Resource Conservation and Recovery Act Post-Closure Care Permit Application

For U.S.D.O.E.-Rocky Flats Plant
Hazardous & Radioactive Mixed Wastes

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APPENDIX A

SAMPLING PLANS

REVIEWED FOR CLASSIFICATION/UCNI
By [illegible] (UNP)
Date 4/1/92

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This appendix contains the CEARP (DOE, 1987b) sampling plan for the Present Landfill area (Appendix A-1). Also attached is the revised sampling plan for the Present Landfill area prepared by Rockwell International in 1988 (Appendix A-2). This plan was prepared to evaluate the effectiveness of the ground-water intercept system and slurry wall at the Present Landfill in support of closure activies.

Drilling activies at the Present Landfill generally occurred according to the plan presented in Appendix A-2; however, some deviations from this plan occurred during its implementation. Specifically, wells 70-87 and 71-87 were moved to the locations shown on Plate 4-1 as their proposed locations were within the active landfill area. Well 69-87 was not drilled, again because its proposed location was within the active landfill area.

APPENDIX A-1

PRESENT LANDFILL

CEARP SAMPLING PLAN

DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE
ENVIRONMENT, SAFETY AND HEALTH DIVISION
ENVIRONMENTAL PROGRAMS BRANCH

COMPREHENSIVE ENVIRONMENTAL ASSESSMENT AND RESPONSE PROGRAM

PHASE 2:
ROCKY FLATS PLANT
SITE-SPECIFIC MONITORING PLAN

(Work Plan for Performance of Remedial Investigations and Feasibility Studies for all High-Priority Sites)

SAMPLING PLAN

February 1987

DRAFT

1. INTRODUCTION

CEARP Phase 2 Confirmation consists of CEARP Phase 2a, Monitoring Plan, and CEARP Phase 2b, site characterization (remedial investigation). The Sampling Plan is one component of the Monitoring Plan for Rocky Flats Plant. The Monitoring Plan typically consists of five parts: Synopsis, Sampling Plan, Technical Data Management Plan, Health and Safety Plan, and Quality Assurance/Quality Control (QA/QC) Plan. Because of the Compliance Agreement made by the State of Colorado, Environmental Protection Agency, and Department of Energy (DOE), this Monitoring Plan also includes a Feasibility Study Plan.

CEARP uses a three-tiered approach in the preparation of monitoring plans: the CEARP Generic Monitoring Plan, the Installation Generic Monitoring Plan (IGMP), and Site Specific Monitoring Plans (SSMPs). This SSMP serves as the Work Plan for Performance of Remedial Investigations and Feasibility Studies for all High-Priority Sites required by the Compliance Agreement. Therefore, the acronym used to refer to this plan is SSMP/RIFS. This Rocky Flats Plant SSMP/RIFS Sampling Plan is the detailed work plan for implementation of CEARP Phase 2b site characterizations (remedial investigations) at Rocky Flats Plant and follows guidance provided in the IGMP/CSPCP. This SSMP/RIFS Sampling Plan is complemented by and inseparable from the Technical Data Management Plan and the Quality Assurance/Quality Control Plan. Sections of the Sampling Plan are supported by reference to the other plans and to the Synopsis. Emphasis is placed on integration of efforts for each of the CEARP Phases: Phase 3 (Technological Assessment), Phase 4 (Remedial Action), and Phase 5 (Compliance Verification and Monitoring).

Sampling at Rocky Flats Plant will be conducted using the integrated approach being implemented by CEARP. The integrated approach is summarized in the Synopsis and detailed here. The integrated approach includes characterization in stages, in which the results from the previous stage of sampling are used to design the next stage. This iterative process incorporates the experience and knowledge gained from each stage to minimize the total number of samples required to adequately characterize the site and to provide the necessary data base to prepare feasibility studies for alternative remedial actions. The benefit of staged sampling is greater flexibility within the sampling program with a minimum of cost.

1.1. PURPOSE

This SSMP/RIFS Sampling Plan provides the following basic components of sample, measurement collection and analysis for each high-priority site at Rocky Flats Plant:

- objectives and goals of the investigation
- justification for selected methods and procedures
- proposed sample locations
- proposed number and type of samples
- additional site-specific information requirements.

1.2. OBJECTIVES

The objectives of CEARP Phase 2b site characterizations (remedial investigations) at the high-priority sites at Rocky Flats Plant are to

- verify and characterize contaminant sources,
- determine the present areal and vertical extent of contamination,
- estimate the potential for contaminant migration (including rate and direction) to support risk assessment studies,
- support the technological assessments (feasibility studies) of alternative response actions, including the alternative of "no action," and
- support identification of long term monitoring and verification requirements, as appropriate.

2. SITE SURVEY AND MAPPING

Following the guidance in the IGMP/CSPCP Sampling Plan, all monitoring locations will be described in accordance with the Installation Coordinate System (ICS) for Rocky Flats Plant. The existing coordinate system is a grid system in English units (feet). Elevations will be described in English units, feet above MSL. Surveying will be done in conformance with surveying procedures established in the IGMP/CSPCP.

3. SITE-SPECIFIC MONITORING

Environmental conditions at Rocky Flats Plant have been monitored since shortly after operations began in 1952. In addition, special programs to characterize waste streams, environmental conditions, and past waste disposal practices have been conducted recently (DOE 1986b and DOE 1986f). CEARP Phase I identified approximately 70 sites or groupings of sites that could have adverse impacts on the environment. Additional data collected during preparation of the RCRA Part B Operating Permit Application identified several more potential sites. All potential sites at Rocky Flats Plant were designated as solid waste management units, assigned a reference number, and located on a base map (IGMP/CSPCP Sampling Plan, Plate 1).

A list of solid waste management units is presented in Appendix 1 of the RCRA Part B Operating Permit Application (3004[u] Waste Management Units) (DOE 1986f). These solid waste management units are divided into three categories. The first category includes those hazardous waste management units which will continue to operate and which require a RCRA Operating Permit. The second category includes those hazardous waste management units which are being closed under RCRA Interim Status. The third category includes those inactive waste management units (i.e., RCRA continuing release sites) that are identified under Section 3004(u) of RCRA. Another class of sites is regulated under CERCLA. These CERCLA areas identified at Rocky Flats Plant contain only radioactive wastes (DOE 1986f). However, for ease in referencing these units and/or areas, they have been collectively termed solid waste management units. A preliminary prioritization of solid waste management units based on the CEARP Phase I Installation Assessment was performed and summarized in a report titled "Preliminary Prioritization of Sites" (DOE 1986h).

The high-priority sites addressed in this SSMP/RIFS Monitoring Plan were selected and designated as high-priority sites because of their suspected relationship to preliminarily-identified contaminant plumes in groundwater. Several solid waste management units are included in most of the high-priority sites (Table 3.1 Synopsis) because of their physical proximity to each other. This results in high-priority sites that contain solid waste management units from various phases of CEARP. This is consistent with the staged approach being used by CEARP for site characterizations

remedial investigations), where the higher priority solid waste management units within the high-priority sites are investigated first, and data from these characterizations (investigations) guide the remainder of the program.

The six high-priority sites identified at Rocky Flats Plant (Plate 1) are as follows:

- 881 Hillside Site
- 903 Pad Area Site
- Mound Area Site
- East Burial Trenches Site
- Present Landfill Site
- Solar Evaporation Ponds Site

The solar ponds and present landfill are RCRA regulated units undergoing closure. Plans for characterization of these sites have been incorporated into this SSMP and are consistent with the 40 CFR 265 Closure Plans for these facilities.

The three viable pathways for releases of contaminants from Rocky Flats Plant are air, surface water, and groundwater (DOE 1986b). Air pathway characterization studies will not be performed under CEARP, as the air pathway has been adequately characterized and documented by previous studies (DOE 1986b, RI 1986b). A site-specific discussion of the other pathways at each high-priority site is presented after each site description. A plant-wide discussion of pathways is presented in the SSMP/RIFS Synopsis.

Investigations at each high-priority site can be divided into source characterization, and migration pathway and plume characterization. Source characterization will generally consist of geophysical surveys, soil gas surveys and soil/waste sampling. Migration pathway and plume characterization will generally include geophysical surveys, soil gas surveys, soil sampling, monitor well installation, groundwater sampling, and surface water and sediment sampling. All CEARP Phase 2b site characterizations (remedial investigations) will be implemented using an integrated approach, in which geophysical and soil gas survey results are used to direct soil and groundwater sampling efforts.

Invasive sampling will be performed at many of the high-priority sites. General criteria that are considered in the sampling descriptions of this plan are as follows:

- If the solid waste management unit cannot be located through geophysical techniques, its suspected location will be sampled.

- Invasive samples from a solid waste management unit will be taken only if the presence of containers of liquid or other hazardous conditions is not anticipated.

- At least six samples will be submitted for laboratory analysis from each borehole depending on the amount of available material. The reader is referred to Section 6 of the IGMP Sampling Plan for rationale.

The following sections present high-priority site descriptions including discussions of associated solid waste management units and migration pathways, followed by detailed plans for source and migration pathway and plume characterization. Complete descriptions of the solid waste management units are contained in the RCRA Part B Operating Permit, Appendix I (DOE 1986f).

3.5. PRESENT LANDFILL SITE

3.5.1. Site Description

3.5.1.1. Solid Waste Management Unit Descriptions

The Present Landfill Site consists of the present landfill and two other solid waste management units on the hillsides east of the landfill as discussed below.

- The Present Landfill (SWMU Ref. No. 114) - The present landfill is located north of the main plant area at the head of an tributary to North Walnut Creek. The existing portion of the present landfill will be closed to meet the performance standards of 40 CFR 265.11 (DOE 1986a).

  Operations at the present landfill began in August 1968 on a fill placed across the drainage using on-site soils. Based on engineering studies performed by consultants, collection systems for groundwater, surface water, and leachate were installed in 1974, together with two downstream impoundments to hold the various fluids. In 1978 and 1979, the Colorado Department of Health inspected the landfill and found it to be in compliance with State regulations. Between 1977 and 1981, the leachate collection system was buried by landfill expansion. However, the groundwater control structure was extended beyond the expanded landfill by the installation of slurry walls in 1981. Also in 1981, one of the impoundments was removed to allow further landfill expansion.

  Operational procedures have evolved over the life of the landfill. In July 1977, a solid waste management plan was prepared that excluded radioactive wastes and allowed liquid wastes only with a special permit from the Waste Management and Hazardous Materials Committee of Rockwell International.

Most of the 20 to 30 cubic yards of waste delivered to the landfill each day is office trash; however, a certain amount of construction debris and shop wastes are included. Small quantities of hazardous materials including solvents and paints have been incorporated into the landfill with the construction debris and shop wastes. In addition, it is possible that prior to initiation of radiometric monitoring in 1973, a certain amount of radioactive material may also have been incorporated into the fill.

- Trenches (Ref. No. 166) - Three trenches were operated in the vicinity of the landfill for disposal of sanitary sewer sludge contaminated with uranium and possibly plutonium.

- Spray Fields (Ref. No. 167) - Three areas are used for spray irrigation of landfill pond water in order to enhance evaporation. Spraying began sometime after 1968 and has continued to the present.

3.5.1.2. Surface Water

Surface water in the vicinity of the present landfill site generally flows to the east on the terrace. Most of the runoff enters the landfill pond and is disposed of by natural and enhanced evaporation. Enhanced evaporation consists of spray irrigating the slope south of the pond. Flow patterns are controlled by the ditches that circle the landfill and by the presence of the various roads. The Church and McKay ditches and the North Walnut Creek diversion ditch cross the terrace surface north of the landfill.

3.5.1.3. Groundwater

Most of the area in the vicinity of the present landfill is underlain by about 22 to 23 ft of Rocky Flats Alluvium. The alluvium was found to contain discrete layers of sand (7 ft thick) and of silt (4 ft thick). Bedrock immediately beneath the alluvium is Arapahoe Formation claystone. In well 9-86, located west of the landfill, 100 ft of claystone and siltstone were penetrated before sandstone.

Groundwater occurs in the vicinity of the present landfill in both the Rocky Flats Alluvium and the Arapahoe Formation bedrock. The general direction of groundwater flow in the alluvium is toward the east with some flow toward the south-east near the North Walnut Creek drainage. Depth to groundwater in the Rocky Flats Alluvium is approximately 10 ft below ground surface. In the drainage

downgradient of the landfill, the valley fill material is dry, indicating that the water control systems at the landfill are probably functioning as designed.

Limited data are available relative to groundwater quality conditions at the present landfill. All downgradient wells, with the exception of Well WS-2, were dry. At Well WS-2, sufficient sample was only available for HSL volatiles analysis. No volatiles were detected.

3.5.2. Source Characterization

3.5.2.1. Health and Safety Screening

Prior to any surveying or sampling activities at the 881 Hillside Site, a screening for radioactive and chemical contaminants will be conducted. Radiation screening will be performed using a field instrument for detection of low energy radiation (FIDLER), and chemical screening will be done with a photoionization detector (PID). If significant surficial contamination is detected during screening, detailed health and safety surveys will be performed. Detailed surveys will consist of FIDLER and PID readings at each survey grid node as described in Section 3.5.2.2.

3.5.2.2. Survey Grid

A 30-ft centered grid will be established for implementation of geophysical and soil gas surveys. Grid node locations will be surveyed to an accuracy of 1 ft. Plate 2 shows the location and extent of this grid.

3.5.2.3. Surface Geophysics

Several types of geophysical surveys will be performed at the Present Landfill Site to delineate burial trenches east of the landfill. Each of these methods is discussed below. Specific procedures and equipment specifications for these techniques are presented in Appendixes A and B of the IGMP/CSPCP Sampling Plan.

Electromagnetics. An electromagnetic induction survey will be conducted east of the present landfill to identify and delineate the three burial trenches in this area. The survey will be conducted using a Geonics EM-31 terrain-conductivity instrument

in a continuous recorder mode. Conductivity measurements will be taken on 30-ft centers across the burial trenches. Closely spaced measurements will be taken at the edges of anomalous areas for boundary definition.

Conductivity measurements in millimhos per meter (mmhos/m) will be plotted and contoured to identify areas of anomalous conductivities. These anomalous areas should be indicative of source areas.

Magnetometer. A magnetometer survey will be conducted over the burial trenches to screen for buried metallic objects. This survey will be conducted with a portable proton memory magnetometer and will supplement the electromagnetic induction survey. This survey will be conducted on 15-ft centers within the surveyed grid.

Metal Detection. Areas believed to contain metallic objects (from electromagnetic induction and magnetometer data) will be investigated further using a White's metal detector. Buried metallic objects located with the metal detector will be flagged to avoid drum puncture during soil sampling efforts.

Electrical Resistivity Soundings. Two vertical electrical resistivity soundings will be conducted at each of the three burial trenches at the Present Landfill Site to determine the approximate depth of each trench. A Bison Instrument Model 2365 resistivity instrument will be used for this source characterization effort. These soundings will provide a vertical profile of resistivity, which should indicate the depth of waste disposal water table and bedrock. The soundings will be made to an effective depth of about 50 ft.

3.5.2.4. Soil Gas Surveys

Soil gas surveys at the Present Landfill Site will be primarily used to assist in landfill closure design. Methane and hydrogen sulfide soil gas sampling will be performed on the existing landfill cap to evaluate gases presently trapped in the landfill. Approximately 20 soil gas sampling points in the landfill cover are anticipated.

Additional soil gas sampling will be conducted over the burial trenches and spray irrigation areas to characterize these sources. These surveys will be performed on 90-ft surveyed grids following procedures in Appendix A of the IGMP/CSPCP Sampling Plan.

