 30/94
Checked by: D. HERRINGTON D.L.H.
Check date: 9-20-94
ID #: 00808

Variable===> T R P, "y" L n K D, "x"

Lab #	Water Temp. (C)	Time of Reading (min)	Hydrometer Reading (g/l)	Corrected Hydrometer Reading	Soil In Suspension (%)	Effective Depth (D422 Table 2) (cm)	RP27 Water Viscosity (poise)	D422 Table 3 Constant	Particle Diameter (mm)	
3708	26.0	1	18.0	18.0	18.8	13.3	0.00870	0.01316	0.0481	2.54 = G = SG of soil particles (g/cc)
	26.0	2	16.0	16.0	16.7	13.7	0.00870	0.01316	0.0344	75.00 = Air–dry mass of total soil sample (g)
	26.0	5	15.0	15.0	15.6	13.8	0.00870	0.01316	0.0219	75.69 = Percent of total soil sample passing #10
	26.0	15	14.0	14.0	14.6	14.0	0.00870	0.01316	0.0127	0.9916 = Hygroscopic moisture corr. (D422 Sec 8,13)
	26.0	30	12.5	12.5	13.0	14.3	0.00870	0.01316	0.0091	1.02 = a = SG correction (D422 Table 1)
	26.0	60	11.5	11.5	12.0	14.4	0.00870	0.01316	0.0065	1.000 = G1 = SG of suspending medium (g/cc)
	27.0	250	9.5	9.5	9.9	14.7	0.00851	0.01302	0.0032	98.26 = W = Oven–dry mass of total soil sample
	25.0	1440	9.5	9.5	9.9	14.7	0.00890	0.01331	0.0013	rep. by mass of soil dispersed (g)

Equipment Used: Balance, PM400 DOE # 708507, Calibration Due: 09/21/94

TABLE 2. PARTICLE–SIZE DETERMINATION BY 152H HYDROMETER (ASTM D422–90)

Project: 10C CRATER, LANDFILL CLOSURE
Requestor: R. ZIEGENBEIN
Organization: RSN
Address: M/S 608
Phone: 295–4395

Tested by: R. STROTE
Test date: 08/24 TH 30/94
Checked by: D. HERRINGTON DLH.
Check date: 9-20-94
ID #: 00808

Variable===> T R P, "y" L n K D, "x"

Lab #	Water Temp. (C)	Time of Reading (min)	Hydrometer Reading (g/l)	Corrected Hydrometer Reading	Soil In Suspension (%)	Effective Depth (D422 Table 2) (cm)	RP27 Water Viscosity (poise)	D422 Table 3 Constant	Particle Diameter (mm)	
3709	26.0	1	17.0	17.0	17.9	13.5	0.00870	0.01330	0.0489	2.51 = G = SG of soil particles (g/cc)
	26.0	2	16.0	16.0	16.8	13.7	0.00870	0.01330	0.0348	75.00 = Air–dry mass of total soil sample (g)
	26.0	5	14.0	14.0	14.7	14.0	0.00870	0.01330	0.0223	75.64 = Percent of total soil sample passing #10
	26.0	15	12.0	12.0	12.6	14.3	0.00870	0.01330	0.0130	0.9897 = Hygroscopic moisture corr. (D422 Sec 8,13)
	26.0	30	10.5	10.5	11.0	14.6	0.00870	0.01330	0.0093	1.03 = a = SG correction (D422 Table 1)
	26.0	60	10.0	10.0	10.5	14.7	0.00870	0.01330	0.0066	1.000 = G1 = SG of suspending medium (g/cc)
	27.0	250	8.0	8.0	8.4	15.0	0.00851	0.01315	0.0032	98.14 = W = Oven–dry mass of total soil sample
	25.0	1440	8.0	8.0	8.4	15.0	0.00890	0.01345	0.0014	rep. by mass of soil dispersed (g)

Equipment Used: Balance, PM400 DOE # 708507, Calibration Due: 09/21/94

TABLE 3. PARTICLE – SIZE ANALYSIS OF SOILS (HYDROMETER) D 422

Project:	10C CRATER, LANDFILL CLOSURE	Tested by:	R. STROTE
Requestor:	R. ZIEGENBEIN	Test date:	08/24 TH 30/94
Organization:	RSN	RSN ID #:	00808
Address: M/S	608	Checked by:	D. HERRINGTON D.L.H.
Phone:	5–4395	Check date:	9-20-94

LAB #	TOTAL SAMPLE WEIGHT	WEIGHT RETAINED ON # 10	WEIGHT PASSING # 10	% PASSING # 10	WEIGHT USED FOR HYD	WEIGHT RETAINED ON # 200	HYGROSCOPIC CORRECTION FACTOR		
							WEIGHT BEFORE	WEIGHT AFTER	CORRECTION FACTOR
3706	4122.2	578.8	3543.4	86.0%	75	52.30	45.50	45.24	0.9943
3707	2810.0	503.9	2306.1	82.1%	75	54.00	17.13	16.99	0.9918
3708	3663.4	890.6	2772.8	75.7%	75	55.00	28.74	28.50	0.9916
3709	3291.5	801.8	2489.7	75.6%	75	54.70	31.19	30.87	0.9897
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Equipment used: Mettler PM 400 PTL # Y1255 Calibration Due: 12/07/94

CC: R. ZIEGENBEIN RSN

MTL GPP FILES

Remarks NONE

TABLE 4. GRADATION (ASTM D422–90)

Project: 10C CRATER, LANDFILL CLOSURE
Requestor: R. ZIEGENBEIN
Organization: RSN
Address: M/S 608
Phone: 295–4395

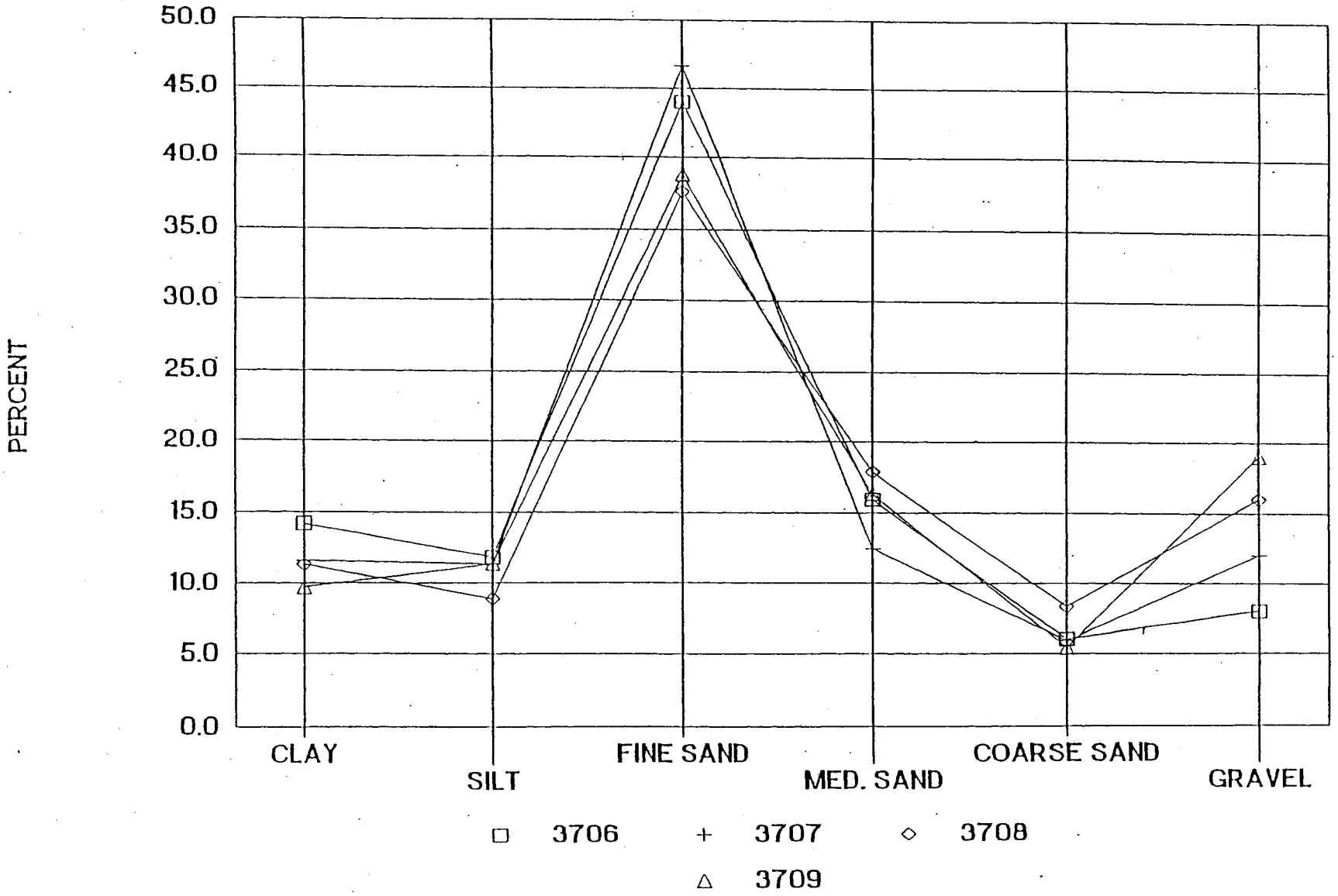
Tested by: R. STROTE
Test date: 08/24 TH 30/94
Checked by: D. HERRINGTON DLH
Check date: 9-20-94
ID #: 00808