3.5.2.5. Soil/Waste Sampling

Soil and waste sampling will be performed at the Present Landfill Site to characterize the cover materials on the present landfill, the contents of the burial trenches east of the landfill, and the soils in the spray irrigation areas. Specific sampling locations will be defined based on geophysical and soil gas survey results; however, at least two borings will be drilled into each trench and each spray irrigation area, as appropriate. Approximately 20 borings through the landfill cover are anticipated at this time (Plate 3). Physical testing will be performed on samples from these borings to evaluate the integrity of the existing landfill cover.

Borings through the trenches and spray irrigation areas will extend though each unit down to bedrock. Samples will be analyzed for the parameters listed in Table 3.1.

3.5.3. Migration Pathway and Plume Characterization

3.5.3.1. Soil Gas Surveys

Soil gas surveys will not be conducted at the Present Landfill Site for plume delineation. Source characterization soil gas surveys are discussed in Section 3.5.2.4.

3.5.3.2. Soil Sampling

Soil sampling may be performed to delineate the extent of soil contamination and to characterize migration pathways at the Present Landfill Site. Specific sampling locations will be based on the soil gas survey results. Samples will be collected from boreholes and monitoring well installations as described in Appendix A of the IGMP/CSPCP Sampling Plan and analyzed for the parameters listed in Table 3.1.

3.5.3.3. Monitor Well Installation and Groundwater Sampling

Three new monitor wells are currently anticipated at the Present Landfill Site (Plate 4). A well pair will be installed in the tributary at the base of the landfill

pond dam to characterize downgradient groundwater quality and saturation conditions. An alluvial well will be installed in the tributary east of the new downgradient well pair to define the extent of saturation in valley fill alluvium.

There are several existing monitor wells in the vicinity of the present landfill that will be used in characterizing the groundwater pathway at the site. Well pair 10-86 (alluvial well) and 9-86 (bedrock well) are located west of the present landfill and serve to characterize upgradient conditions. Well pair 7-86 (alluvial well) and 8-86 (bedrock well) are located east of the present landfill at the toe of the fill. This pair is located to allow characterization of groundwater conditions immediately downgradient of the landfill. Alluvial wells 6-86 and 5-86 are located further east of the present landfill in the tributary to evaluate the extent of saturation and contaminant plumes.

Groundwater samples will be collected from new and existing wells at the Present Landfill Site following the procedures in Appendix A of the IGMP/CSPCP Sampling Plan. Samples will be analyzed for the parameters listed in Table 3.2. Based on results of soil/waste sampling performed during source characterization, this parameter list may be modified to include additional contaminants.

3.5.3.4. Surface Water and Sediment Sampling

Surface water samples will be collected from established sampling locations upstream and downstream from the Present Landfill Site. Included will be stations along Church Ditch, McKay Ditch, and the unnamed tributary of Walnut Creek. Stratified sampling of the landfill pond will also be performed to characterize its contents. Surface water samples will be collected from any springs or seeps occurring on the hillsides north or south of the landfill pond. Additional surface water and/or sediment samples may be collected based on soil gas survey results. Samples will be analyzed for the parameters in Tables 3.1 and 3.2 as appropriate.

Table 3.1. Source Sampling Parameters

Metals[a,b]
Hazardous Substance List - Metals
Beryllium
Chromium (hexavalent)
Lithium
Strontium

Organics
Hazardous Substances List - Volatiles[b]
Oil and Grease[a]

Radionuclides[b]
Gross Alpha
Gross Beta
Uranium 233, 234, and 238
Americium 241
Plutonium 239
Strontium 90
Cesium 137
Tritium

Other
TCLP
EP Toxicity
Characteristics (e.g., ignitability, corrosivity, reactivity)
pH
Cation Exchange Capacity

---

[a]These analyses will be performed on only one-third of the samples.
[b]These analyses may be performed on sediments.

Table 3.2. Groundwater and Surface Water Sampling Parameters

Field Parameters
pH
Specific Conductance
Temperature
Dissolved Oxygen*

Indicators
Total Dissolved Solids
Total Suspended Solids*

Metals**
Hazardous Substances List - Metals***
Beryllium***
Calcium
Chromium (hexavalent)***
Iron
Lithium***
Magnesium
Manganese
Potassium
Sodium
Strontium***
Zinc

Anions
Carbonate
Bicarbonate
Chloride
Sulfate
Nitrate

Organics
Hazardous Substances List - Volatiles
Oil and Grease***

Radionuclides
Gross Alpha
Gross Beta
Uranium 233, 234, and 238
Americium 241
Plutonium 239
Strontium 90
Cesium 137
Tritium

Table 3.2. (Continued)

Other
EP Toxicity
Characteristics (e.g., ignitability, corrosivity, reactivity)

---

* for surface water samples only
** dissolved metals for groundwater samples,
total and dissolved metals for surface water samples
***These analyses will be performed on only one-third of the samples.

4. SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Protocols for sample containers, sample preservation, and holding times will conform to those specified in the CGMP and IGMP/CSPCP Sampling Plans and Quality Assurance/Quality Control Plans.

5. SAMPLE CONTROL AND DOCUMENTATION

Procedures for sample control and documentation will conform to those specified in the CGMP and IGMP/CSPCP Quality Assurance/Quality Control Plans.

6. SAMPLE HANDLING, TRANSPORT, AND STORAGE

Procedures for sample handling, transport, and storage will conform to those specified in the CGMP and IGMP/CSPCP Quality Assurance/Quality Control Plans.

7. SAMPLE PREPARATION AND ANALYSES

Procedures for sample preparation and analyses will conform to those specified in the CGMP and IGMP/CSPCP Quality Assurance/Quality Control Plans.

8. REFERENCES

DOE 1986b: "Comprehensive Environmental Assessment and Response Program Phase 1: Draft Installation Assessment Rocky Flats Plant," US Department of Energy unnumbered draft report, April 1986.

DOE 1986f: "Resource Conservation and Recovery Act Part B - Operating Permit Application for USDOE Rocky Flats Plant, Hazardous and Radioactive Mixed Wastes," US Department of Energy unnumbered report, November 1986.

DOE 1986g: "Resource Conservation and Recovery Act Part B - Post-Closure Care Permit Application for USDOE Rocky Flats Plant, Hazardous and Radioactive Mixed Wastes," US Department of Energy unnumbered report, November 1986.

DOE 1986h: "Draft Preliminary Prioritization of Sites," US Department of Energy unnumbered draft report, July 1986.

Hurr 1976: R.T. Hurr, "Hydrology of a Nuclear-Processing Plant Site, Rocky Flats, Jefferson County, Colorado," US Geological Survey Open-File report 76-268, 1976.

RI 1986a: "Annual Environmental Monitoring Report: January-December 1985," Rockwell International Rocky Flats Plant, Golden, Colorado report RFP-ENV-85, April 1986.

RI 1986b: "Rocky Flats Plant Radioecology and Airborne Pathway Summary Report," Rockwell International, Rocky Flats Plant, Golden, Colorado unnumbered report, December 1986.

Robson 1981: Robson, S.G., J.C. Romero and S. Jawistowski, "Geologic Structure, Hydrology, and Water Quality of the Arapahoe Aquifer in the Denver Basin, Colorado," US Geologic Survey Hydrologic Atlas HA-647, 1981.

APPENDIX A-2

REVISED SAMPLING PLAN

APPENDIX A-2

REVISED PRESENT LANDFILL SAMPLING PLAN

PRESENT LANDFILL PROPOSED MONITOR WELLS

Presented below are proposed monitor well installation locations at the Present Landfill. These wells are needed to:

1) characterize ground-water flow directions in the vicinity of the landfill;

2) characterize ground-water quality in and around the landfill;

3) evaluate the effectiveness of the ground-water intercept and leachate collection system on the west, north, and south sides of the landfill; and

4) determine the effectiveness of the slurry wall cutoff system on the north and south sides of the landfill.

Fifteen new monitoring wells will be completed at the Present Landfill Site. Proposed monitor well locations are shown on Figure 1 and are discussed individually below. Boreholes will be terminated in bedrock beneath surficial materials, and all of the proposed wells will be completed in surficial materials. Available data from 1986 well installations and from previous engineering work conducted at the landfill indicate the depth to bedrock should not exceed 25 feet.

Proposed monitor wells 58-87, 59-87, 60-87, 61-87, 62-87, 63-87, 64-87, 65-87, and 66-87 will be installed on the west, north, and south sides of the western portion of the landfill to evaluate the effectiveness of the ground-water intercept system. These wells will be placed at approximate distances of 30, 90, and 150 feet from the buried perforated PVC piped serving as the ground-water intercept system. This system was buried at a depth of approximately 22 feet at the western end of the

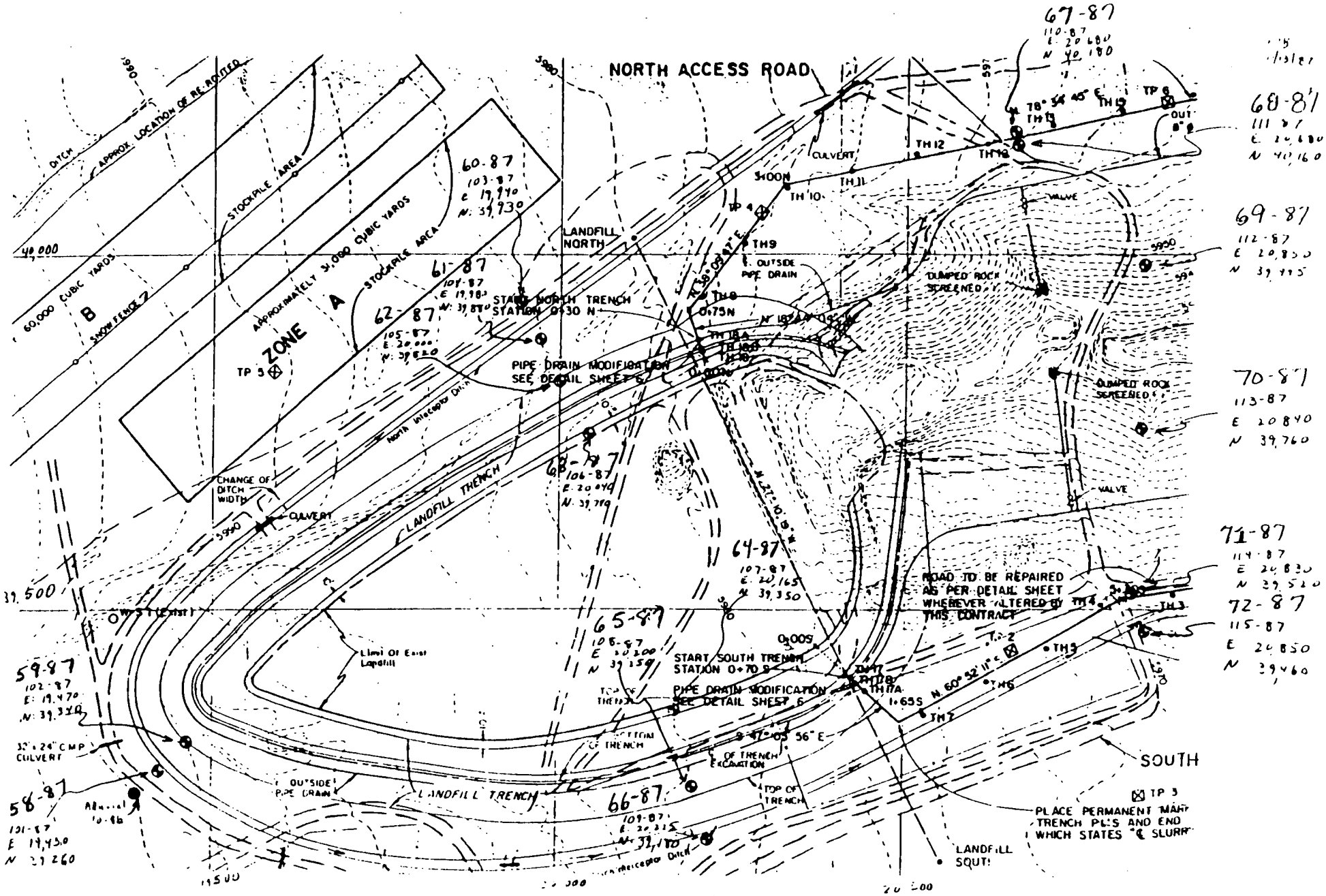


Figure 1. Present Landfill Proposed 1987 Monitor Wells

landfill. The depth of burial of the perforated pipe on the northern leg of the landfill decreases to approximately 15 feet at 20,170 east (Rocky Flats Plant coordinates). East past 20,170 the pipe is a solid vitrified clay sewer pipe. The depth of burial of the perforated pipe on the southern leg of the landfill decreases to approximately 23 feet at 20,499 east (Rocky Flat Plant coordinates). The slope of the buried perforated pipe is 2 or 1 percent depending on the exact location of interest. The elevation of grade also slopes down to the east, causing the relatively constant depth of pipe burial. Ground water in the vicinity of the landfill was found to occur at an approximate depth of 10 feet in 1973 and 1974; this is also the approximate depth to ground water in the vicinity of well 10-86.

Placement of the wells as shown in Figure 1 should identify a drawdown curve, if one exists near the ground-water intercept system. The shape of the curve will help determine the effectiveness of the intercept system in collecting the nearby ground water, and samples from these wells will identify whether leachate that may be present in the landfill is flowing past the ground-water intercept system. If a drawdown curve toward the ground-water intercept system is identified, and the wells outside the landfill identify no contaminated ground water, then the ground-water intercept system will be considered effective.

Wells 67-87, 68-87, 71-87, and 72-87 will be installed to evaluate the effectiveness of the slurry wall north and south of the eastern portion of the landfill. The slurry wall was keyed into the ground-water intercept system when the landfill was extended past the intercept system in 1982. The effectiveness of the slurry wall in separating natural ground-water flow from the landfill will be evaluated by reviewing water level and water quality data from the new wells. If ground-water elevations on the landfill side of the slurry wall are lower than on the "natural" side

of the wall, then the slurry wall is likely to be working properly. Ground-water quality differences between the wells inside and outside the slurry wall may also indicate the effectiveness of the wall.

Wells 69-87 and 70-87 will be completed in colluvial materials downgradient of the Present Landfill as shown on Figure 1. These wells will serve to monitor ground-water quality exiting the landfill area.

A test pit will be excavated at approximate coordinates E 20,700 and N39,900 (Rocky Flats Plant coordinates) to determine if a leachate is present in the east end of the landfill. If leachate is found, then a sample will be collected to characteristize the leachate. The approximate elevation of the free water surface will also be determined. In any case, the elevation of the surface of the landfilled waste in this area will be accurately determined in order to know the approximate depth to natural soil.