SIEVE #	LAB # 3706	3707	3708	3709	N/A	N/A	N/A	N/A	N/A	N/A
	% PASSING									
4	92.0	88.0	84.0	81.0						
10	86.0	82.1	75.7	75.6						
16	82.0	78.8	71.3	71.6						
20	79.6	77.2	68.3	69.2						
30	75.7	74.2	63.9	65.2						
40	70.1	69.6	57.8	59.3						
50	63.6	63.6	51.5	52.5						
60	58.1	58.3	46.3	47.2						
70	54.0	53.4	42.6	43.3						
80	47.4	46.3	36.9	37.6						
100	44.3	42.8	34.4	35.2						
200	26.0	23.0	20.2	20.5						

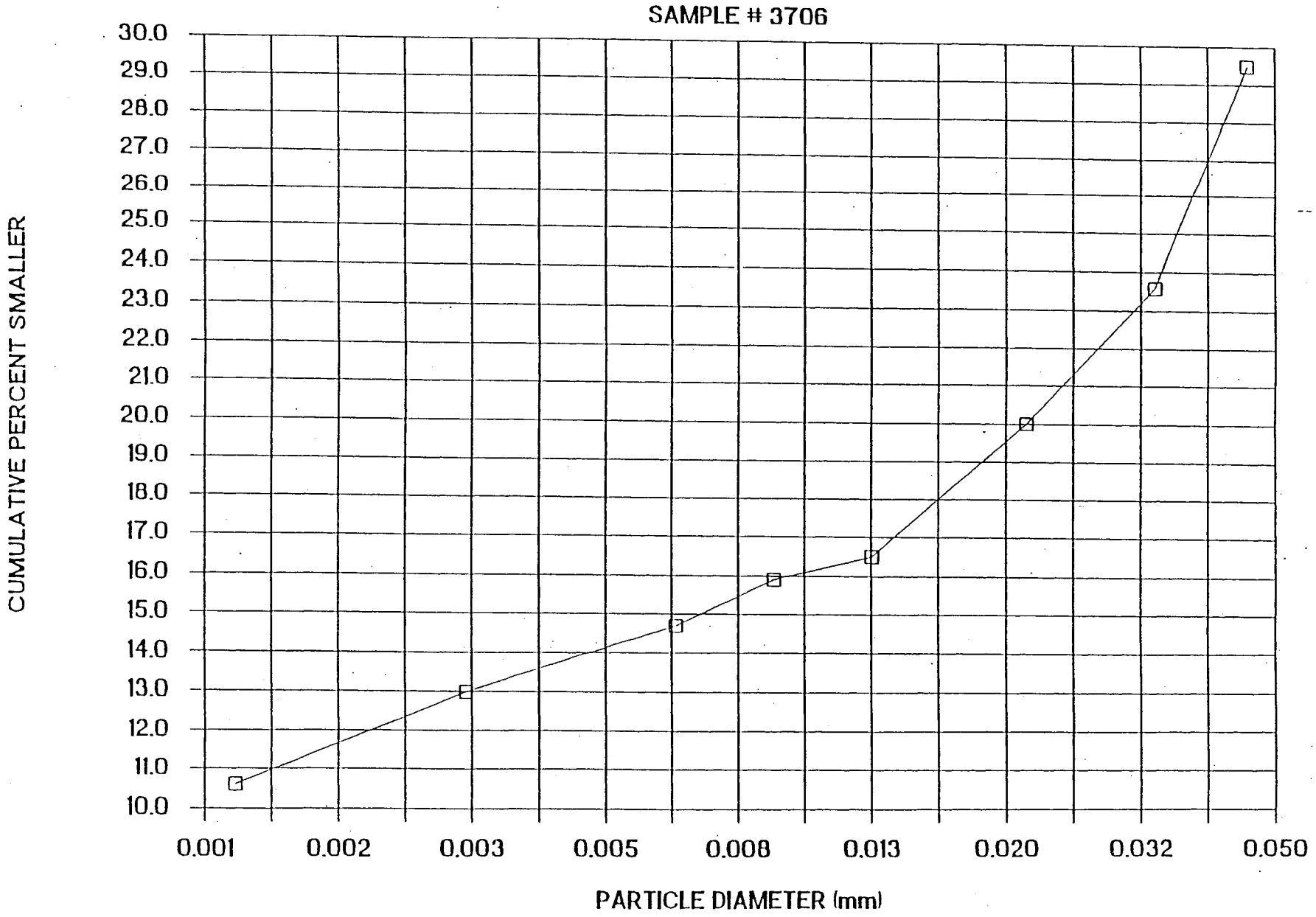
BALANCE PM16 DOE #708508 CALIBRATION DUE: 12/07/94
Information compiled from other tables