APPENDIX B

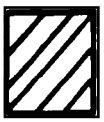
HYDROGEOLOGIC DATA

EXPLANATION OF SYMBOLS AND TERMS ON BORING LOGS

SAMPLE TYPE

Split Spoon

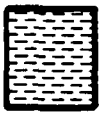
NC Core



Continuous Drive

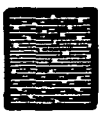
Bulk

GRAPHIC LOG



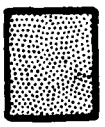
Clay or Claystone

Clayey Sand or Sandy Clay

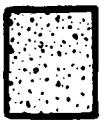


Silty Claystone

Cobbles, Gravel and/or Boulders

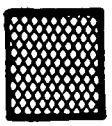


Sand and Sandstone



Sand and Gravel

Silt or Siltstone



Artificial Fill / Disturbed Ground

APPENDIX B

HYDROGEOLOGIC DATA

EXPLANATION OF SYMBOLS AND TERMS ON BORING LOGS

SAMPLE TYPE

Split Spoon

NC Core

Continuous Drive

Bulk

GRAPHIC LOG

Clay or Claystone

Clayey Sand or Sandy Clay

Silty Claystone

Cobbles, Gravel and/or Boulders

Sand and Sandstone

Sand and Gravel

Silt or Siltstone

Artificial Fill / Disturbed Ground

APPENDIX B-1

1986 MONITOR WELLS

INDEX OF DATA

Boring No.: 4-86

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

____ Saturated Thickness Hydrograph

Project:	Rocky Flats Plant	LOG OF BORING NO.	4-86
Date Drilled	4/24/86	Coordinates	
Boring Method	Hollow Stem Auger	Ground Surface Elevation	5645

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	0			VALLEY FILL ALLUVIUM 0-0.7'. CLAY: dark brown; silty; trace granitic pebbles; moist. 0.7-1.5'. CLAY: medium to dark brown; some very fine-grained sand; moist.			
	3			1.5-2.7'. SAND: medium to dark brown; poorly sorted; fine to coarse; quartz and feldspar; silty clay partings; moist. 2.7-3.0'. CLAY: dark grayish brown; iron stains and trace granitic pebbles; silty; moist to wet. 3.0-8.0'-Sample. Recovered 1.7/5.0'=34%. 3.0-4.0'. CLAY: Same as above; moist to wet.			
	6			6.3-8.0'. CLAY: dark grayish brown; silty; iron stains and trace granitic pebbles; moist to wet. 8.0-10.5'-Sample. Recovered 0.7/2.5'=28%. 8.0-8.7'. CLAY: dark brown; silty; trace grading to some granitic cobbles; moist. 10.5-13.0'-Sample. Recovered 1.3/2.5'=52%.			
	9			11.7-12.2'. CLAY: medium to dark brown; some granitic pebbles and cobbles; sandy to gravelly; moist. Wet at 12.0'. 12.2-13.0'. CLAY: medium brown to medium gray; sandy to gravelly; some granitic pebbles and cobbles; iron staining; wet.			
	12						

Remarks Logged by: S. Paschke Checked by: _____

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 4-86
Date Drilled	4/21/86	Coordinates
Boring Method	Hollow Stem Auger	Ground Surface Elevation 5645

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	12			13.0-15.5'-Sample. Recovered 2.1/2.5'=84%. 13.0-14.7'. CLAY: medium gray; some fine to coarse sand and some granitic pebbles; iron staining; wet. 14.7-14.9'. CLAY: medium gray; some fine to coarse sand and granitic pebbles; iron staining; wet.			
	15			ARAPAHOE FORMATION 15.5-18.0'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: medium gray; slightly sandy; moist.			
	18			TOTAL DEPTH: 18.0'			
	21						
	24						

Remarks Logged by: S. Paschke Checked by:

Project No. 106P06222

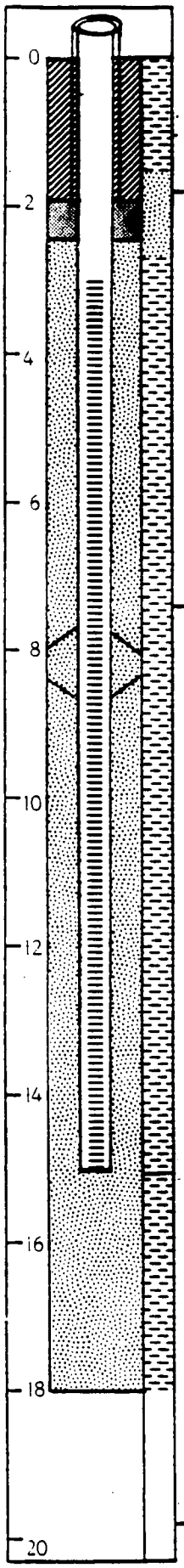
Hydro-Search, Inc.

WELL 4-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 40437.1 E 30774.2

ELEVATION: GROUND LEVEL 5636.60'
TOP OF CASING 5637.94'



LOCATION Golden, CO
PERSONNEL S. Paschke
PROJECT 100106222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 14.92' Hole: 18.00'
BOREHOLE DIAMETER 7½"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Doyle Styles)
RIG Mobile B-57
BIT(S) Blade bit

DRILLING FLUID None

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

CASING STRING(S): C=CASING S=SCREEN

0.00'	3.52'	C1
3.52'	14.92'	S1

CASING: C1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.020" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS Centralizer placed approximately mid-point on screened interval.

FILTER MATERIAL 12-20 silica sand
2.40' - 18.00'

CEMENT Portland Type I
0.00' - 1.95'

OTHER 3/8" bentonite pellets
1.95' - 2.40'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7½" auger	4/24	1440	4/24	1600
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	4/24	1725	4/24	1730
FILTER PLACEMENT:	4/24	1730	4/24	1810
CEMENTING:	4/25	1010	4/25	1020
DEVELOPMENT:	8/29	1606	8/29	1606
OTHER:				
Bentonite	4/25	1000	4/25	1010

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 12.00' during drilling

Top of stainless steel casing: 1.34'

Well No.: 4-86

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
8-29-86	1606	-	-	-	Dry-moist dark brown mud in bottom of hole

ROCKY FLATS LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
0486	08/29/86	5636.60	5637.94	1.34	14.92	-1.00	DRY
	10/13/86					-1.00	DRY
	11/26/86					-1.00	DRY
	01/01/87					-1.00	DRY
	02/23/87					7.21	5630.73
	04/01/87					5.54	5632.40
	05/07/87					5.54	5632.40
	06/02/87					6.60	5631.34
	07/08/87					7.45	5630.49
	08/04/87					-1.00	DRY
	08/10/87					-1.00	DRY
	09/01/87					-1.00	DRY
	10/01/87					-1.00	DRY
	11/09/87					-1.00	DRY
	12/08/87					-1.00	DRY
	01/07/88					7.20	5630.74
	02/24/88					6.30	5631.64
	03/07/88					6.50	5631.44
	04/11/88					6.80	5631.14

INDEX OF DATA

Boring No.: 5-86

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

____ Saturated Thickness Hydrograph

Project: Rocky Flats Plant

LOG OF BORING NO. 5-86

Date Drilled 9/4/86 **Coordinates**

Boring Method Hollow Stem Auger **Ground Surface Elevation** 5723

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	0			VALLEY FILL ALLUVIUM 0-2.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: grayish red (10R 4/2) with very fine-grained sand; roots and grasses; poorly sorted; subangular; unconsolidate; weathered; dry. 2.0-4.0'-Sample. Recovered 0.8/2.0'=40%. GRAVEL: grayish red (10R 4/2) gravel and sand; quartzite and granite pebbles and cobbles; poorly sorted; angular; unconsolidate; dry.			
	2			4.5-6.0'-Sample. Recovered 1.5/2.0'=75%. 4.5-5.7'- SAND: dark yellowish brown (10YR 4/2) very fine-grained sand with some gray quartzite pebbles and cobbles; some light brown (5YR 5/6) areas; poorly sorted; sub-angular; unconsolidated; dry.			
	4			5.7-6.0'- CLAY: moderate yellowish brown (10YR 5/4) with several gray quartzite pebbles and cobbles; several white calcareous laminations; strong reaction with HCL; dry.			
	6			6.0-8.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: several gray quartzite gravels and pebbles in a moderate yellowish brown (10YR 5/4) clay matrix; angular; poorly sorted; weathered; dry.			
	8						

Remarks Logged by: J. Bergman Checked by: _____

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	5-86
Date Drilled	4/21/86	Coordinates	
Boring Method	Hollow Stem Auger	Ground Surface Elevation	5723

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	8			8.0-9.0'-Sample. Recovered 0.6/2.0'=30%. CLAY: dark yellowish brown (10YR 4/2) and moderate yellowish brown (10YR 5/4) clay; few gravels (subrounded); unconsolidated; dry.			
				ARAPAHOE FORMATION			
	10			9.0 -10.0'-Sample. CLAYSTONE: Dark yellowish brown (10YR 4/2) and moderate yellowish brown (10YR 5/4) mottles; poorly consolidated; dry.			
				10.0-12.0'-Sample. Recovered 0.9/2.0'=45%. CLAYSTONE: dark yellowish brown (10YR 4/2) with abundant moderate yellowish brown (10YR 5/4) and light brown (5YR 5/6) mottles; no pebbles or inclusions; weathered; dry.			
	12			12.0-14.0'-Sample from augers. CLAYSTONE: light olive gray (5Y 5/2) and light brown (5YR 5/6) mottled clay; several iron stains; dry.			
	14			TOTAL DEPTH: 14.0'			
	16						

Remarks Logged by: J. Bergman Checked by: _____

Project No. 106P06222

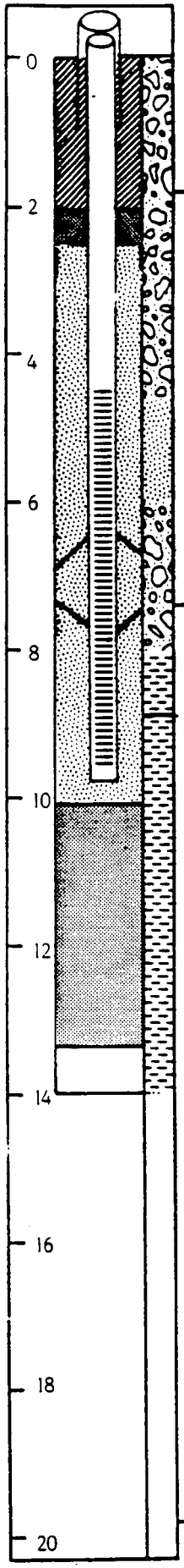
Hydro-Search, Inc.

WELL 5-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 40694.8 E 26699.7

ELEVATION: GROUND LEVEL 5720.07'
TOP OF CASING 5722.61'



LOCATION Golden, CO
PERSONNEL J. Bergman
PROJECT 106R06222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 9.76' Hole: 14.0'
BOREHOLE DIAMETER 7¼"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Tony Robinson)
RIG Acker
BIT(S) Bull nose bit

DRILLING FLUID None

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

CASING STRING(S): C=CASING S=SCREEN

0.0'	-	4.40'	C1		-		
4.40'	-	9.76'	S1		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

CASING: C1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel, 6.54' - 7.71'

FILTER MATERIAL 32-42 silica sand
2.50' - 10.02'

CEMENT Portland Type I
0.00' - 2.00'

OTHER 3/8" bentonite pellets
2.00' - 2.50'
10.02' - 13.30'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7¼" auger	9/4	1500	9/4	1635
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/5	1040	9/5	1045
FILTER PLACEMENT:	9/5	1045	9/5	1050
CEMENTING:	9/5	1100	9/5	1105
DEVELOPMENT:	9/8	1515	9/8	1515
OTHER:				
Bentonite	9/5	1050	9/5	1055
	9/5	1035	9/5	1040

WELL DEVELOPMENT

See Well Development Summary Sheets.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 2.54'

Cave from TD to 13.30'

Well No.: 5-86

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
9-8-86	1515	---	---	---	Dry

ROCKY FLATS LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
0586	09/08/86	5720.07	5722.61	2.54	9.76	-1.00	DRY
	10/13/86					-1.00	DRY
	11/26/86					-1.00	DRY
	01/01/87					11.19	5711.42
	02/01/87					9.52	5713.09
	04/01/87					2.88	5719.73
	05/07/87					4.10	5718.51
	06/01/87					6.98	5715.63
	07/08/87					6.75	5715.86
	07/30/87					8.90	5713.71
	08/03/87					11.40	5711.21
	09/28/87					10.20	5712.41
	11/03/87					10.30	5712.31
	12/08/87					10.50	5712.11
	01/06/88					10.50	5712.11
	02/24/88					6.60	5716.01
	03/14/88					4.90	5717.71
	04/11/88					4.70	5717.91

INDEX OF DATA

Boring No.: 6-86

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

____ Saturated Thickness Hydrograph

Project: Rocky Flats Plant

LOG OF BORING NO. 6-86

Date Drilled 9/4/86 **Coordinates** N 40588.1 E 23577.5

Boring Method Hollow Stem Auger **Ground Surface Elevation** 5806.10

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			**VALLEY FILL ALLUVIUM**			
				0.0-2.0'-Sample. Recovered 0.4/2.0'=20%.			
				0-0.3'-Sample. TOPSOIL: grayish brown (5YR 3/2) fine- to coarse-grained sandy soil; contains grass and roots; poorly sorted; dry.			
				0.3-0.4'-Sample. GRAVEL: grayish brown (5YR 3/2) fine- to coarse-grained sand and gravel; friable; few quartzite pebbles; moderately well sorted; subrounded; unconsolidated; dry.			
	2.5			2.0-4.0'-Sample. Recovered 1.7/2.0'=85%. GRAVEL: pale brown (5YR 5/2) fine- to medium-grained sand and gravel; abundant quartzite pebbles and cobbles; poorly sorted; angular to subrounded; unconsolidated; dry.			
	5			4.0-6.0'. Recovered 0.2/2.0'=10%. (Shoe sample) GRAVEL: pale brown (5YR 5/2) sand and gravel; common quartzite cobbles and pebbles; poorly sorted; subangular; unconsolidated; dry.			
	7.5			6.0-8.0'-Sample. Recovered 0.4/2.0'=20%. CLAY: dark yellowish brown (10YR 4/2); very fine-grained with some quartzite grains; unconsolidated; slightly damp.			
				ARAPAHOE FORMATION			
				8.0-10.0'-Sample from bit. Recovered 0.2/2.0'=20%. CLAYSTONE: pale brown (5YR 5/2) with some light brown (5YR 5/6) staining; very fine-grained; dry.			
	10						

Remarks Logged by: J. Bergman Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 6-86

Date Drilled 9/4/86 **Coordinates** N 40588.1 E 23577.5

Boring Method Hollow Stem Auger **Ground Surface Elevation** 5806.10

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	10			10.0-12.0'-Sample. Recovered 0.8/2.0'=40%. CLAYSTONE: dark yellowish brown (10YR 4/2) with few light brown (5YR 5/6) mottles; unweathered; dry.			
				12.0-14.0'-Sample. Recovered 1.6/2.0'=80%. CLAYSTONE: grayish brown (5YR 3/2) with few light brown (5YR 5/6) mottles; homogenous; dry.			
	12.5						
				TOTAL DEPTH: 14.0'			
	15						
	17.5						
	20						

Remarks Logged by: J. Bergman Checked by: [illegible]

Project No. 106P06222

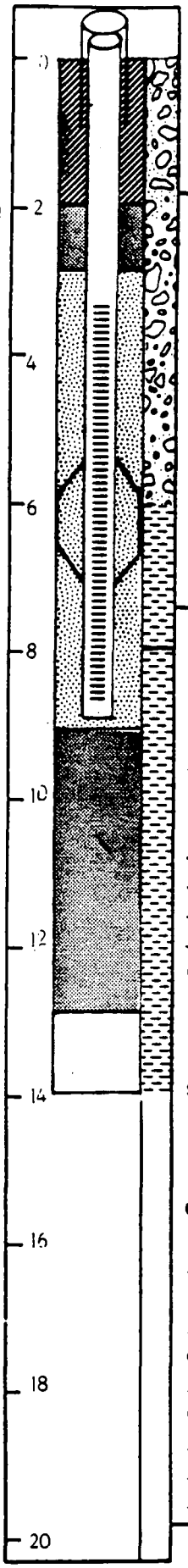
Hydro-Search, Inc.

WELL 6-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 40588.1 E 23577.5

ELEVATION: GROUND LEVEL 5806.10'
TOP OF CASING 5808.58'



LOCATION Golden, CO
PERSONNEL J. Bergman
PROJECT 106P06222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 8.88' Hole: 14.0'
BOREHOLE DIAMETER 7¼"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Tony Robinson)
RIG Acker
BIT(S) Bull nose bit

DRILLING FLUID None

SURFACE CASING 5" x 5' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

CASING STRING(S): C=CASING S=SCREEN

0.0'	-	3.28'	C1		-		
3.28'	-	8.88'	S1		-		

CASING: C1 2" I.D. Sch. 5, type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5, type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
5.47' - 6.65'

FILTER MATERIAL 32-42 silica sand
9.10' - 2.75'

CEMENT Portland Type I
0.00' - 1.91'

OTHER 3/8" bentonite pellets
1.91' - 2.75'
9.10' - 12.90'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7¼" auger	9/4	0930	9/4	1140
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/4	1310	9/4	1312
FILTER PLACEMENT:	9/4	1312	9/4	1315
CEMENTING:	9/4	1340	9/4	1345
DEVELOPMENT:	9/8	1515	9/8	1515
OTHER:				
Bentonite	9/4	1315	9/4	1320
	9/4	1305	9/4	1310

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 2.48'

Cave from TD to 12.90'

Well No.: 5-35

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
9-8-86	1605	---	---	---	Dry

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
0686	09/08/86	5806.10	5808.58	2.48	8.88	-1.00	DRY
	10/13/86					11.13	5797.45
	11/26/86					10.99	5797.59
	01/01/87					10.92	5797.66
	02/01/87					10.83	5797.75
	04/01/87					3.29	5805.29
	05/07/87					3.88	5804.70
	06/01/87					7.22	5801.36
	07/08/87					9.20	5799.38
	08/03/87					8.90	5799.68
	08/10/87					8.60	5799.98
	09/28/87					9.70	5798.88
	11/03/87					9.70	5798.88
	12/08/87					9.70	5798.88
	01/06/88					3.30	5805.28
	02/04/88					10.20	5798.38
	03/14/88					10.10	5798.48
	04/11/88					4.50	5804.08

INDEX OF DATA

Boring No.: 7-86

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

Project: Rocky Flats Plant

LOG OF BORING NO. 7-86

Date Drilled 9/23/86
Boring Method Hollow Stem Auger

Coordinates N 39869.8 E 20892.8
Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			VALLEY FILL ALLUVIUM 0-2.0'-Sample. Recovered 1.4/2.0'=70%. CLAY: grayish brown (5YR 3/2) with granitic pebbles; poorly sorted; subangular to subrounded; roots and organics common; damp. 2.0-4.0'-Sample. Recovered 0.2/2.0'=10%. GRAVEL: granitic pebbles in a grayish brown (5YR 3/2) clay matrix; poorly sorted; subangular to subrounded; few roots; unconsolidated; damp.			
	2			4.0-6.0'-Sample. Recovered 2.0/2.0'=100%. 4.0-5.0'. GRAVEL: quartzite and granite pebbles in a grayish brown (5YR 3/2) clay matrix; poorly sorted; subangular to subrounded; unconsolidated; damp.			
	4			ARAPAHOE FORMATION 5.0-6.0'-Sample. CLAYSTONE: light olive gray (5Y 5/2) with limonite staining and few willow roots; very fine-grained; damp.			
	6			6.0-8.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: light olive gray (5Y 5/2) with dark yellowish orange (10YR 6/6) mottling occurring as bands (1/4" laminae); rare silty laminae; becomes more silt rich at base; rare dusky blue (5PB 3/2) swirl; poorly consolidated; damp.			
	8						

Remarks Logged by: C. Walker

Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 7-86

Date Drilled 9/23/86

Boring Method Hollow Stem Auger

Coordinates N 39869.8 E 20892.8

Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	8			8.0-10.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: light olive gray (5Y 5/2) with dark yellowish orange (10YR 6/6) mottling occurring as bands (1/4" laminae); common black organic particles throughout sample; sample is swirled with natural bedding disturbed; limonite (very dusky purple 5P 2/2) to 50% in lower 1.5'.			
	10			TOTAL DEPTH: 10.0'			
	12						
	14						
	16						

Remarks Logged by: C. Walker

Checked by:

Project No. 106P06222

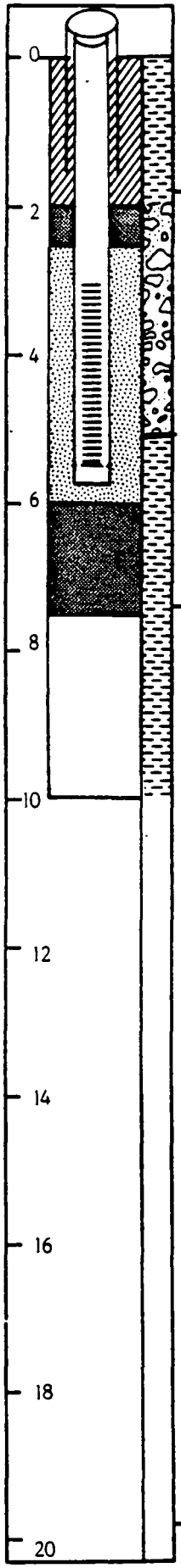
Hydro-Search, Inc.

WELL 7-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 39869.8 E 20892.8

ELEVATION: GROUND LEVEL 5923.40' (est.)
TOP OF CASING 5925.66' (est.)



LOCATION Golden, CO
PERSONNEL C. Walker
PROJECT 106PK6222
Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 5.74' Hole: 10.00'
BOREHOLE DIAMETER 7¼"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Tony Robinson)
RIG Acker
BIT(S) Blade bit

DRILLING FLUID None

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

CASING STRING(S): C=CASING S=SCREEN

0.0'	-	3.0'	C1		-		
3.0'	-	5.74'	S1		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

CASING: C1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed. 0.010" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS None

FILTER MATERIAL 32-42 silica sand
2.50' - 6.00'

CEMENT Portland Type I
0.00' - 2.00'

OTHER 3/8" bentonite pellets
2.00' - 2.50'
6.00' - 7.51'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7¼" auger	9/23	0955	9/23	1045
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/23	1215	9/23	1220
FILTER PLACEMENT:	9/23	1220	9/23	1225
CEMENTING:	9/23	1230	9/23	1235
DEVELOPMENT:	9/29	1445	9/29	1445
OTHER:				
Bentonite	9/23	1225	9/23	1230
	9/23	1210	9/23	1215

WELL DEVELOPMENT

See Well Development Summary Sheets.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 2.26'

Cave from TD to 7.51'

Well No.: 7-86

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
9-29-86	1445	—	—	—	Dry

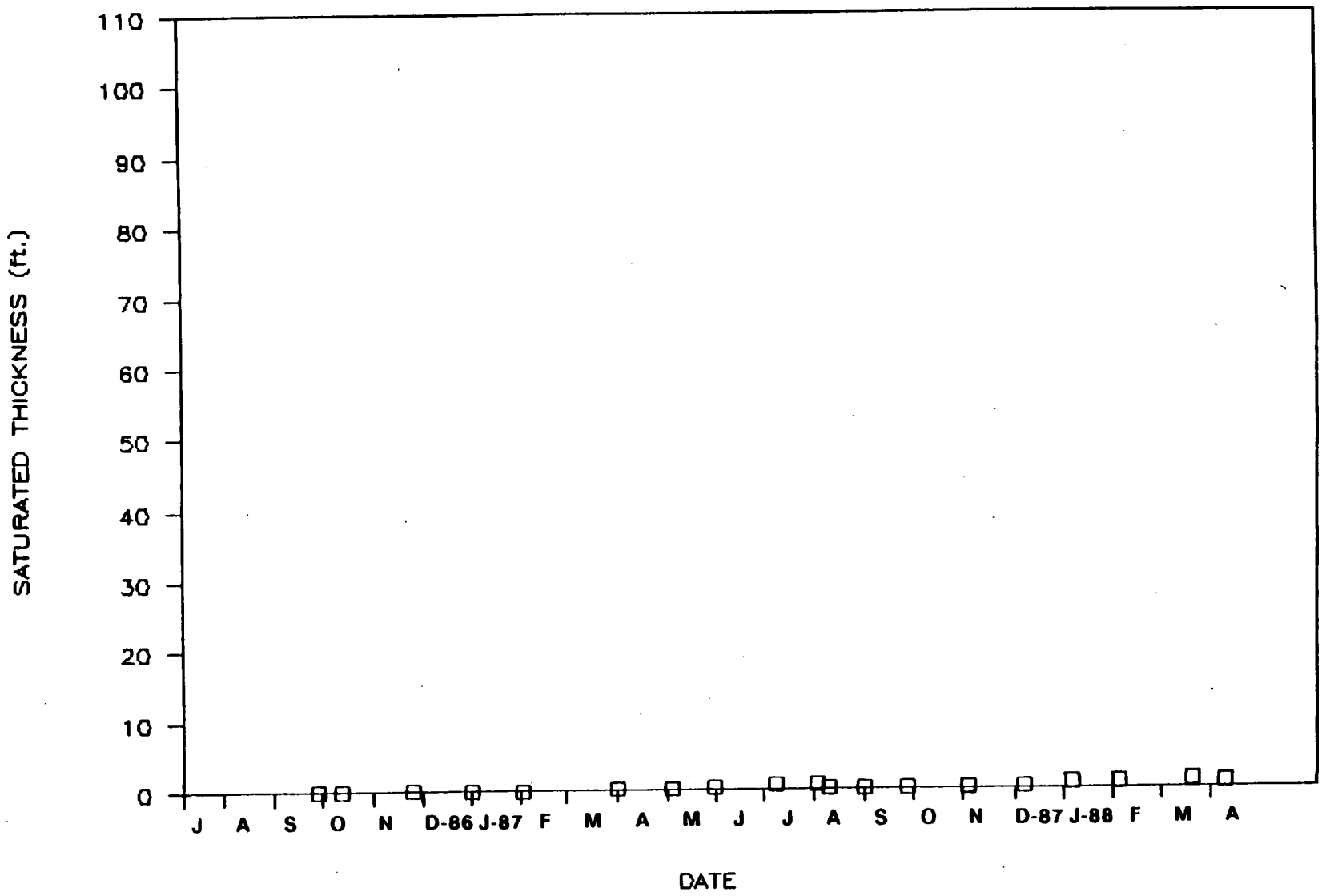
ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
0786	09/29/86	~~5914.40~~ 5923.40	5916.66 5915.66	2.26	5.74	-1.00	DRY
	10/13/86					-1.00	DRY
	11/26/86					7.10	~~5909.56~~ 5918.56
	01/01/87					6.38	~~5910.28~~ 5919.28
	02/01/87					6.00	~~5910.66~~ 5919.66
	04/01/87					5.63	~~5911.03~~ 5920.03
	05/06/87					6.29	~~5910.37~~ 5919.37
	06/01/87					5.80	~~5910.86~~ 5919.37
	07/08/87					5.10	~~5911.56~~ 5920.56
	08/04/87					5.30	~~5911.36~~ 5920.36
	08/10/87					-1.00	DRY
	08/31/87					-1.00	DRY
	09/28/87					-1.00	DRY
	11/03/87					6.90	~~5909.76~~ 5918.76
	12/08/87					7.00	~~5909.66~~ 5918.76
	01/06/88					4.80	~~5911.86~~ 5920.76
	02/04/88					4.80	~~5911.86~~ 5920.76
	03/21/88					4.70	~~5911.96~~ 5920.76
	04/11/88					4.90	~~5911.76~~ 5920.76

Adjusted elevation to fit topographic map. JBS 5/23/88
Survey in progress to verify ground surface elevation

SATURATED THICKNESS IN WELL # 07-86



INDEX OF DATA

Boring No.: 8-86

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

X Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

Project: Rocky Flats Plant

LOG OF BORING NO. 8-86

Date Drilled 9/23/86, 10/20/86 - 10/23/86 **Coordinates** N 39859.2 E 20916.7

Boring Method Hollow Stem Auger/NC Core **Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			**VALLEY FILL ALLUVIUM** 0-2.0'-Sample. Recovered 1.9/2.0'95%. 0.0-0.9'. GRAVEL: coarse grained sand to pebble sized grains in moderate brown to light brown (5YR 5/6) clay; roots; poorly sorted; unconsolidated; dry.			
	5			**ARAPAHOE FORMATION** 0.9 to 2.0'. CLAYSTONE: light olive gray (5Y5/2) with organics and some limonite staining; poorly consolidated; damp. 2.0-4.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: light olive gray (5Y 5/2); silty; poorly consolidated; weathered; damp.			
	10			4.0-5.0'-Sample. Recovered 1.3/1.0'=130%. CLAYSTONE: light olive gray (5Y 5/2); approximately 30-40% limonite; poorly consolidated; weathered; damp.			
	15			5.0-7.0'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: light olive gray (5Y 5/2) containing very little limonite; limonite percents decrease from 5.0 to 6.5' - at 6.5' core becomes less limonitic with incipient parting; blocky; slightly weathered; dry.			
	20			7.0-9.0'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: light olive gray (5Y 5/2); weathered with 30-35% limonite; crumbly texture; dry.			

Remarks Logged by: C. Walker & L. Pivonka Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant	LOG OF BORING NO. 8-86
Date Drilled 9/23/86, 10-20-86 - 10/23/86	**Coordinates** N 39859.2 E 20916.7
Boring Method Hollow Stem Auger/NC Core	**Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	20			9.0-11.0'-Sample. Recovered 2.2/2.0'=110%. CLAYSTONE: light olive gray (5Y 5/2) with 20-40% limonite; crumbly from 9.0-9.3'; 9.3-11.0' sample is fairly consolidated with rare black organics; rare incipient parting; damp.			
	25			11.0-13.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: light olive gray (5Y 5/2); up to 50% limonite; organics up to 10% with dusky blue (5PB 3/2) patches and bands; damp.			
	30			13.0-15.0'-Sample. Recovered 2.2/2.0'=110%. 13.0-13.8'. CLAYSTONE: light olive gray (5Y 5/2); up to 50% limonite. 13.8-15.0'. SHALE: grayish black (N/2); high black organic content with discontinuous coal seams (up to 1/8" thick); rare limonite laminae along parting; poorly consolidated; slightly damp.			
	35			15.0-17.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: grayish black to black (N/2 to N/1) coaly shale and claystone; poorly and irregularly developed; poorly consolidated; up to 30% coal; organic percent decreases from 16.0-17.0' to dark gray claystone with 0.0-5.0% organics; dry.			
	40			17.0-19.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: medium dark gray (N4); no reaction with HCL; poorly consolidated; dry.			