PERCENTAGE OF COMPOSITE SAMPLE

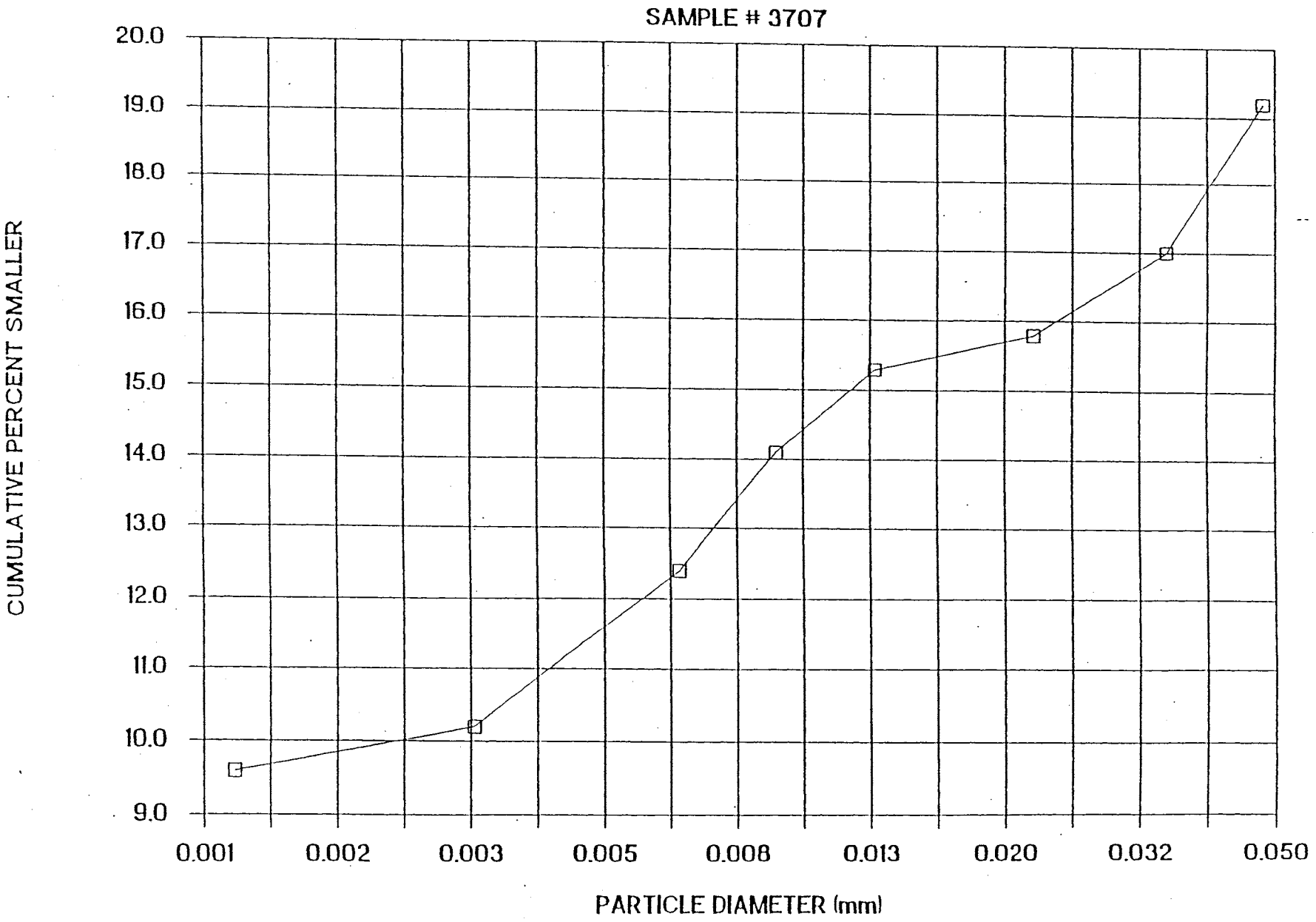
SAMPLE # 3706 th 3709



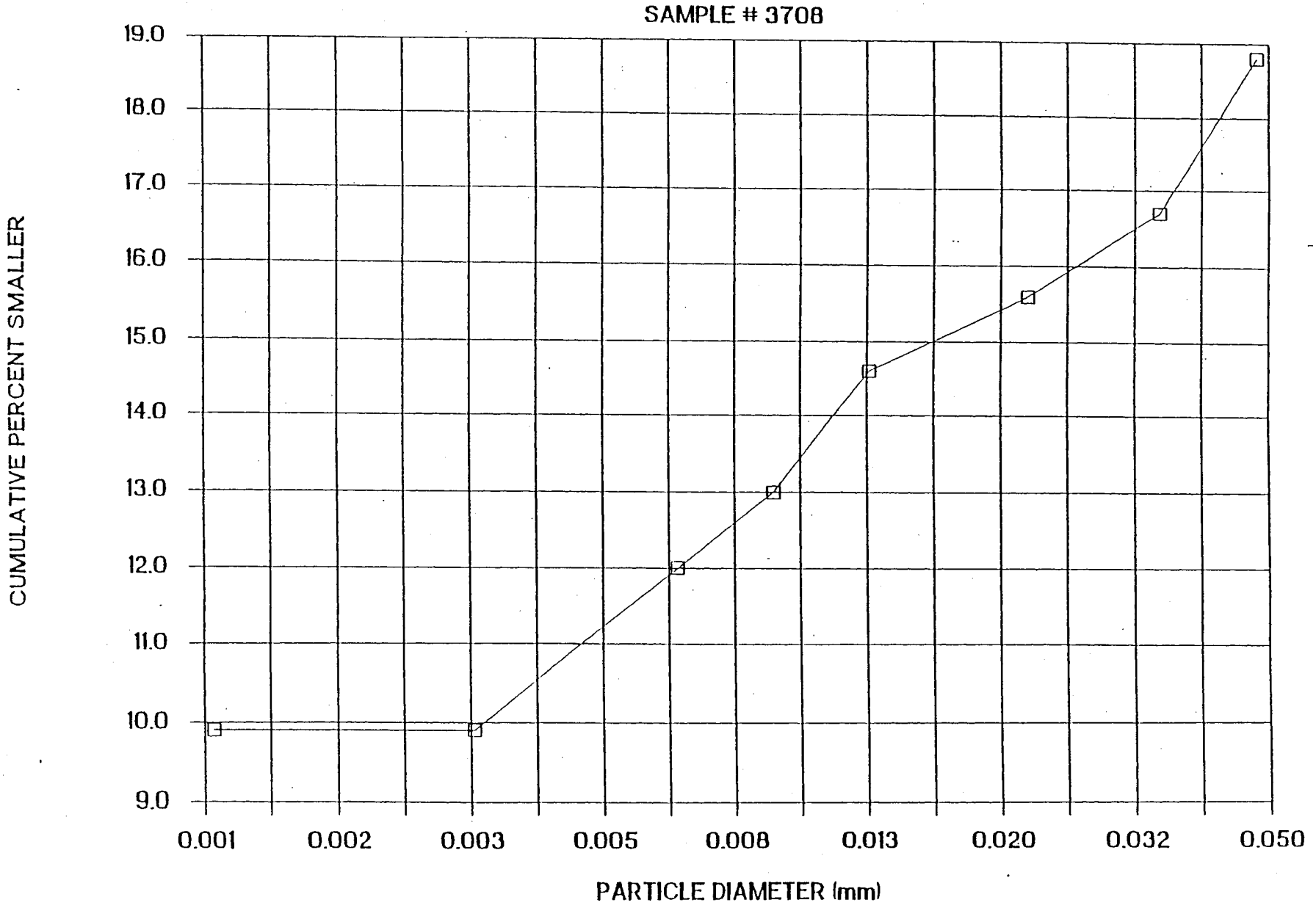
HYDROMETER ANALYSIS (ASTM D422-90)



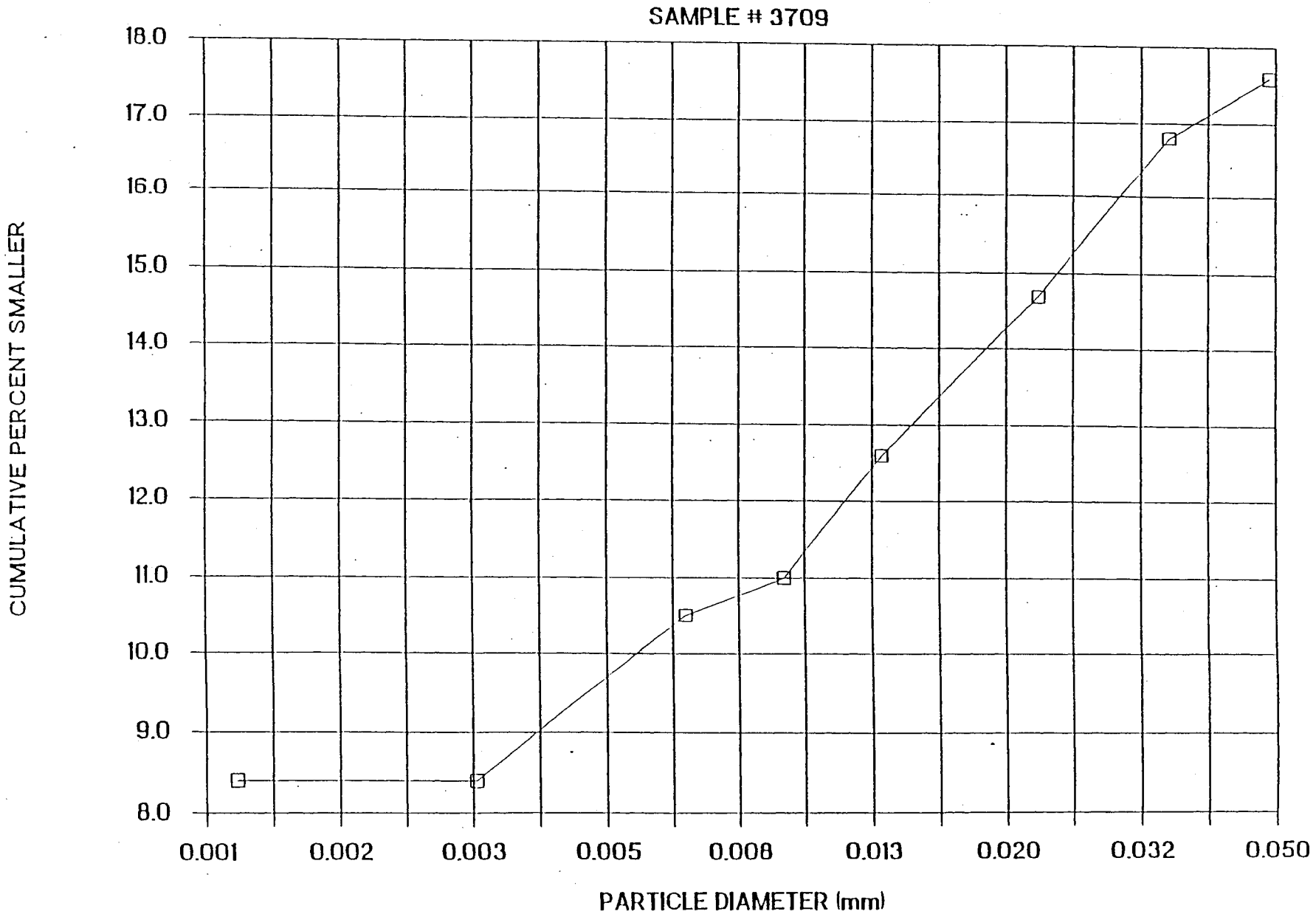
HYDROMETER ANALYSIS (ASTM D422-90)



HYDROMETER ANALYSIS (ASTM D422-90)



HYDROMETER ANALYSIS (ASTM D422-90)



Raytheon Services Nevada
Materials Testing Laboratory
Nevada Test Site
P.O. Box 328, M/S 607 Ph: (702)-295-6669

SOIL PERMEABILITY TO MERCURY TAP WATER

ASTM D 2434-68 (Reapproved 1974)
Standard Test Method for Permeability of Granular Soils (Constant Head)

Project: SOIL PERMEABILITY	MTL Lab#: 3706
Requestor: R. Ziegenbein	Request #: S-545
Organization: RSN	Charge #: 00808
Address: M/S	Sample Origin: 10C Crater, Landfill Encl.
Phone: 5-4395	Sample Mat'l: S.E. Existing (See Map)
Tested by: Jim Aamodt	Checked by: V. Thummala V-Qumla
Test date: 08/29/94	Check date: 09/12/94 9/12/94

Diam. (cm)	Length (cm)
6.26	13.20

MTL Lab #	Manometers H1 mm	Manometers H2 mm	Head cm	Q cm^3	t sec.	Q/At	h/l	Temp. deg. C	k cm/sec
3706	986	135	85.1	10.0	1318	0.00025	6.4470	30	1.83E-05
	880	135	74.5	5.0	729	0.00022	5.6439	30	1.89E-05
	522	133	38.9	1.0	281	0.00012	2.9470	30	1.88E-05
								Average k:	1.87E-05

Remarks:
The soil sample was compacted to 106.4 pcf (95% max dry density).

Equipment Used:	*Calibration Due:*
Mettler PM6100 Balance, PTL W-1723	12/07/94
Digital thermometer, PTL W-3189	09/02/94
Digital Caliper, PTL-Y11135	09/29/94

Raytheon Services Nevada
Materials Testing Laboratory
Nevada Test Site
P.O. Box 328, M/S 607 Ph: (702)-295-6669

SOIL PERMEABILITY TO MERCURY TAP WATER

ASTM D 2434-68 (Reapproved 1974)
Standard Test Method for Permeability of Granular Soils (Constant Head)

Project: SOIL PERMEABILITY	MTL Lab#: 3707
Requestor: R. Ziegenbein	Request #: S-545
Organization: RSN	Charge #: 00808
Address: M/S	Sample Origin: 10C Crater, Landfill Encl.
Phone: 5-4395	Sample Mat'l: N.E. Existing (See Map)
Tested by: Jim Aamodt	Checked by: V. Thummala
Test date: 08/29/94	Check date: 09/12/94

Diam. (cm)	Length (cm)
6.26	14.10

MTL Lab #	Manometers H1 mm	Manometers H2 mm	Head cm	Q cm^3	t sec.	Q/At	h/l	Temp. deg. C	k cm/sec
3707	935	134	80.1	10.0	442	0.00074	5.6809	34	5.81E-05
	758	135	62.3	10.0	626	0.00052	4.4184	34	5.27E-05
	461	135	32.6	10.0	1193	0.00027	2.3121	34	5.28E-05
								Average k:	5.45E-05

Remarks:
The soil sample was compacted to 104.5 pcf (95% max dry density).

Equipment Used:	*Calibration Due:*
Mettler PM6100 Balance, PTL W-1723	12/07/94
Digital thermometer, PTL W-3189	09/02/94
Digital Caliper, PTL-Y11135	09/29/94

Raytheon Services Nevada
Materials Testing Laboratory
Nevada Test Site
P.O. Box 328, M/S 607 Ph: (702)-295-6669

SOIL PERMEABILITY TO MERCURY TAP WATER

ASTM D 2434-68 (Reapproved 1974)
Standard Test Method for Permeability of Granular Soils (Constant Head)

Project: SOIL PERMEABILITY	MTL Lab#: 3708
Requestor: R. Ziegenbein	Request #: S-545
Organization: RSN	Charge #: 00808
Address: M/S	Sample Origin: 10C Crater, Landfill Encl.
Phone: 5-4395	Sample Mat'l: N.W. Existing (See Map)
Tested by: Jim Aamodt	Checked by: V. Thummala V Thummala
Test date: 08/30/94	Check date: 09/12/94

Diam. (cm)	Length (cm)
6.26	13.27

MTL Lab #	Manometers H1 mm	Manometers H2 mm	Head cm	Q cm^3	t sec.	Q/At	h/l	Temp. deg. C	k cm/sec
3708	930	135	79.5	7.0	2302	0.00010	5.9910	30	7.86E-06
	833	135	69.8	6.0	2291	0.00009	5.2600	30	7.71E-06
	755	135	62.0	10.0	4207	0.00008	4.6722	30	7.88E-06
								Average k:	7.82E-06

Remarks:
The soil sample was compacted to 111.1 pcf (95% max dry density).

Equipment Used:	*Calibration Due:*
Mettler PM6100 Balance, PTL W-1723	12/07/94
Digital thermometer, PTL W-3189	09/02/94
Digital Caliper, PTL-Y11135	09/29/94

Raytheon Services Nevada
Materials Testing Laboratory
Nevada Test Site
P.O. Box 328, M/S 607 Ph: (702)-295-6669

SOIL PERMEABILITY TO MERCURY TAP WATER

ASTM D 2434-68 (Reapproved 1974)
Standard Test Method for Permeability of Granular Soils (Constant Head)

Project: SOIL PERMEABILITY	MTL Lab#: 3709
Requestor: R. Ziegenbein	Request #: S-545
Organization: RSN	Charge #: 00808
Address: M/S	Sample Origin: 10C Crater, Landfill Encl.
Phone: 5-4395	Sample Mat'l: S.W. Existing (See Map)
Tested by: Jim Aamodt	Checked by: V. Thummala V. Thummala
Test date: 09/02/94	Check date: 09/12/94

Diam. (cm)	Length (cm)
6.26	13.12

MTL Lab #	Manometers H1 mm	Manometers H2 mm	Head cm	Q cm^3	t sec.	Q/At	h/l	Temp. deg. C	k cm/sec
3709	968	135	83.3	5.0	1579	0.00010	6.3491	31	7.81E-06
	890	135	75.5	4.0	1382	0.00009	5.7546	31	7.88E-06
	755	135	62.0	5.0	2107	0.00008	4.7256	30	7.87E-06
							Average k:		7.85E-06

Remarks:
The soil sample was compacted to 105.3 pcf (95% max dry density).

Equipment Used:	*Calibration Due:*
Mettler PM6100 Balance, PTL W-1723	12/07/94
Digital thermometer, PTL W-3189	09/02/94
Digital Caliper, PTL-Y11135	09/29/94

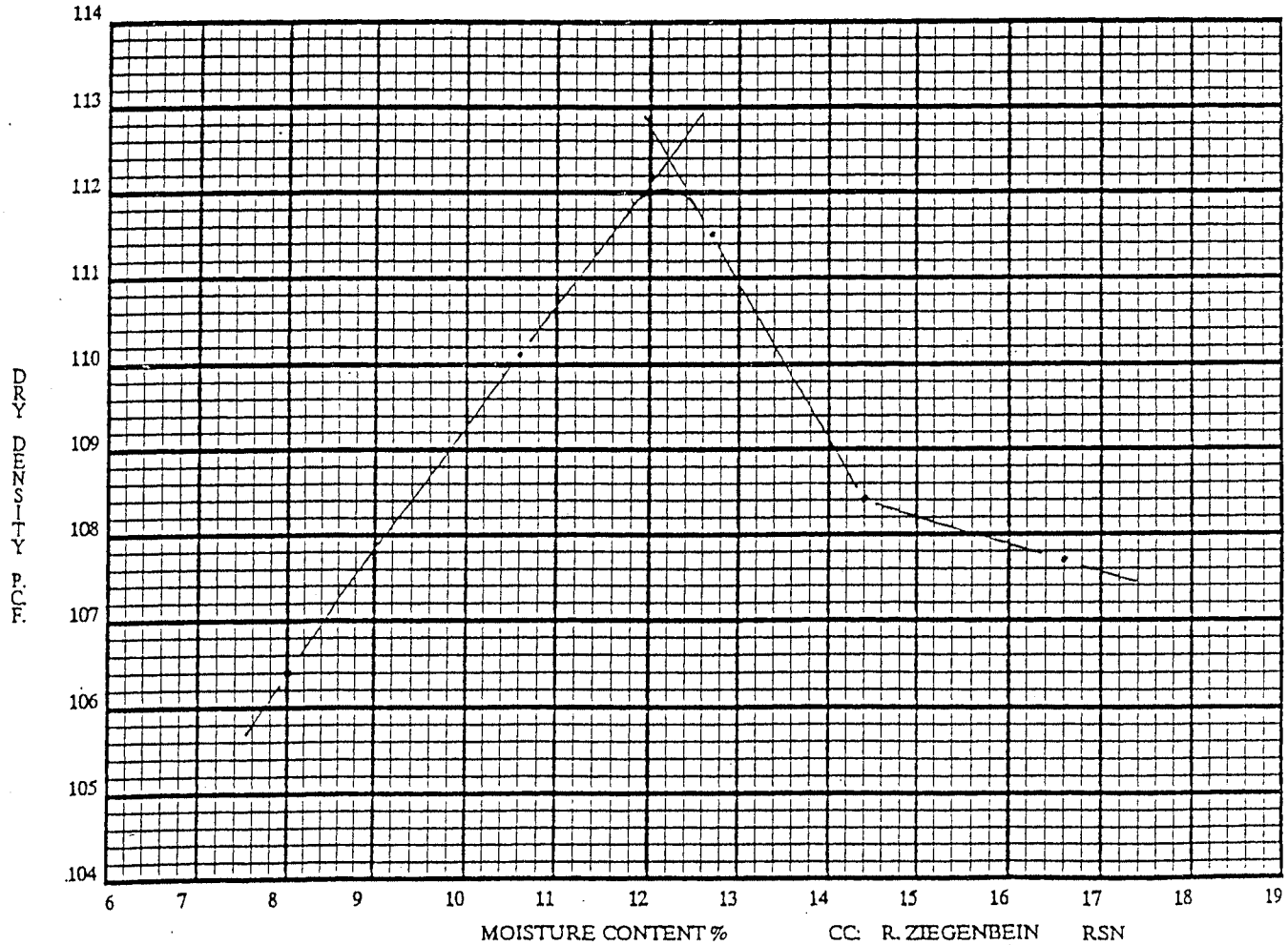
PROCTOR TEST
ASTM D 1557-91
METHOD C

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

ID # 00808
LAB # 3706
DATE 08/29/94

Project: 10C CRATER, LANDFILL CLOSURE Requested by: R. ZIEGENBEIN User/Agency: RSN
Sampled by: D. ANDERSON Date sampled: 08/17/94 Material: S.E. EXISTING (See Map)
Tested by: R. STROTE Date tested: 08/22/94 Checked by: D. HERRINGTON

	TRIAL	1	2	3	4	5	6
1	Wt.mold + wet soil	6766.0	6998.5	7128.0	7075.9	7128.5	N/A
2	Wt. mold	2856.5	2856.5	2856.5	2856.5	2856.5	N/A
3	Wt. wet soil	3909.5	4142.0	4271.5	4219.4	4272.0	N/A
4	Wet Density, PCF	114.9	121.8	125.6	124.0	125.6	N/A
5	Moisture Tare #	1	2	3	4	5.0	N/A
6	Wt wet soil + tare	1317.3	1390.7	1380.5	1397.0	1671.6	N/A
7	Wt dry soil + tare	1221.3	1259.0	1227.3	1223.2	1436.2	N/A
8	Wt moisture	96.0	131.7	153.2	173.8	235.4	N/A
9	Wt tare	16.9	16.9	16.9	16.9	16.9	N/A
10	Wt dry soil	1204.4	1242.1	1210.4	1206.3	1419.3	N/A
11	**% Moisture**	**8.0**	**10.6**	**12.7**	**14.4**	**16.6**	N/A
12	**Dry Density, PCF**	**106.4**	**110.1**	**111.5**	**108.4**	**107.7**	N/A