Remarks Logged by: C. Walker & L. Pivonka Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	8-86

Date Drilled	9/24/86, 10/20/86 - 10/23/86	Coordinates	N 39859.2 E 20916.7
Boring Method	Hollow Stem Auger/NC Core	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot) 20 40	Water Content (%) 20 40	Other Tests
	40			19.0-21.5'-Sample. Recovered 0.3/1.5'=20%. CLAYSTONE: medium dark gray (N 4/0); unweathered; some fine silt; wet.			
				21.5-26.5'-Sample. Recovered 3.8/5.0'=76%. CLAYSTONE: medium dark gray (N 4/0); unweathered; greasy; wet.			
	45			26.5-31.5'-Sample. Recovered 5.0/5.0'=100%. SANDY CLAYSTONE: medium dark gray (N 4/0); some very fine grained sand; trace of organic carbonaceous plant fossils; trace grayish orange (10YR 7/4) concretions (0.2-2.0 cm in diameter); wet			
	50			31.5-36.5'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: medium gray (N 5/0) to black (N 1/0); greasy; organic rich layers; wet.			
				36.5-41.5'-Sample. Recovered 4.5/5.0'=90%. SILTY CLAYSTONE: medium dark gray (N 4/0); blocky; some silt; wet.			
	55			41.5-46.5' -Sample. Recovered 2.0/5.0'=40%. CLAYSTONE: dark gray (N 3/0); blocky, greasy; trace carbonaceous plant fossils; wet.			
				46.5-51.5'-Sample. Recovered 5.0/5.0'=100% SILTY CLAYSTONE: dark gray (N 3/0); blocky; some silt; trace carbonaceous plant fossils; wet.			
	60						

Remarks Logged by: C. Walker & L. Pivonka Checked by:

Project No. 106P06222	Hydro-Search, Inc.	Page 3 of 4

Project:	Rocky Flats Plant	LOG OF BORING NO.	8-86

Date Drilled 9/24/86, 10/20/86 - 10/23/86 **Coordinates** N 39859.2 E 20916.7

Boring Method Hollow Stem Auger/NC Core **Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot) 20 40	Water Content (%) 20 40	Other Tests
	60			51.5-53.5'-Sample. Recovered 2.0/2.0'=100%. SILTY CLAYSTONE:same as above; wet.			
				53.5-55.5'-Sample. Recovered 2.0/2.0'=100%. CLAYEY SANDSTONE: medium gray (N 5/0); fine-grained sandstone; wet.			
	65			55.5-56.5'-Sample. Recovered 1.0/1.0'=100% CLAYSTONE: grayish black (N 2/0); organic-rich; blocky; wet.			
				56.5-59.5'-Sample. Recovered 2.4/3.0'=80%. CLAYSTONE: same as above; wet.			
	70			59.5-61.5'- Sample. Recovered 2.0/2.0'=100%. SILTY SANDSTONE: medium gray (N 5/0); silty; fine-grained sandstone; some carbonaceous plant fossils; wet.			
				61.5-63.5'- Sample. Recovered 2.0/2.0'=100%. SILTY SANDSTONE: medium gray (N 4/0); silty, fine-grained; quartzose; wet.			
	75			63.5-66.5'-Sample. Recovered 3.0/3.0'=100%. SILTY CLAYSTONE: dark gray (N 3/0); blocky; some silt; wet.			
				66.5-71.5'- Sample. Recovered 3.5/5.0'=70% SILTY CLAYSTONE: same as above; wet.			
				TOTAL DEPTH: 71.5'			
	80						

Remarks Logged by: C. Walker & L. Pivonka Checked by:

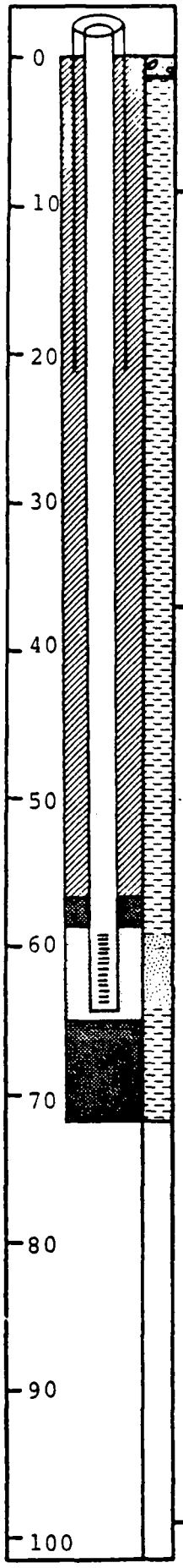
Project No. 106PU6222	Hydro-Search, Inc.	Page 4 of 4

WELL 8-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 39859.3 E 20916.8

ELEVATION: GROUND LEVEL 5923.81' (est.)
TOP OF CASING 5925.81' (est.)



LOCATION Rocky Flats Plant
PERSONNEL C. Walker/L. Pivonka
PROJECT 106R06222

DRILLING SUMMARY:

TOTAL DEPTH Well: 63.80' Hole: 71.50'
BOREHOLE DIAMETER 0.00' - 18.35': 7½"
18.35' - 71.50: 4 3/4"
DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Ave., Golden, CO
(Tony Robinson, Jim Horn)
RIG Mobile B-57 .00' - 18.35': Acker; 18.35' - 71.50':
BIT(S) 0.00' - 18.35': Blade bit;
18.35' - 71.50': Coring bit
DRILLING FLUID None
SURFACE CASING 5" x 20.85' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

CASING STRING(S): C=CASING S=SCREEN

0.00'	18.35'	C1			
0.00'	59.08'	C2			
59.08'	63.79'	S1			

CASING: C1 5" I.D. steel surface casing
C2 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.010" wire wrapped screen, 0.25' welded bottom cap.

CENTRALIZERS None

FILTER MATERIAL 32-42 silica sand
58.00' - 64.30'
CEMENT Portland Type I
0.00' - 56.00'
OTHER 3/8" bentonite pellets
56.00' - 58.00'
64.30' - 71.50'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7½" auger	9/24	0930	9/24	1135
NC Core	10/20	1049	10/20	1310
Reaming	10/22	1720	10/23	0920
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
5" steel	9/24	1315	9/24	1327
2" stainless	11/3	1243	11/3	1253
FILTER PLACEMENT:	11/3	1207	11/3	1340
CEMENTING:	11/3	1415	11/3	1500
DEVELOPMENT:	11/5	1515	11/13	0930
OTHER:				
Bentonite	11/3	1340	11/3	1410
	11/3	1143	11/3	1207
Packer testing	10/22	0900	10/22	1516
Cementing 5" steel	9/24	1330	9/24	1350

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 1.86'

When drilling (with air and water) abundant bubbles surface in the adjacent pond near the rig. When drilling stops, the bubbling stops. Probable cause: (1) fractured bedrock from 20' - 30'.

Well No.: 3-86

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
11-5-86					1 Well Bore Volume = 9.23 gals. 10 Well Bore Volumes = 92.3 gals.
11-5-86	1515	Bailed	8 gals.	Clear, moderately turbid	8/92.3 gals. purged to date
11-6-86	1530	Airlifted	11 gals.	Clear	19/92.3 gals. purged to date
11-10-86	1245	Bailed	11 gals.	Clear, slightly turbid	30/92.3 gals. purged to date
11-11-86	1415	Pumped	13 gals.	Clear, slightly turbid	43/92.3 gals. purged to date
11-12-86	0845	Bailed	8 gals.	Clear, very slightly turbid	51/92.3 gals. purged to date
11-12-86	1345	Bailed	1 gal.	Light gray	52/92.3 gals. purged to date
11-13-86	0930	——	——	Clear to very light gray	Sampled

WESTON

SHEET ____ of ____

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____

DEPT _____ DATE _____

WELL 08-86

Hydraulic Conductivity (cm/sec) = 7×10^{-8}

Flowrate (gpm) = 0.146

Screened Interval (ft below G.L.) = 59.08 - 63.79

59.08 - 59.5 claystone

59.5 - 63.5 silty sandstone

63.5 - 63.79 silty claystone

Method of Analysis: Residual-drawdown Plot

(Driscoll, 1986 - pg 256.)

RFW 10-05-003/A-5/85

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SHEET ____ of ____

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____

DEPT _____ DATE _____

WELL 08-86

$$T\ (gpd/ft) = \frac{264\,Q}{\Delta S'} = \frac{264\,(.146)}{5373} = 7.17 \times 10^{-3}$$

where $Q\ (gpm) = 8.75$ gallons / 60 minutes $= 0.146$ gpm

$\Delta S' =$ ft. change in residual drawdown / log cycle

$=$ (see attached plot)

$$K\ (gpd/ft^2) = T/b = 7.17 \times 10^{-3} / 4.71 = 1.52 \times 10^{-3}$$

where $b\ (ft) = 4.71$ ft.

$$K\ (cm/sec) = 1.52 \times 10^{-3}\ gpd/ft^2 \times \frac{4.72 \times 10^{-5}\ cm/sec}{gpd/ft^2} = 7 \times 10^{-8}$$

This method is valid where $u \leq 0.01$

solving for t for $u \leq 0.01$.

$$t\ (min) = \frac{r^2 S}{4\,T\,u} = \frac{(.198)^2 \quad 10^{-3}}{4\,(7.17 \times 10^{-3})\,(.01)} \times \frac{1440\ min}{day} \times \frac{7.482\ gal}{ft^3}$$

$= 1473$ min

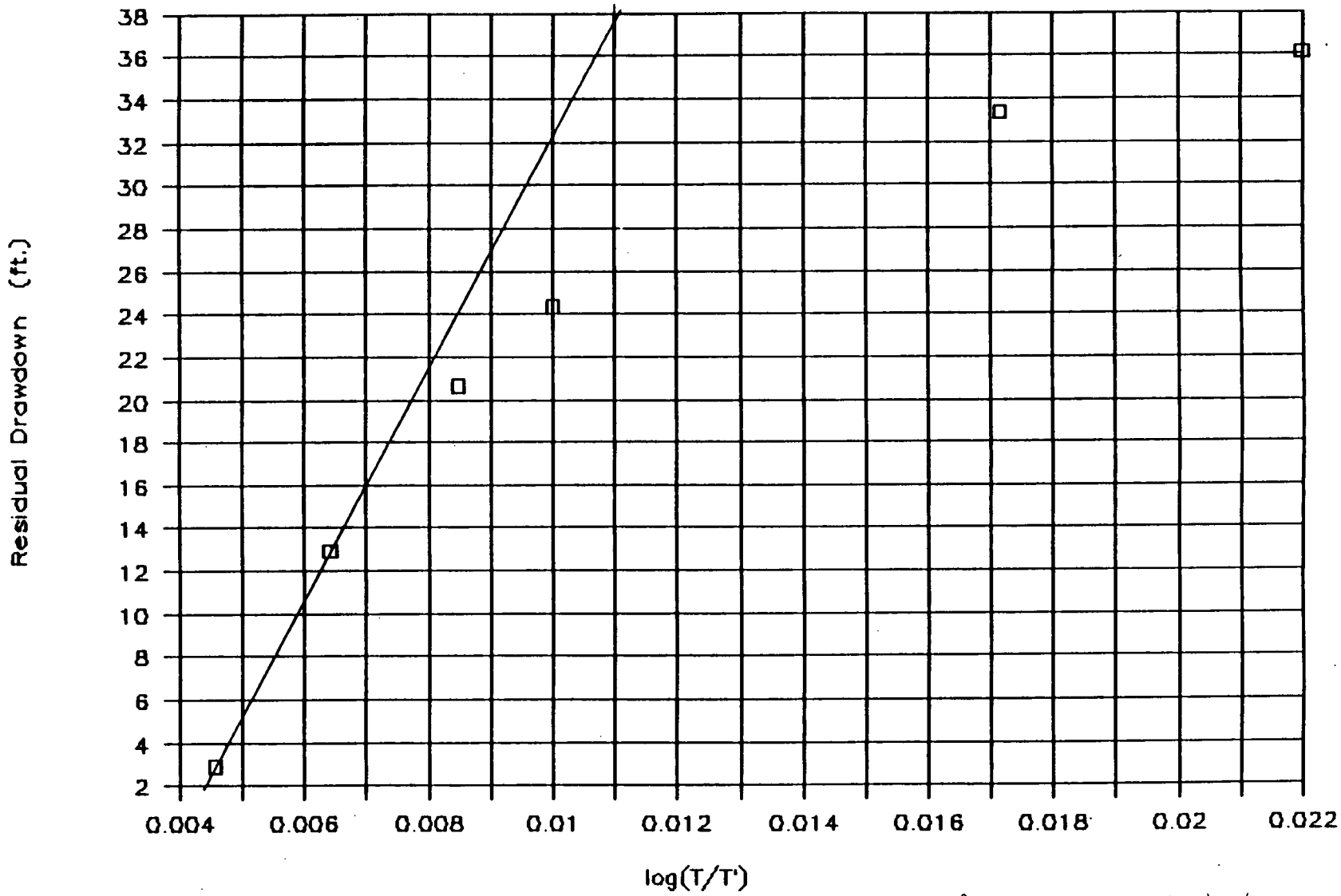
where $r\ (ft) = \left(\frac{4.75}{24}\right) ft = 0.198$ ft

$S = 10^{-3}$ assumed S for confined aquifer

$\Delta S'$ is based on points where $t \geq 4090$ min.