CC: R. ZIEGENBEIN RSN
MTL GPP FILES

MAX. DENSITY = 112.0 PCF
OPT. MOISTURE = 12.2 %

NO SPECIFICATIONS: INFORMATION ONLY
Equipment used: PM 16, DOE # 708508, Calibration due: 09/21/94

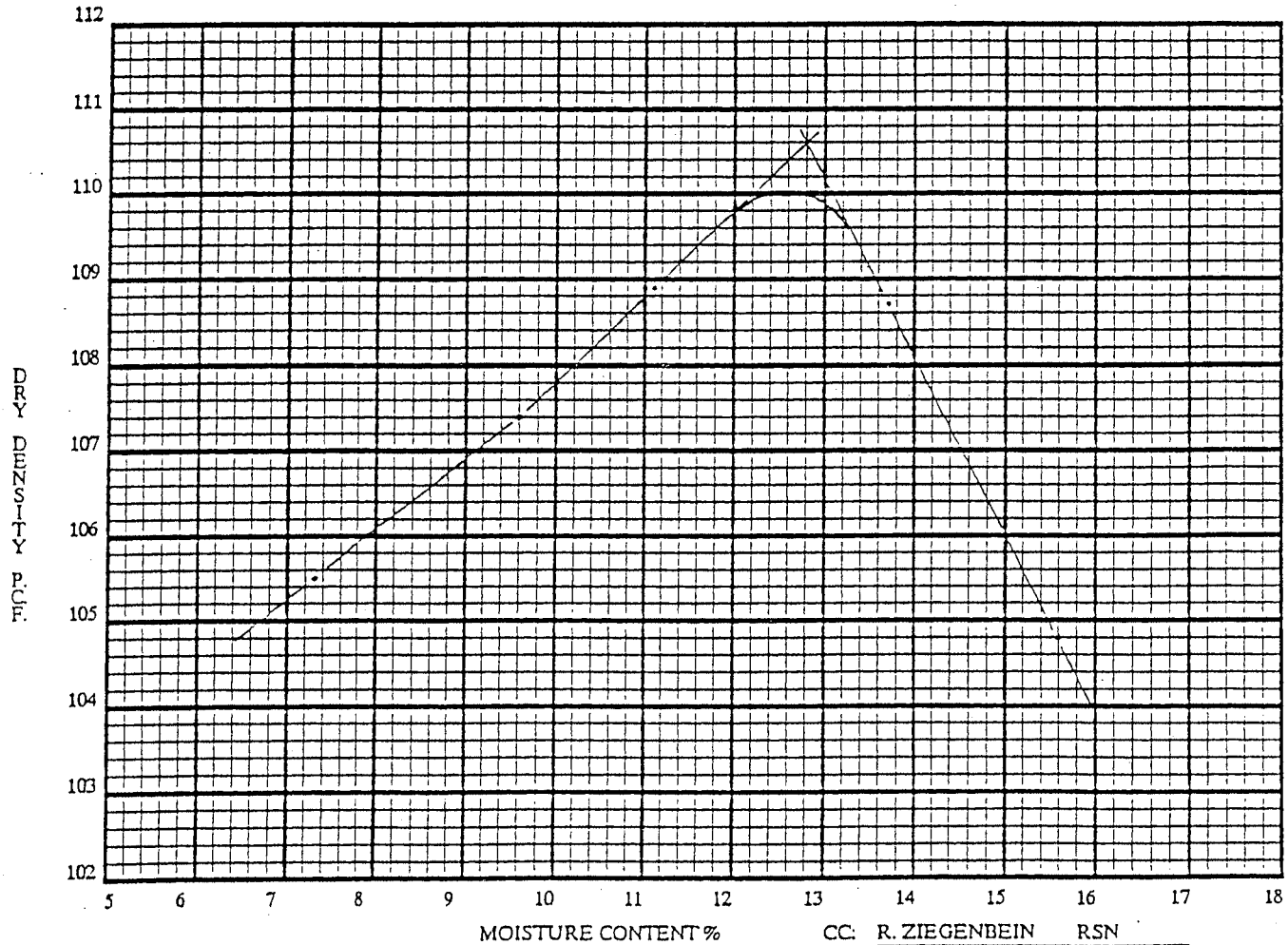
PROCTOR TEST
ASTM D 1557–91
METHOD C

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

ID # 00808
LAB # 3707
DATE 08/29/94

Project: 10C CRATER. LANDFILL CLOSURE Requested by: R. ZIEGENBEIN User/Agency: RSN
Sampled by: D. ANDERSON Date sampled: 08/17/94 Material: N.E. EXISTING (See Map)
Tested by: R. STROTE Date tested: 08/23/94 Checked by: D. HERRINGTON DLH

	TRIAL	1	2	3	4	5	6
1	Wt.mold + wet soil	6708.3	6862.5	6975.5	7062.6	6980.0	N/A
2	Wt. mold	2856.5	2856.5	2856.5	2856.5	2856.5	N/A
3	Wt. wet soil	3851.8	4006.0	4119.0	4206.1	4123.5	N/A
4	Wet Density, PCF	113.2	117.8	121.1	123.6	121.2	N/A
5	Moisture Tare #	1	2	3	4	5.0	N/A
6	Wt wet soil + tare	1707.3	1453.2	1330.8	1405.5	1569.4	N/A
7	Wt dry soil + tare	1592.1	1327.1	1199.0	1238.0	1359.7	N/A
8	Wt moisture	115.2	126.1	131.8	167.5	209.7	N/A
9	Wt tare	16.9	16.9	16.9	16.9	16.9	N/A
10	Wt dry soil	1575.2	1310.2	1182.1	1221.1	1342.8	N/A
11	% Moisture	7.3	9.6	11.1	13.7	15.6	N/A
12	Dry Density, PCF	105.5	107.4	108.9	108.7	104.8	N/A



MAX. DENSITY = 110.0 PCF
OPT. MOISTURE = 12.6 %

CC: R. ZIEGENBEIN RSN
MTL GPP FILES

NO SPECIFICATIONS: INFORMATION ONLY
Equipment used: PM 16. DOE # 708508. Calibration due: 09/21/94