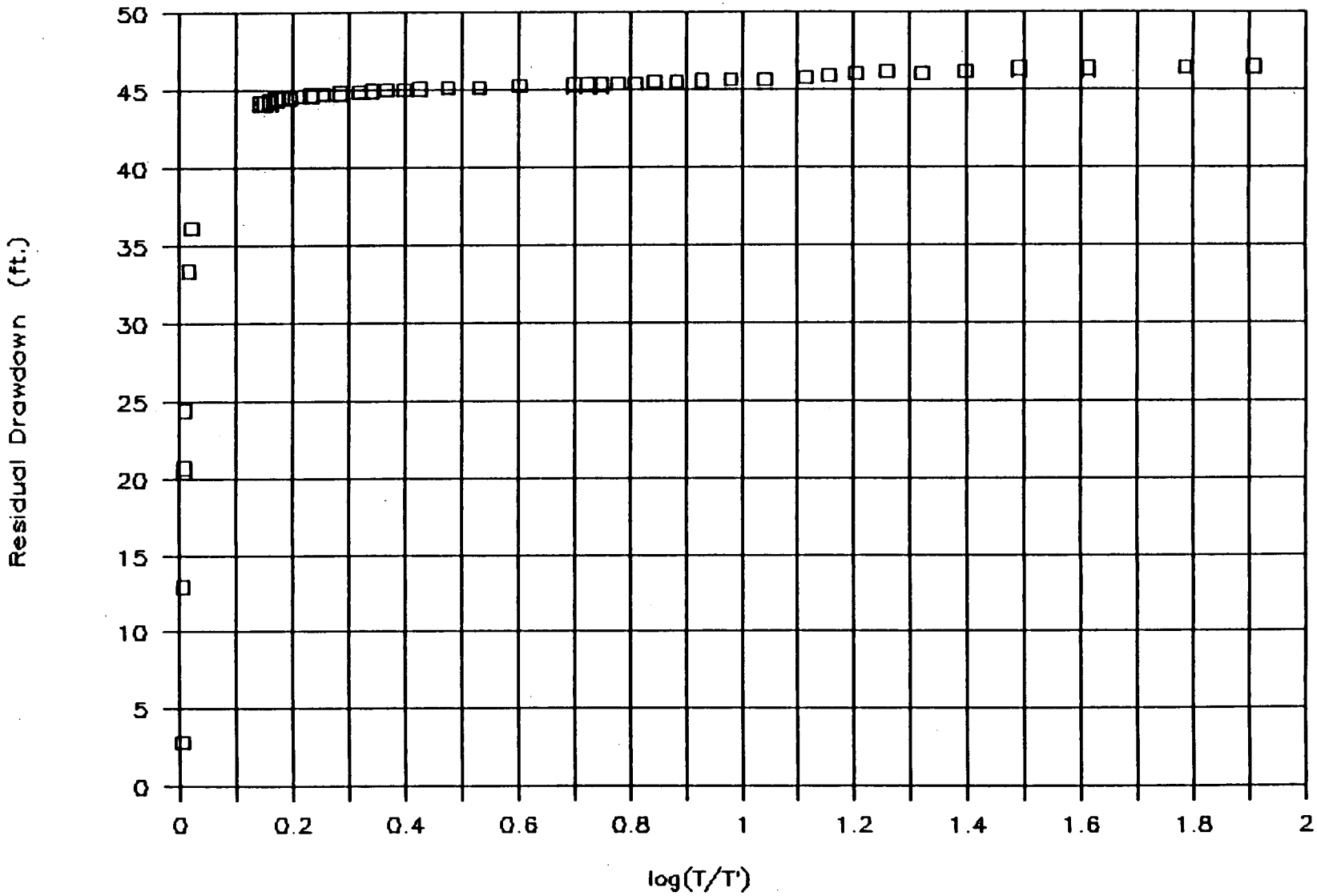
RFW 10-05-003/A-5/85

WELL 08-86

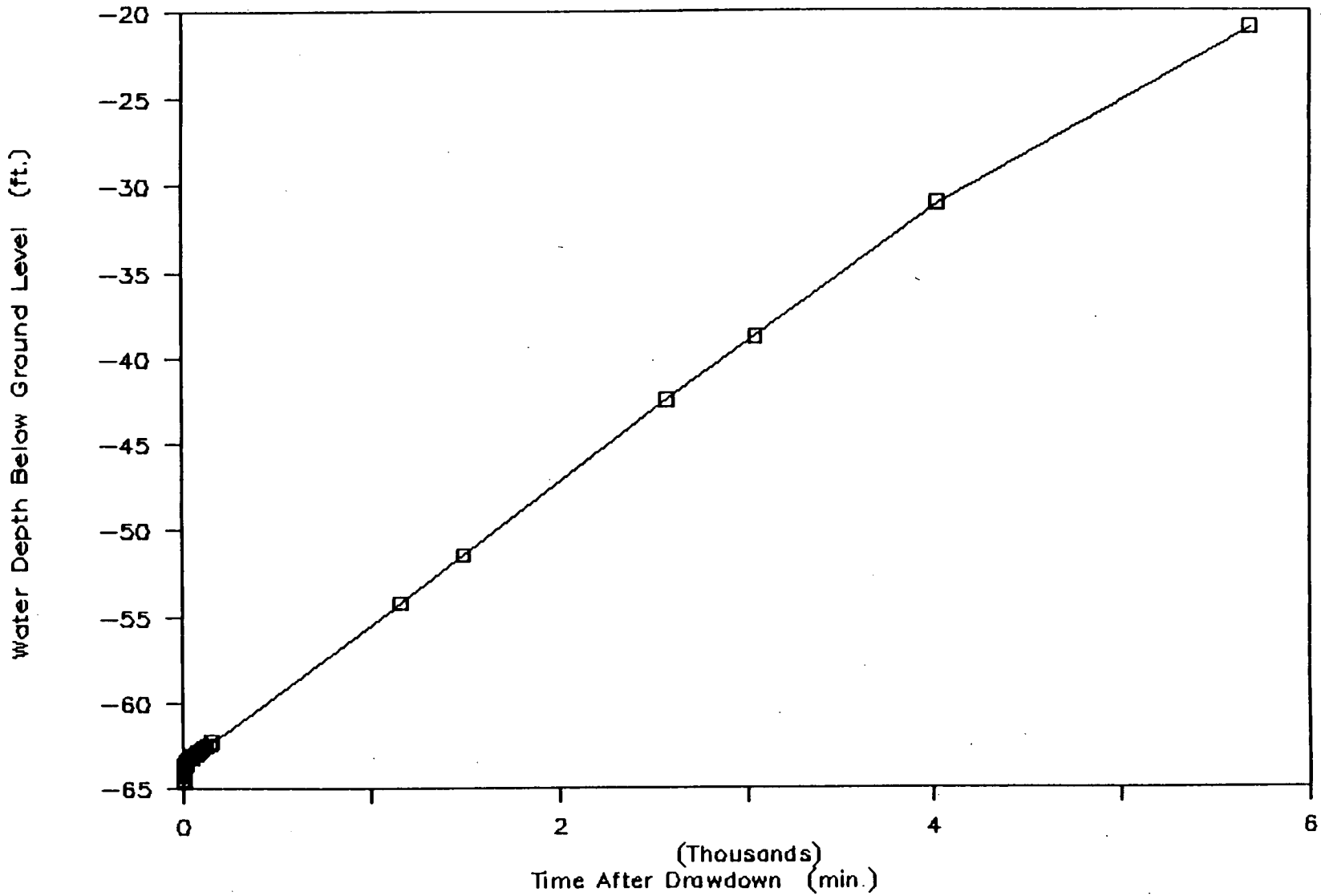


$$\rightarrow S' = \frac{(38-2)\,ft}{.0111 - .0044} = 5373\,ft/\text{log cycle}$$

WELL 08-86


Residual Drawdown (ft.)
50
45
40
35
30
25
20
15
10
5
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
log(T/T')

WELL 08-86


-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
Water Depth Below Ground Level (ft.)
0
2
4
6
(Thousands)
Time After Drawdown (min.)

WELL 08-86

T Time (min.)	T' T Prime (min.)	Water Level (ft.)	s' Rsd Drwdn (ft.)	log(T/T')
60.75	0.75	64.58	46.49	1.91
61.00	1.00	64.50	46.41	1.79
61.50	1.50	64.43	46.34	1.61
62.00	2.00	64.44	46.35	1.49
62.50	2.50	64.21	46.12	1.40
63.00	3.00	64.12	46.03	1.32
63.50	3.50	64.25	46.16	1.26
64.00	4.00	64.09	46.00	1.20
64.50	4.50	64.00	45.91	1.16
65.00	5.00	63.89	45.80	1.11
66.00	6.00	63.75	45.66	1.04
67.00	7.00	63.74	45.65	0.98
68.00	8.00	63.66	45.57	0.93
69.00	9.00	63.57	45.48	0.88
70.00	10.00	63.57	45.48	0.85
71.00	11.00	63.48	45.39	0.81
72.00	12.00	63.46	45.37	0.78
73.00	13.00	63.43	45.34	0.75
74.00	14.00	63.36	45.27	0.72
75.00	15.00	63.40	45.31	0.70
80.00	20.00	63.31	45.22	0.60
85.00	25.00	63.23	45.14	0.53
90.00	30.00	63.23	45.14	0.48
96.00	36.00	63.11	45.02	0.43
100.00	40.00	63.09	45.00	0.40
105.00	45.00	63.06	44.97	0.37
110.00	50.00	63.01	44.92	0.34
115.00	55.00	62.97	44.88	0.32
125.00	65.00	62.92	44.83	0.28
135.00	75.00	62.85	44.76	0.26
145.00	85.00	62.77	44.68	0.23
155.00	95.00	62.66	44.57	0.21
165.00	105.00	62.55	44.46	0.20
175.00	115.00	62.55	44.46	0.18
185.00	125.00	62.49	44.40	0.17
195.00	135.00	62.39	44.30	0.16
205.00	145.00	62.26	44.17	0.15
215.00	155.00	62.28	44.19	0.14
1215.00	1155.00	54.24	36.15	0.02
1550.00	1490.00	51.46	33.37	0.02
2635.00	2575.00	42.45	24.36	0.01
3105.00	3045.00	38.75	20.66	0.01
4090.00	4030.00	31.05	12.96	0.01
5745.00	5685.00	20.99	2.90	0.00

AQUIFER TEST DATA

WELL 8-86
PUMPING or OBSERVATION WELL
PUMPING or RECOVERY DATA
PAGE 1 OF

TYPE OF AQUIFER TEST Bail down / recovery
HOW Q MEASURED 4½ Gallon bucket
HOW W.L.'s MEASURED Olympic
RAD./DIST. OF/FROM PUMPING WELL N/A
MEAS. POINT FOR W.L.'s
ELEVATION OF MEAS. POINT

TD = 65.38'
DEPTH OF PUMP/AIRPIPE
PUMP ON: date time
PUMP OFF: date time
DURATION OF AQUIFER TEST

LOCATION
PERSONNEL
PROJECT

TIME t = ____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL ____					DISCHARGE		RECORDED BY	COMMENTS
DAY	CLOCK TIME	t	t'		READING	CONVERSIONS & CORRECTIONS	WATER LEVEL	s or s'		READING	Q		
1	1245				15+3.09								Static
	1300												Begin bailing
	~~1340~~												~~End bailing~~
	1345				60+4.78						8.75	JP	End bailing
	1345:45				60+4.58								*note time?
	1346				60+4.50								
	1346:30				60+4.43								
	1347				60+4.49								
	1347:30				60+4.31								Calculate 90%
	1348				60+4.12								recovery = 23.12
	1348:30				60+4.25								or 20+3.12
	1349				60+4.09								
	1349:30				60+4.00								
	1350				60+3.89								
	1351				60+3.75								
	1352				60+3.74								
	1353				60+3.66								
	1354				60+3.57								
	1355				60+3.57								
	1356				60+3.48								
	1357				60+3.46								
	1358				60+3.43								
	1359				60+3.36								
	1400				60+3.40								Slow recovery ∴
	1405				60+3.31								slow 5 min intervals
	1410				60+3.23								go directly to
	1415				60+3.23								5 min intervals.
	1421				60+3.11								
	1425				60+3.09								
	1430				60+3.06								
	1435				60+3.01								
	1440				60+2.97								Missed 1435
	1450				60+2.92								Go to 10 min
	1500				60+2.85								interval
	1510				60+2.77								
	1520				60+2.66								
	1530				60+2.55								
	1540				60+2.55								
	1550				60+2.49								
	1600				60+2.39								
	1610				60+2.26								

AQUIFER TEST DATA

WELL 8-86
PUMPING or OBSERVATION WELL
PUMPING or RECOVERY DATA
PAGE 1 OF

TYPE OF AQUIFER TEST Bail down / recovery
HOW Q MEASURED 4.5 gal bucket
HOW W.L.'s MEASURED OLYMPIC
RAD./DIST. OF/FROM PUMPING WELL
MEAS. POINT FOR W.L.'s
ELEVATION OF MEAS. POINT

TD = 65.38'

DEPTH OF PUMP/AIRPIPE
PUMP ON: date Bailed time
PUMP OFF: date time
DURATION OF AQUIFER TEST

LOCATION
PERSONNEL
PROJECT

TIME t = ____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL ____					DISCHARGE		RECORDED BY	COMMENTS
DAY	CLOCK TIME	t	t'		READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	s or s'		READING	Q		
~~1~~	~~[illegible]~~				~~[illegible]~~								~~Static~~
	~~[illegible]~~												~~Begin bailing~~
	~~[illegible]~~												~~End bailing~~
1	1620				60+2.28								Last day / reading
2	0900				50+4.24								
2	1435				50+1.46								Begin 2nd day
3	0840				40+2.45								
3	1630				35+3.75								Begin 3rd day
4	0855				30+1.05								4th day
5	1230				20+0.99								90% attained

PACKER TEST ANALYSIS
WELL NO. 8-86
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 106P06222
DATE TESTED: 10/22/86 BY: L. PIVONKA
TEST INTERVAL (FEET BELOW G.S.): 33.50 - 43.53
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 5.14

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00487992 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 5.14 + 9.00 + 4.00 * 2.31 = 23.38
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00001357 FT/MIN
K = .00000690 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00393869 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 5.14 + 9.00 + 5.00 * 2.31 = 25.69
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000997 FT/MIN
K = .00000506 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00208519 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 5.14 + 9.00 + 3.50 * 2.31 = 22.23
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000610 FT/MIN
K = .00000310 CM/SEC

PACKER TEST ANALYSIS
WELL NO. 8-86
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 106P06222
DATE TESTED: 10/22/86 BY: L. PIVONKA
TEST INTERVAL (FEET BELOW G.S.): 43.50 - 53.53
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 5.14

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

TEST ABORTED

P2/3 TEST

Q = INJECTION RATE = .00018825 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 5.14 + 9.00 + 7.00 * 2.31 = 30.31
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000040 FT/MIN
K = .00000021 CM/SEC

2ND P1/3 TEST

TEST ABORTED

PACKER TEST ANALYSIS
WELL NO. 8-86
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 106P06222
DATE TESTED: 10/22/86 BY: L. PIVONKA
TEST INTERVAL (FEET BELOW G.S.): 53.50 - 63.53
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 5.14

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00083987 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 5.14 + 9.00 + 4.50 * 2.31 = 24.53
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000223 FT/MIN
K = .00000113 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00003620 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 5.14 + 9.00 + 9.00 * 2.31 = 34.93
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000007 FT/MIN
K = .00000003 CM/SEC

2ND P1/3 TEST

TEST ABORTED

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

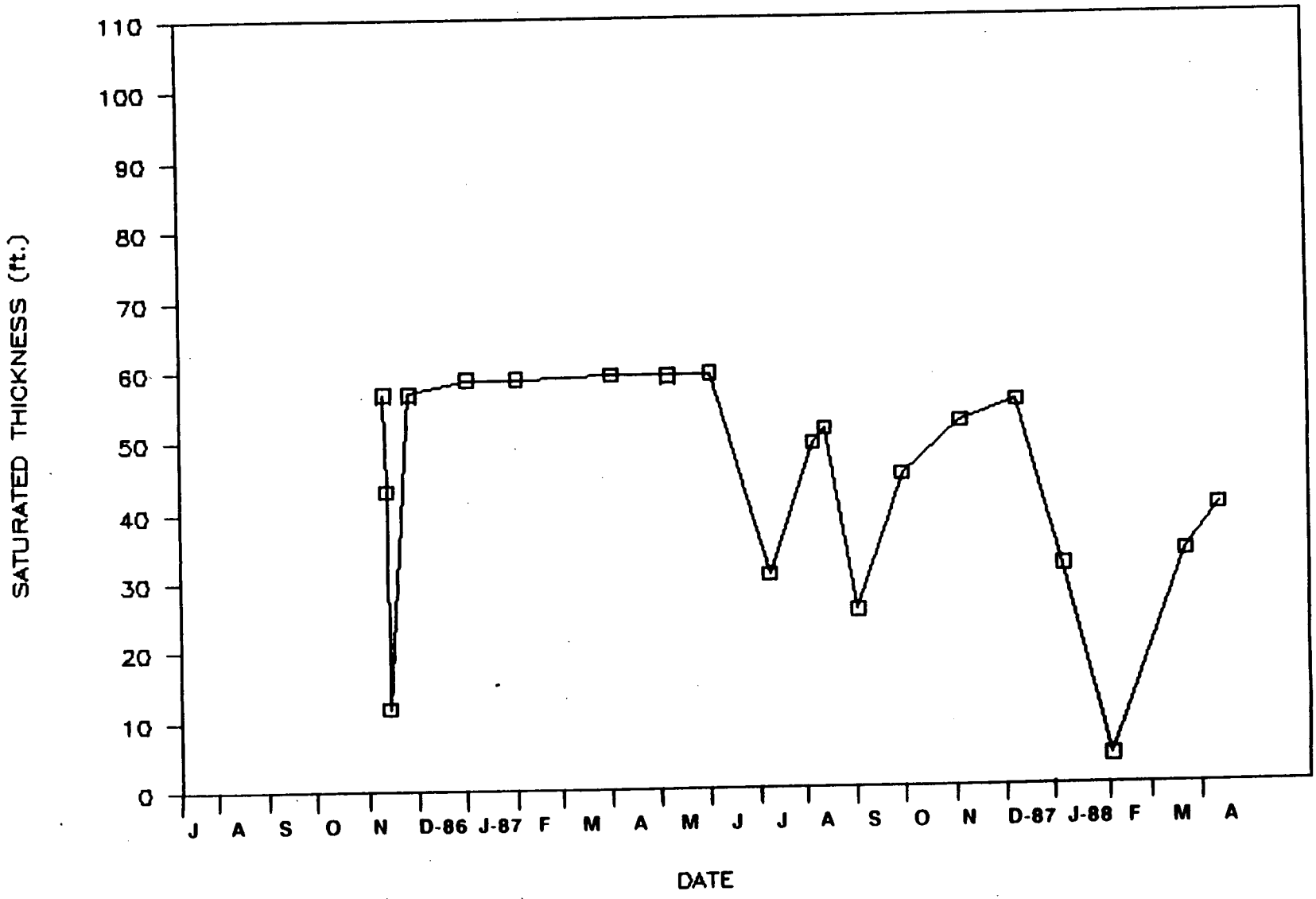
WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION	
0886	11/10/86	5923.81 ~~5914.81~~	5925.67 ~~5916.67~~	1.86	63.79	7.15	~~5909.52~~	5918.52
	11/12/86					20.80	~~5895.87~~	5904.87
	11/13/86					51.81	5864.86	5873.86
	11/26/86					7.00	5909.67	5918.67
	01/01/87					5.13	5911.54	5920.54
	02/01/87					5.08	5911.59	5920.59
	04/01/87					4.67	5912.00	5921.00
	05/06/87					4.77	5911.90	5920.90
	06/01/87					4.53	5912.14	5921.14
	07/08/87					33.20	5883.47	5892.47
	08/04/87					14.50	5902.17	5911.17
	08/11/87					12.50	5904.17	5913.17
	08/31/87					38.40	5878.27	5887.27
	09/28/87					19.10	5897.57	5906.57
	11/03/87					11.70	5904.97	5913.97
	12/08/87					8.90	5907.77	5916.77
	01/06/88					32.20	5884.47	5893.47
	02/04/88					59.50	5857.17	5866.17
	03/21/88					30.30	5886.37	5895.37
	04/11/88					23.80	5892.87	5901.87

adjusted elevation to fit topographic map

JBB 5/23/88

Survey in progress to verify ground surface elevation.