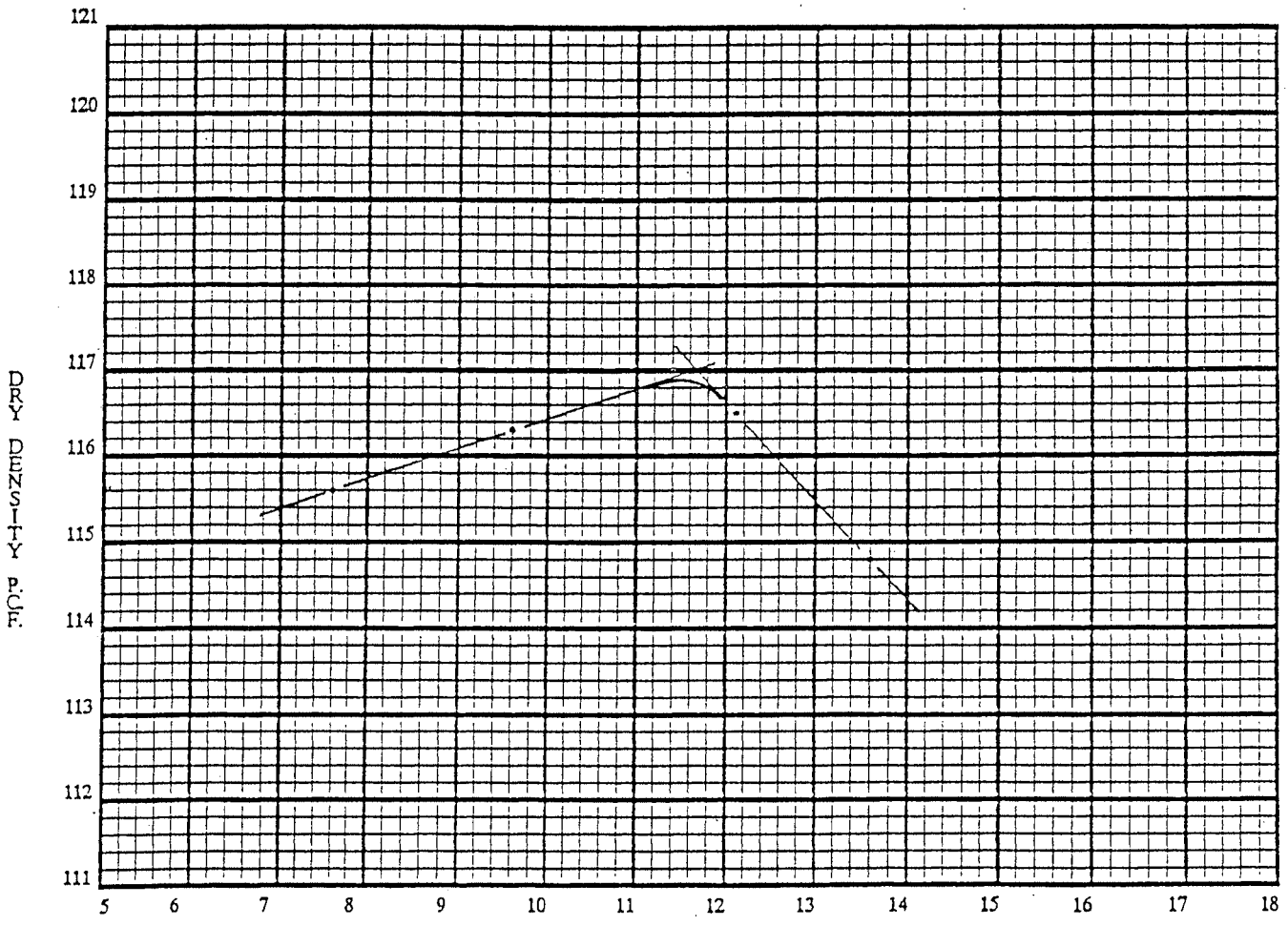
PROCTOR TEST
ASTM D 1557-91
METHOD C

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

ID # 00808
LAB # 3708
DATE 08/29/94

Project: 10C CRATER, LANDFILL CLOSURE Requested by: R. ZIEGENBEIN User/Agency: RSN
Sampled by: D. ANDERSON Date sampled: 08/17/94 Material: N.W. EXISTING (See Map)
Tested by: R. STROTE Date tested: 08/24/94 Checked by: D. HERRINGTON

	TRIAL	1	2	3	4	5	6
1	Wt.mold + wet soil	7087.6	7196.3	7299.5	7290.3	0.0	N/A
2	Wt. mold	2856.5	2856.5	2856.5	2856.5	0.0	N/A
3	Wt. wet soil	4231.1	4339.8	4443.0	4433.8	0.0	N/A
4	Wet Density, PCF	124.4	127.6	130.6	130.3	0.0	N/A
5	Moisture Tare #	1	2	3	4	0.0	N/A
6	Wt wet soil + tare	1361.4	1448.0	1515.0	1582.0	0.0	N/A
7	Wt dry soil + tare	1266.1	1322.1	1353.7	1395.2	0.0	N/A
8	Wt moisture	95.3	125.9	161.3	186.8	0.0	N/A
9	Wt tare	16.9	16.9	16.9	16.9	0.0	N/A
10	Wt dry soil	1249.2	1305.2	1336.8	1378.3	0.0	N/A
11	**% Moisture**	7.6	9.6	12.1	13.6	0.0	N/A
12	**Dry Density, PCF**	115.6	116.3	116.5	114.8	0.0	N/A



CC: R. ZIEGENBEIN RSN
MTL GPP FILES

MAX. DENSITY = 116.9 PCF
OPT. MOISTURE = 11.5 %

NO SPECIFICATIONS: INFORMATION ONLY
Equipment used: PM 16, DOE # 708508, Calibration due: 09/21/94

PROCTOR TEST

ASTM D 1557-91

METHOD C

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

ID # 00808

LAB # 3709

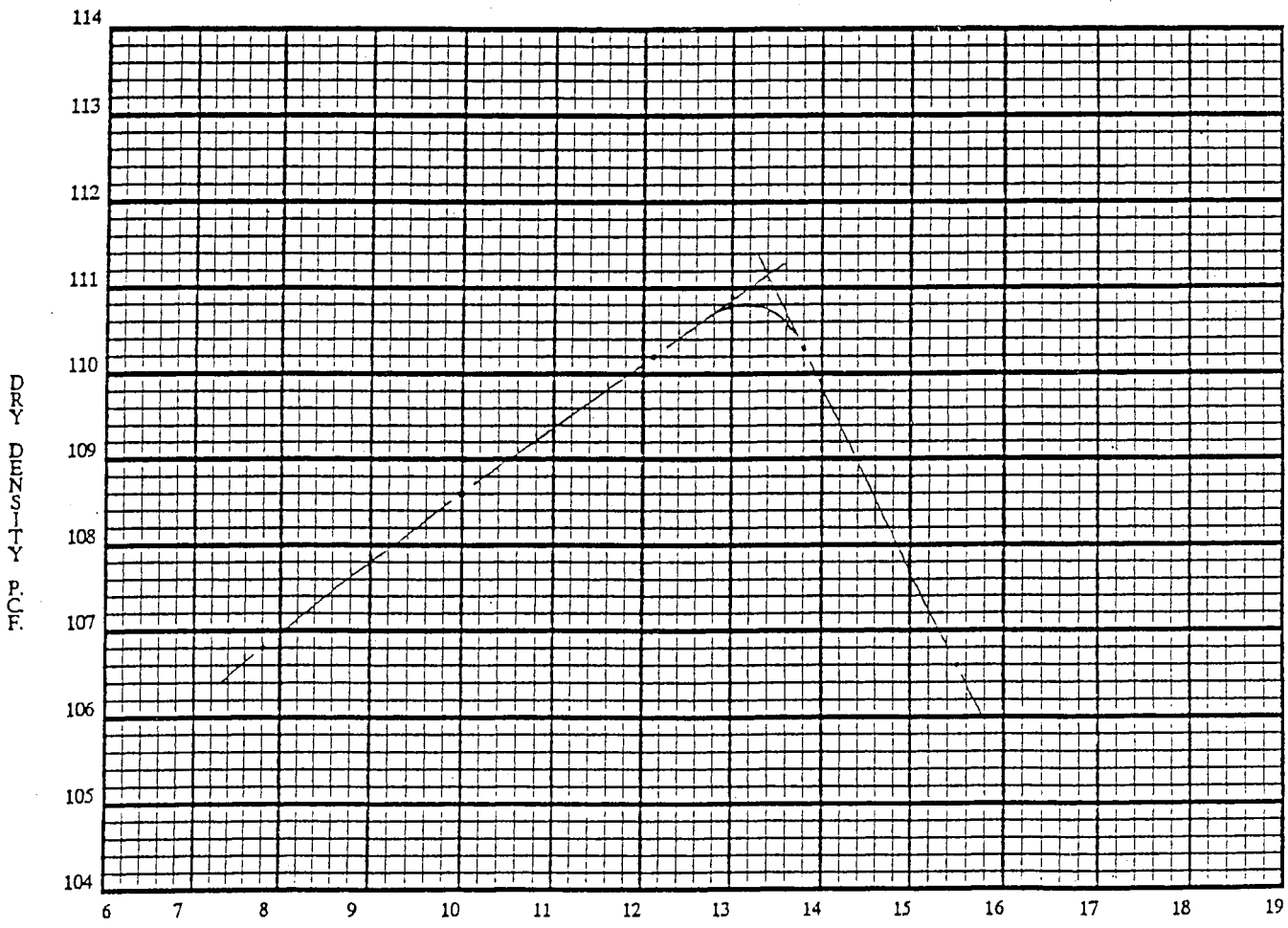
DATE 08/29/94

Project: 10C CRATER. LANDFILL CLOSURE Requested by: R. ZIEGENBEIN User/Agency: RSN

Sampled by: D. ANDERSON Date sampled: 08/17/94 Material: S.W. EXISTING (See Map)

Tested by: R. STROTE Date tested: 08/25/94 Checked by: D. HERRINGTON DLH

	TRIAL	1	2	3	4	5	6
1	Wt.mold + wet soil	6771.5	6920.9	7058.0	7126.9	7044.8	N/A
2	Wt. mold	2856.5	2856.5	2856.5	2856.5	2856.5	N/A
3	Wt. wet soil	3915.0	4064.4	4201.5	4270.4	4188.3	N/A
4	Wet Density, PCF	115.1	119.5	123.5	125.5	123.1	N/A
5	Moisture Tare #	1	2	3	4	5.0	N/A
6	Wt wet soil + tare	1215.6	1148.7	1330.2	1376.6	1541.6	N/A
7	Wt dry soil + tare	1129.3	1045.8	1188.6	1211.6	1337.4	N/A
8	Wt moisture	86.3	102.9	141.6	165.0	204.2	N/A
9	Wt tare	16.9	16.9	16.9	16.9	16.9	N/A
10	Wt dry soil	1112.4	1028.9	1171.7	1194.7	1320.5	N/A
11	% Moisture	7.8	10.0	12.1	13.8	15.5	N/A
12	Dry Density, PCF	106.8	108.6	110.2	110.3	106.6	N/A



MAX. DENSITY = 110.8 PCF

OPT. MOISTURE = 13.2 %

CC: R. ZIEGENBEIN RSN

MTL GPP FILES

NO SPECIFICATIONS: INFORMATION ONLY

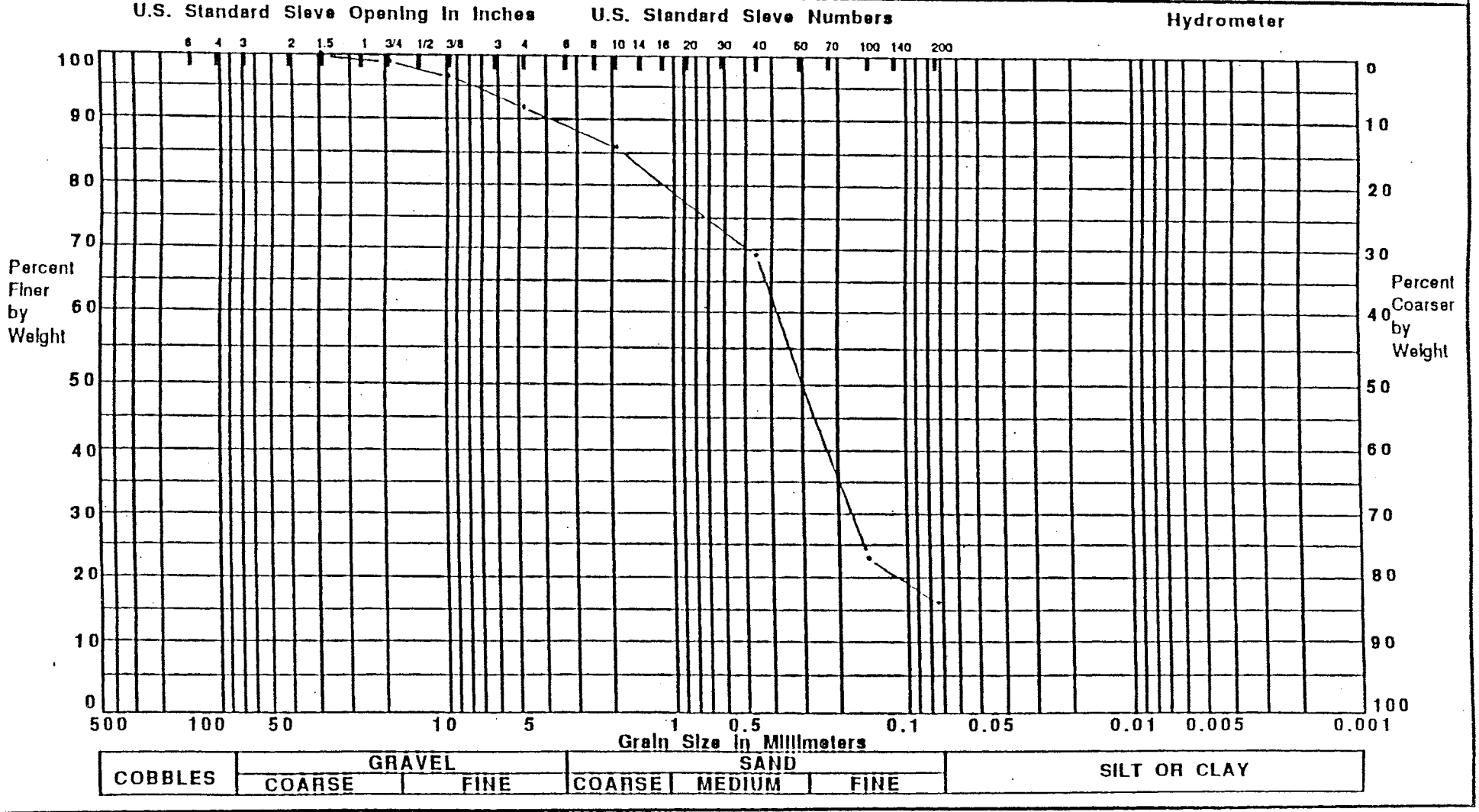
Equipment used: PM 16. DOE # 708508. Calibration due: 09/21/94

GRADATION CURVES
SOIL CLASSIFICATION

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

LAB NO. 3706
ID NO. 00808 --
PAGE 1 OF 1

PROJECT: 10C CRATER, LANDFILL CLOSURE SAMPLE # S.E. EXISTING CLASSIFICATION: SM
CHECKED BY: D. HERRINGTON DLH DATE CHECKED: 9-21-94 MATERIAL EXISTING



NO EQUIPMENT USED.

NO SPECIFICATION, INFORMATION ONLY.

CC: R. ZIEGENBEIN
MTL GPP FILES

RSN

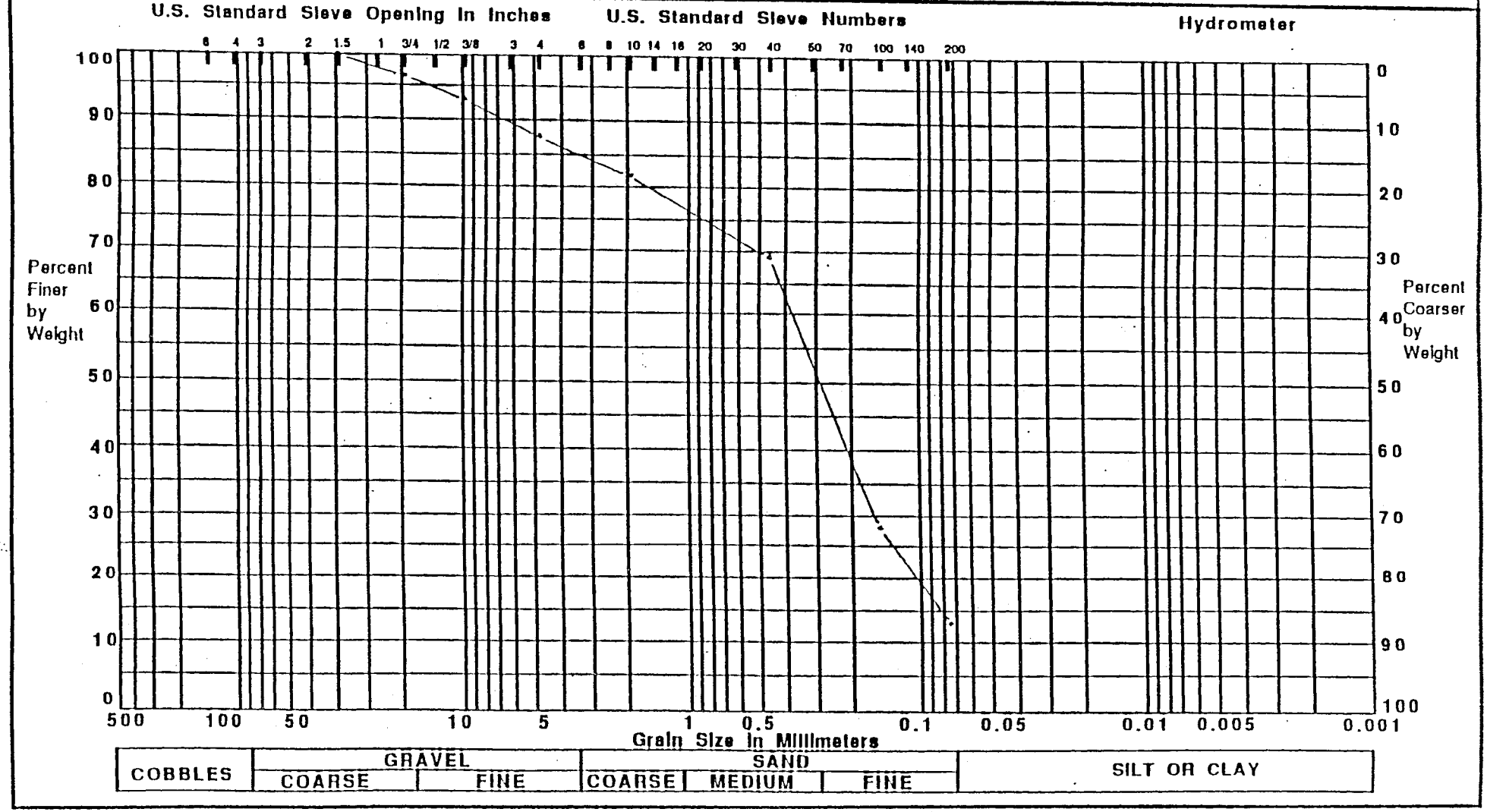
GRADATION CURVES
SOIL CLASSIFICATION

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

LAB NO. 3707
ID NO. 00808
PAGE 1 OF 1

PROJECT: 10C CRATER, LANDFILL CLOSURE SAMPLE # N.E. EXISTING CLASSIFICATION: SM

CHECKED BY: D. HERRINGTON D.L.H. DATE CHECKED: 9-21-94 MATERIAL EXISTING



NO EQUIPMENT USED. NO SPECIFICATION, INFORMATION ONLY.