SATURATED THICKNESS IN WELL # 08-86



INDEX OF DATA

Boring No.: 9-86

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

X Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			ROCKY FLATS ALLUVIUM 0-4.5'-Cuttings. GRAVEL: yellowish gray (5Y 7/2) quartzite pebbles and cobbles with silty sand; fines less than 5.0%; poorly sorted; angular; unconsolidated; dry.			
	5			4.5-5.5'-Cuttings. SAND: yellowish gray (5Y 7/2); very fine- grained; silty; moderately sorted; subrounded; unconsolidated; damp.			
				5.5-7.0'-Cuttings. GRAVEL: yellowish gray (5Y 7/2) sandy quartzite gravel (70%); silty; poorly sorted; angular to subrounded; unconsolidated; damp. 7.0-8.0'-Cuttings. No sample obtained.			
	10						
				8.0-15.0'-Cuttings. SAND: moderate brown (5YR 4/4); silty; fines 20-30%; poorly sorted; angular to subrounded; unconsolidated; damp.			
	15			15.0-20.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4) with abundant quartzite; fines less than 5.0%; poorly sorted; unconsolidated; wet.			
	20						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	20			20.0-21.0'-Cuttings. GRAVEL: light gray (N 7); fines <5%; poorly sorted; wet.			
				21.0-22.0'-Cuttings. SILT: yellowish gray (5Y 7/2) silt; unconsolidated; moist to wet.			
				ARAPAHOE FORMATION			
				22.0-27.0'-Cuttings. CLAYSTONE: light olive brown (5Y 5/6) and light olive gray (5Y 5/2); plastic; damp.			
	25						
				27.0-31.0'-Cuttings. SILTSTONE: light olive gray (5Y 5/2) clayey siltstone; semi-plastic; damp.			
				31.0-32.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2) and light olive brown (5Y 5/6); semi-plastic; damp.			
	30						
				32.0-33.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2); well laminated; semi-plastic; damp.			
				33.0-35.0'-Cuttings. CLAYSTONE: olive gray (5Y 3/2); laminated; semi-plastic; damp.			
	35						
				37.0-42.0'-Sample. Recovered 0.0/5.0'=0%.			
	40						

Remarks Logged by: T. Murphy Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	40						
				42.0-47.0'-Sample. Recovered 2.9/5.0'=58%. CLAYSTONE: yellowish gray (5Y 7/2); mottled with dark yellowish orange (10YR 6/6) stains; trace silt; carbonaceous material throughout; subvertical fracture at 2.6'; core lined with limonite; moderately soft; damp.			
	45			47.0-51.5'-Sample. Recovered 0.0/4.5'=0%.			
				51.5-56.5'-Sample. Recovered 0.7/5.0'=14%. RQD 0.7/0.7'=100%. CLAYSTONE: yellowish gray (5Y 7/2); mottled with dark yellowish orange (10YR 6/6) stains; trace silt; carbonaceous material throughout; subvertical fracture at 2.6'; core lined with limonite; moderately soft; damp.			
	50			56.5-58.5'-Sample. Recovered 1.9/2.0'=95%. RQD 0.5/1.9'=26%. CLAYSTONE: dark gray (N 3); some silt; subvertical to vertical fractures filled with dark yellowish orange (10YR 6/6) limonite stain; ironstone concretion at bottom of core; firm; damp.			
	55			58.5-60.5'-Sample. Recovered 1.2/2.0'=60%. RQD 0.6/1.2'=50%. CLAYSTONE: dark gray (N 3); some silt; subvertical to vertical fractures filled with dark yellowish orange (10YR 6/6) limonite stain; firm; damp.			
	60						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	60			60.5-65.5'-Sample. Recovered 2.6/5.0'=52%. RQD 2.6/2.6'=100%. CLAYSTONE: dark gray (N 3); silty; very fine-grained sand bed at 62.0'; hard; slightly calcareous; organic wood fragments throughout; firm; damp.			
	65			65.5-69.0'-Sample. Recovered 2.6/3.5'=74%. RQD 0.8/2.6'=31%. CLAYSTONE: dark gray (N 3); silty; firm; damp.		▽	
	70			69.0-74.0'-Sample. Recovered 3.0/5.0=60%. RQD 1.7/3.0'=57%. CLAYSTONE: dark gray (N 3); silty; organic wood fragments throughout; grades downward to dark greenish gray (5G 4/1) siltstone with very fine-grained sand laminations; firm; damp.			
	75			74.0-79.0'-Sample. Recovered 1.7/5.0'=34%. RQD 0.5/1.7'=29%. CLAYSTONE: dark gray (N 3) to dark greenish gray (5GY 4/1); interbedded silty claystone and claystone; beds are 0.2' thick; firm damp.			
	80						

Remarks Logged by: T. Murphy Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	80			79.0-84.0'-Sample. Recovered 3.3/5.0'=66%. RQD 2.6/3.3'=79%. CLAYSTONE: dark gray (N 3) to dark greenish gray (5GY 4/1); trace of very fine-grained sand; silty; woody organics; occasional vertical fracture with slickensides; firm; damp.			
	85			84.0-89.0'-Sample. Recovered 4.2/5.0'=84%. RQD 1.2/4.2'=29%. CLAYSTONE: dark gray (N 3) to medium dark gray (N 4); silty; layers of brownish gray (5YR 4/1) silt; occasional concretions; hard; slightly calcareous; organic wood fragments throughout; firm; damp.			
	90			89.0-94.0'-Sample. Recovered 4.5/5.0'=90%. RQD 3.5/4.5'=78%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; very carbonaceous with woody fragments; slightly calcareous bed in upper section; very firm; damp.			
	95			94.0-99.0'-Sample. Recovered 4.1/5.0'=82%. RQD 2.4/4.1'=47%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; very carbonaceous with woody fragments; slightly calcareous bed in upper section; very firm; damp.			
	100						

Remarks Logged by: T. Murphy Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	100			99.0-104.0'-Sample. Recovered 4.1/5.0'=82%. RQD 1.0/4.1'=24%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; common concretions of pinkish gray (5YR 8/1) materials; very carbonaceous with woody fragments; slightly calcareous bed in upper section; laminations of siltstone with less clay; rip-ups; convoluted bedding; very firm; damp.			
	105			104.0-109.0'-Sample. Recovered 3.2/5.0'=64%. RQD 2.0/3.2'=62%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; common concretions of pinkish gray (5YR 8/1) materials; very carbonaceous with woody fragments; slightly calcareous bed in upper section; laminations of siltstone with less clay; rip-ups; convoluted bedding; very firm; damp.			
	110			109.0-114.0'-Sample. Recovered 2.2/5.0'=44%. RQD 0/2.2'=0%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; common concretions of pinkish gray (5YR 8/1) materials; very carbonaceous with woody fragments; non-calcarous rip-ups; convoluted bedding; very firm; damp.			
	115			114.0-119.0'-Sample. Recovered 4.6/5.0'=92%. RQD 3.4/4.6'=74%. SILTSTONE: dark gray (N 3); clayey; abundant carbonaceous material to 114.5'; greenish gray (5G 6/1); trace very fine-grained; firm to hard; damp.			
	120						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2	
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	120			119.0-124.0'-Sample. Recovered 4.6/5.0'=92%. RQD 0.6/4.6'=13%. 119.0-122.0'. SILTSTONE: dark gray (N 3); clayey; abundant carbonaceous material to 114.5'; greenish gray (5G 6/1); firm to hard; damp. 122.0-124.0'. SANDSTONE: greenish gray (5G 6/1); fine- to very fine-grained; silty; finely bedded; some carbonaceous material; moderately sorted; soft; wet. 124.0-129.0'-Sample. Recovered 4.5/5.0'=90%. RQD 0/4.5'=0%. SANDSTONE: medium gray (N 4); fine- to medium-grained silty sandstone; cross- bedded; carbonaceous laminations; sandstone alternates with sandy siltstone and clayey siltstone - 0.5' thick; moderately sorted; soft to moderately firm; wet. 129.0-134.0'-Sample. Recovered 2.5/5.0'=50%. RQD 1.3/2.5'=52%. SANDSTONE: medium gray (N 4); fine- to medium-grained; crossbedding; convoluted beds; well sorted; firm to hard;damp. 134.0-139.0'-Sample. Recovered 3.9/5.0'=78%. RQD 2.2/3.9'=56%. 134.0-136.1'. SANDSTONE: medium gray (N 4); fine- to medium-grained sand; convoluted beds; trace sand; well sorted; firm to hard; damp. 136.1-139.0'. SANDSTONE: medium gray (N 4); very fine-grained; silty; convoluted; cross-bedding; banded with carbonaceous laminations; moderately sorted; firm to hard; damp.			
	125						
	130						
	135						
	140						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06-222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 9-86

Date Drilled 9/24/86, 10/1/86, 10/2/86

Coordinates N 39246.2 E 19382.2

Boring Method Casing Driver; Hollow Stem Auger; NC Core

Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	140			139.0-144.0'-Sample. Recovered 3.9/5.0'=78%. RQD 2.9/3.9'=74%. SILTSTONE: medium dark (N 3) to dark (N 4); clayey; few moderate brown (10YR 4/4) concretions; well sorted; firm; damp.			
				144.0-149.0'-Sample. Recovered 4.0/5.0'=80%. RQD 3.0/4.0'=75%. CLAYSTONE: dark gray (N 3); silty; carbonaceous; firm; damp.			
	145						
				TOTAL DEPTH: 149.2'			
	150						
	155						
	160						

Remarks Logged by: T. Murphy

Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

WELL 9-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 39246.2 E 19382.2

ELEVATION: GROUND LEVEL 5995.23' (est.)
TOP OF CASING 5999.64' (est.)

PROJECT 106P06222 Rocky Flats Plant
PERSONNEL T. Gulliver, T. Murphy
LOCATION Golden, CO

DRILLING SUMMARY:

TOTAL DEPTH Well: 135.35' Hole: 151.00'

BOREHOLE DIAMETER 0.00' - 35.00': 5 5/8"
35.00' - 151.00': 4 3/4"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Tom High, Robert Roach)

RIG 0.00' - 35.00': casing advancer, 35.00' - 151.00': Failing

BIT(S) 0.00' - 35.00': down hole hammer
35.00' - 151.00': strata back coring bit, reaming

DRILLING FLUID 0.00' - 35.00': None
35.00' - 151.00': air/water mist

SURFACE CASING 5" x 35.0' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG X

CASING STRING(S): C=CASING S=SCREEN

0.00'	-	33.51'	C1		-		
0.00'	-	122.57'	C2		-		
122.57'	-	135.35'	S1		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

CASING: C1 5" I.D. steel surface casing
C2 2" I.D., Sch. 5, type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D., Sch. 5, type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS None (see comments)

FILTER MATERIAL 32-42 silica sand
121.20' - 140.50'

CEMENT Portland Type I
33.51' - 119.40'

OTHER 3/8" bentonite pellets
119.40' - 121.20'
140.50' - 151.00'

CONSTRUCTION TIME LOG:

TASK	START DATE	START TIME	FINISH DATE	FINISH TIME
DRILLING:	1986		1986	
5 5/8" casing advancer	9/24	0900	9/24	1615
NC Core	10/1	0826	10/2	1200
Reaming	10/6	1000	10/6	1230
GEOPHYS. LOGGING:	10/6	1336	10/7	1627
CASING:				
2" stainless	10/7	1218	10/7	1244
5" steel	9/24	0900	9/24	1615
FILTER PLACEMENT:	10/7	1414	10/7	1700
CEMENTING:	10/8	0900	10/8	1030
DEVELOPMENT:	10/14	0830	10/31	1400
OTHER:				
Bentonite	10/7	1710	10/17	1754
	10/7	0821	10/17	0850
Packer testing	10/2	1200	10/3	1700

WELL DEVELOPMENT

COMMENTS:

Water encountered at 105.37' during drilling on 10/8/86.
Top of stainless steel casing: 1.41'

Built well in NC rod; no centralizers used.

Geophysical logs:
SP - resistivity: 59.00' - 146.00'
Natural gamma: 0.00' - 147.00'

Well No.: 9-86

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
10-14-86	0830				1 Well Bore Volume = 3.67 gals. 10 Well Bore Volumes = 36.7 gals.
10-14-86	0830	Airlifted	11.7 gals.	Light brown to tan spray	———
10-20-86	1320	Bailed	16 gals.	Bottom - light tan Top - clear	16/36.7 gals. purged to date
10-22-86	1015	Bailed	6 gals.	Light brown to gray moderately turbid	22/36.7 gals. purged to date
10-23-86	0940	Bailed	2.5 gals.	Very light brown, slightly turbid	24.5/36.7 gals. purged to date
10-24-86	1015	Bailed	3 gals.	Very light brown, slightly turbid	27.5/36.7 gals. purged to date
10-27-86	0830	Bailed	6.5 gals.	Clear to very light brown	34/36.7 gals. purged to date
10-30-86	1250	Bailed	6.5 gals.	Clear to very light brown	40.5/36.7 gals. purged to date
10-31-86	1400	Bailed	3.0 gals.	Light to medium gray-brown	Sampled

WESTON

SHEET ____ of ____

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____

DEPT _____ DATE _____

WELL 09-86

Hydraulic Conductivity (cm/sec) = 4×10^{-8}

Flowrate (gpm) = 0.109

Screened Interval (ft below G.L.) = 122.57 - 135.35'

122.57 - 135.35' sandstone

Method of Analysis: Residual-drawdown Plot

(Driscoll, 1986 - pg 256.)