CC: R. ZIEGENBEIN RSN
MTL GPP FILES

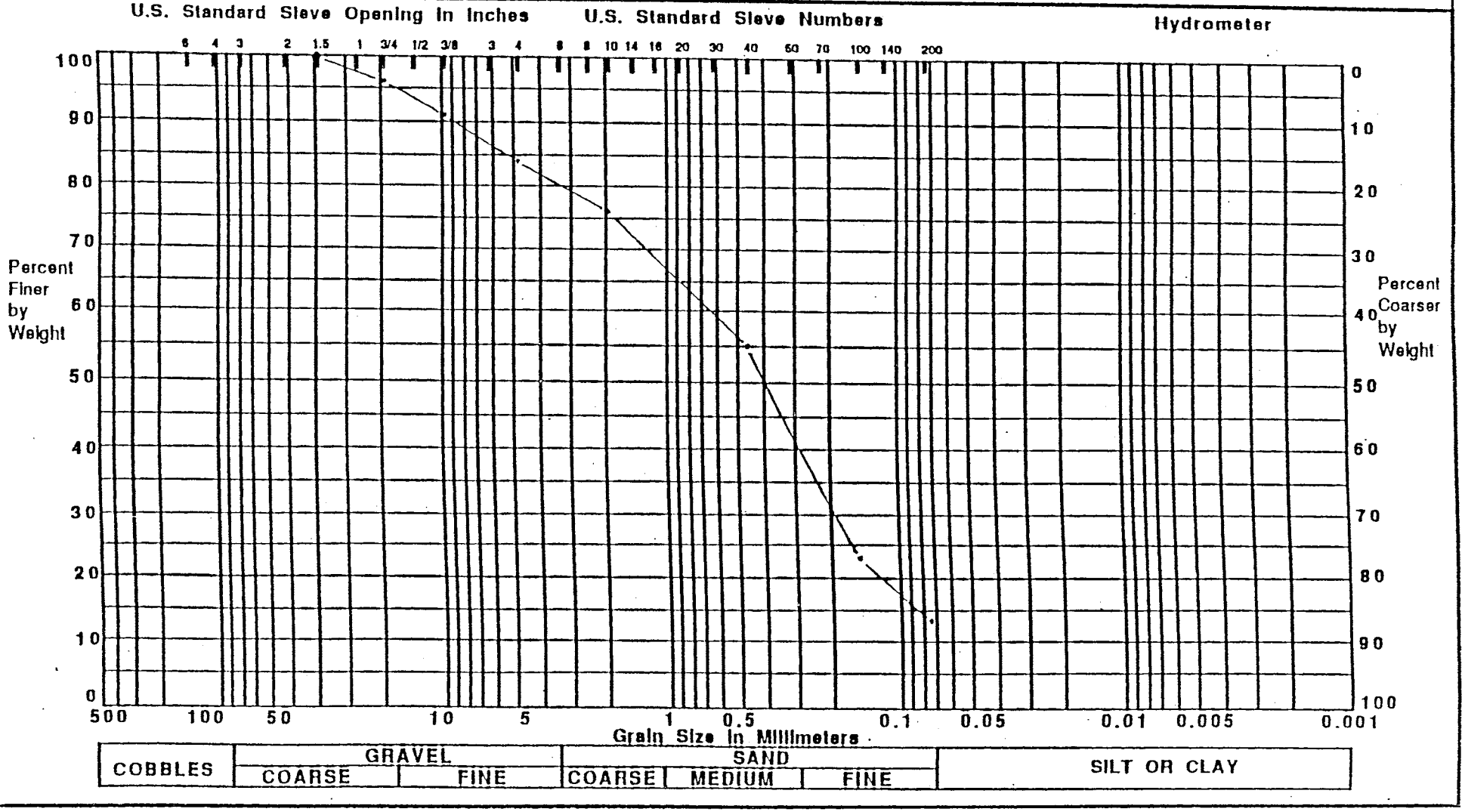
GRADATION CURVES
SOIL CLASSIFICATION

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

LAB NO: 3708
ID NO. 00808
PAGE 1 OF 1

PROJECT: 10C CRATER, LANDFILL CLOSURE SAMPLE # N.W. EXISTING CLASSIFICATION: SM

CHECKED BY: D. HERRINGTON DLH DATE CHECKED: 9-21-94 MATERIAL EXISTING



NO EQUIPMENT USED.

NO SPECIFICATION, INFORMATION ONLY.

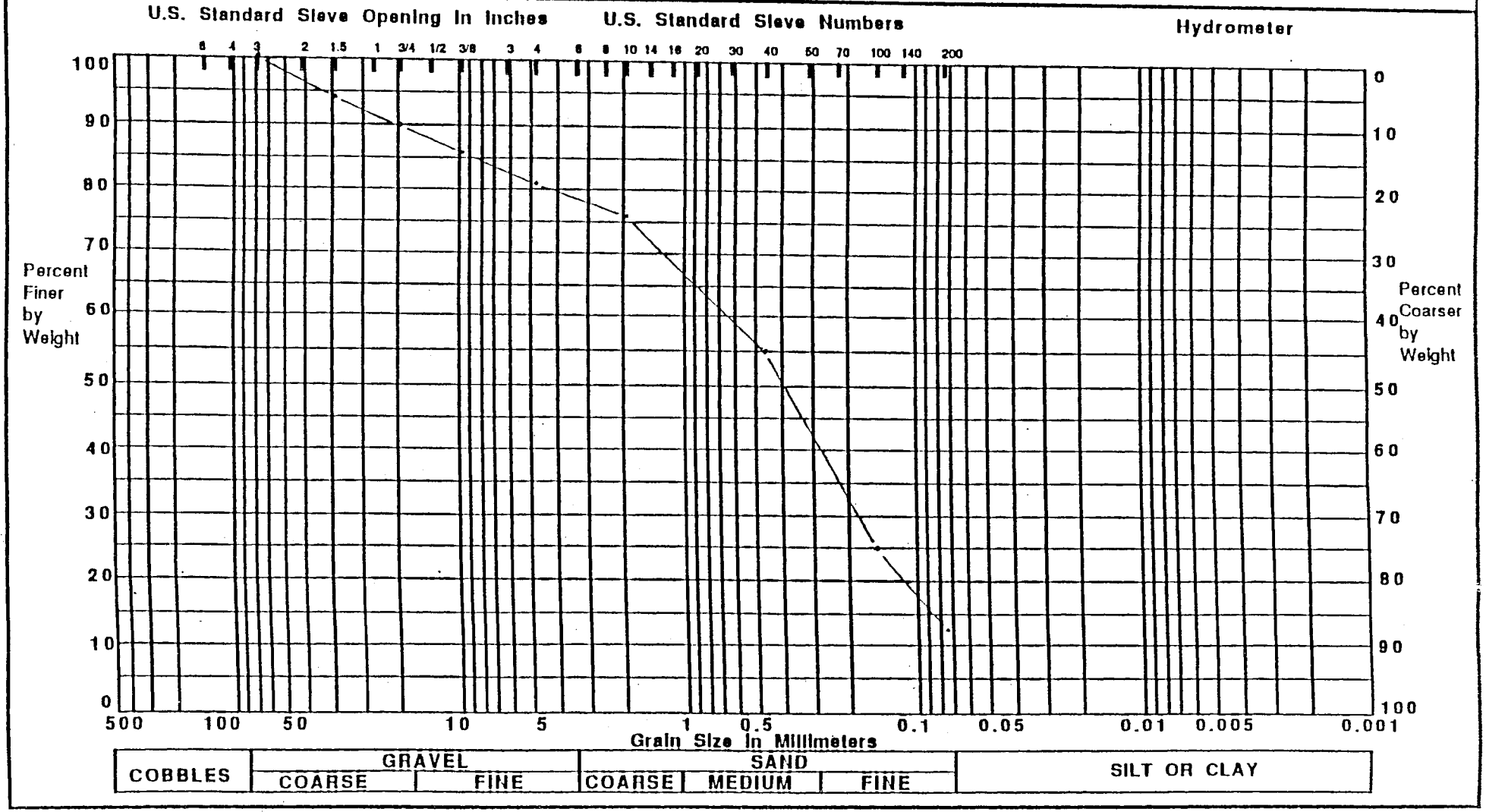
CC: R. ZIEGENBEIN RSN
MTL GPP FILES

GRADATION CURVES
SOIL CLASSIFICATION

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

LAB NO. 3709
ID NO. 00808
PAGE 1 OF 1

PROJECT: 10C CRATER, LANDFILL CLOSURE
SAMPLE # S.W. EXISTING
CLASSIFICATION: SM
CHECKED BY: D. HERRINGTON D.L.H.
DATE CHECKED: 9-21-94
MATERIAL EXISTING



NO EQUIPMENT USED.

NO SPECIFICATION, INFORMATION ONLY.

CC: R. ZIEGENBEIN
MTL GPP FILES

RSN

SPECIFIC GRAVITY
ASTM D 854-91

Raytheon Services Nevada
MATERIALS TESTING LABORATORY
NEVADA TEST SITE

LAB NO. 3706 TH 3709
ID NO. 00808
REPORT DATE 08/30/94

PROJECT: 10C CRATER, LANDFILL CLOSURE
REQUESTOR: R. ZIEGENBEIN
ORGINIZATION: RSN
CHECKED BY: D. HERRINGTON

SAMPLED BY: D. ANDERSON
DATE SAMPLED: 08/17/94
TESTED BY: R. STROTE
TEST DATE: 08/29/94

LAB NO.	DEPTH	FLASK NO.	FLASK WT.	FLASK WT. + SOIL	SOIL WT.	FLASK WT. + SOIL + WATER	WATER WT (ML) 500	WT. DISP. WATER	REL. DENS. WATER	TEMP. (C)	SPECIFIC GRAVITY	ABSORPTION
3706	N/A	509	180.0	483.6	303.6	862.4	498.27	119.47	0.99654	27	2.54	N/A
3707	N/A	510	182.7	498.5	315.8	872.2	498.27	124.57	0.99654	27	2.54	N/A
3708	N/A	516	172.0	484.4	312.4	860.0	498.41	122.61	0.99681	26	2.54	N/A
3709	N/A	517	165.4	471.4	306.0	847.6	498.27	122.07	0.99654	27	2.51	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

EQUIPMENT USED: METTLER PM16 BALANCE (PTL1256)
CAL DUE: 12/07/94
REMARKS: N/A
CC:R. ZIEGENBEIN RSN
M.T.L. GPP FILES

Wt. Disp. Water = (wt. flask + soil) + (wt. water) − (wt. flask + soil + water)

Wt. Water = (rel. density water) x (flask size in ml)

Specific Gravity = (soil wt.) x (rel. density / wt. disp. water)