WESTON

SHEET ____ of ____

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____ DEPT _____ DATE _____

WELL 09-86

$$T\ (gpd/ft) = \frac{264\,Q}{\Delta s'} = \frac{(264)\,(0.109)}{2542} = 0.0113$$

where $Q\ (gpm) = 14.5\ gallon/133\ min = 0.109\ gpm$

$\Delta s'$ = ft. change in residual drawdown / log cycle

= 2542' (see attached plot)

$$K\ (gpd/ft^2) = T/b = 0.0113/12.78 = 8.84 \times 10^{-4}$$

where $b\ (ft) = 12.78$

$$K\ (cm/sec) = 8.84 \times 10^{-4}\ gpd/ft^2 \times \frac{4.72 \times 10^{-5}\ cm/sec}{gpd/ft^2} = 4 \times 10^{-8}$$

This method is valid where $u \leq 0.01$

solving for t for $u \leq 0.01$.

$$t\ (min) = \frac{r^2 S}{4\,T\,u} = \frac{(0.198)^2\ 10^{-3}}{4\,(.0113)\,(.01)} \times \frac{1440\ min}{day} \times \frac{7.482\ gal}{ft^3}$$

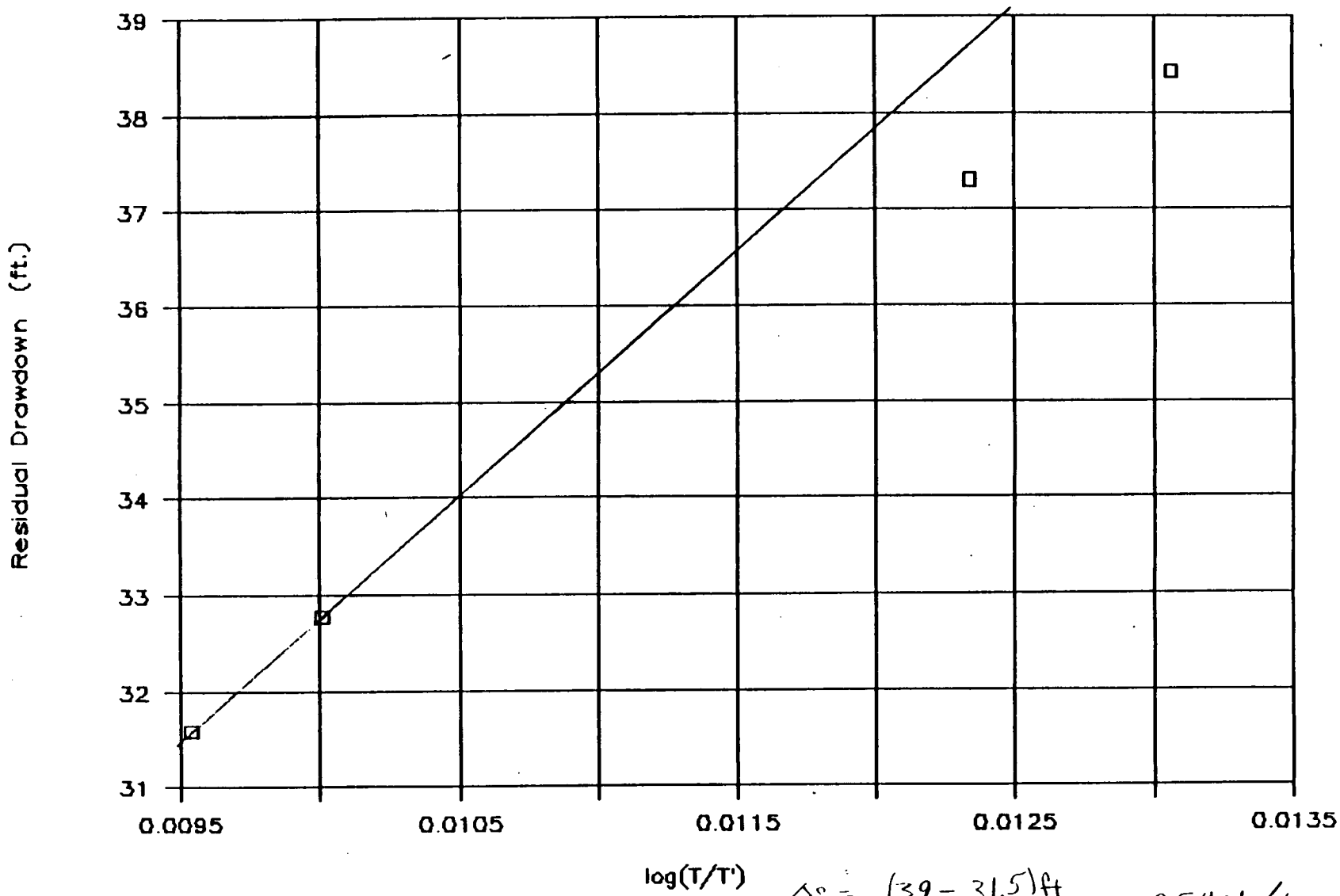
$= 934$ min.

where $r\ (ft) = \left(\frac{4.75}{24}\right) ft = 0.198\ ft$

$S = 10^{-3}$ assumed S for confined aquifer

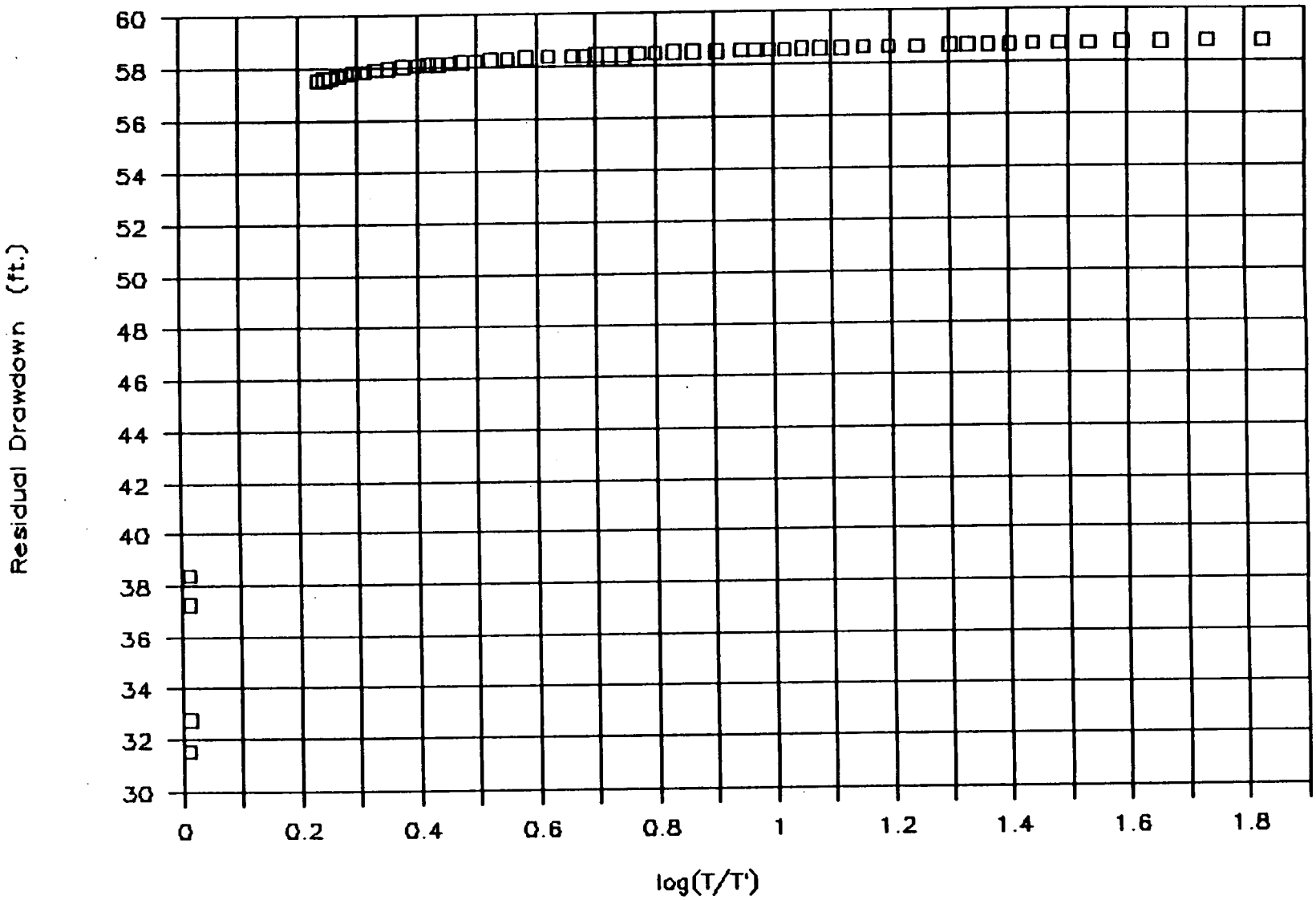
$\Delta s'$ is based on points where $t \geq 5706$ min.

WELL 09-86

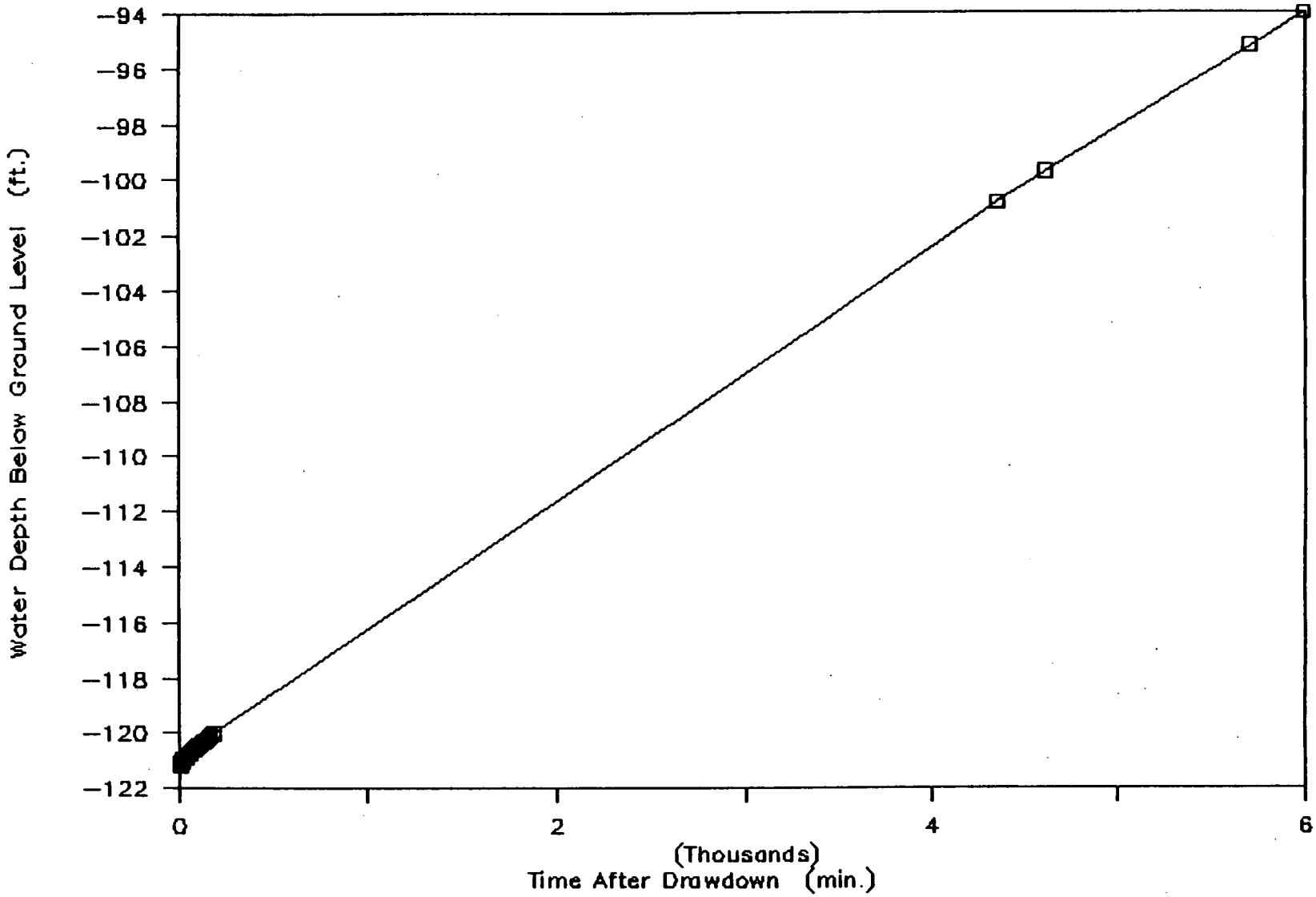


$$\Delta s = \frac{(39 - 31.5)\,ft}{0.01245 - .00950} = 2542'/\log \text{ cycle}$$

WELL 09-86


Residual Drawdown (ft.)
60
58
56
54
52
50
48
46
44
42
40
38
36
34
32
30
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
log(T/T')

WELL 09-86


-94
-96
-98
-100
-102
-104
-106
-108
-110
-112
-114
-116
-118
-120
-122
Water Depth Below Ground Level (ft.)
0
2
4
6
(Thousands)
Time After Drawdown (min.)

WELL 09-86

T Time (min.)	T' T Prime (min.)	Water Level (ft.)	s' Rsd Drwdn (ft.)	log(T/T')
135.00	2.00	121.18	58.76	1.83
135.50	2.50	121.17	58.75	1.73
136.00	3.00	121.16	58.74	1.66
136.50	3.50	121.14	58.72	1.59
137.00	4.00	121.12	58.70	1.53
137.50	4.50	121.11	58.69	1.49
138.00	5.00	121.10	58.68	1.44
138.50	5.50	121.08	58.66	1.40
139.00	6.00	121.07	58.65	1.36
139.50	6.50	121.06	58.64	1.33
140.00	7.00	121.06	58.64	1.30
141.00	8.00	121.04	58.62	1.25
142.00	9.00	121.03	58.61	1.20
143.00	10.00	121.03	58.61	1.16
144.00	11.00	121.00	58.58	1.12
145.00	12.00	120.99	58.57	1.08
146.00	13.00	120.99	58.57	1.05
147.00	14.00	120.97	58.55	1.02
148.00	15.00	120.96	58.54	0.99
149.00	16.00	120.96	58.54	0.97
150.00	17.00	120.95	58.53	0.95
152.00	19.00	120.93	58.51	0.90
154.00	21.00	120.92	58.50	0.87
156.00	23.00	120.90	58.48	0.83
158.00	25.00	120.89	58.47	0.80
160.00	27.00	120.88	58.46	0.77
162.00	29.00	120.86	58.44	0.75
164.00	31.00	120.83	58.41	0.72
166.00	33.00	120.83	58.41	0.70
168.00	35.00	120.81	58.39	0.68
170.00	37.00	120.80	58.38	0.66
175.00	42.00	120.78	58.36	0.62
180.00	47.00	120.75	58.33	0.58
185.00	52.00	120.72	58.30	0.55
190.00	57.00	120.70	58.28	0.52
195.00	62.00	120.65	58.23	0.50
200.00	67.00	120.62	58.20	0.47
205.00	72.00	120.59	58.17	0.45
210.00	77.00	120.55	58.13	0.44
215.00	82.00	120.54	58.12	0.42
220.00	87.00	120.50	58.08	0.40
230.00	97.00	120.45	58.03	0.37
240.00	107.00	120.39	57.97	0.35
250.00	117.00	120.34	57.92	0.33
260.00	127.00	120.27	57.85	0.31
270.00	137.00	120.24	57.82	0.29
280.00	147.00	120.17	57.75	0.28
290.00	157.00	120.11	57.69	0.27
300.00	167.00	120.05	57.63	0.25
310.00	177.00	120.01	57.59	0.24
320.00	187.00	119.95	57.53	0.23
4488.00	4355.00	100.84	38.42	0.01
4748.00	4615.00	99.73	37.31	0.01
5839.00	5706.00	95.19	32.77	0.01
6124.00	5991.00	94.00	31.58	0.01

AQUIFER TEST DATA

WELL 9-86
PUMPING or OBSERVATION WELL
PUMPING or RECOVERY DATA
PAGE 1 OF 2

TYPE OF AQUIFER TEST Bail down Recovery Test
HOW Q MEASURED 4 Gal Bucket
HOW W.L.'s MEASURED Clinic
RAD./DIST. OF/FROM PUMPING WELL 1"
MEAS. POINT FOR W.L.'s
ELEVATION OF MEAS. POINT

DEPTH OF PUMP/AIRPIPE
PUMP ON: date 11/14/86 time 2:15
PUMP OFF: date 11/14/86 time 11:28
DURATION OF AQUIFER TEST

LOCATION
PERSONNEL
PROJECT

TIME t = ____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL 60+4.30 (+ 2.42) 62.42					DISCHARGE		RECORDED BY	COMMENTS
DAY	CLOCK TIME	t	t'		READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	s or s'		READING	Q		T.D. 141.19 (period)
	11:30				120+3.06	1.89	121.18	58.76				CW	~~[illegible]~~
	1130½				120+3.09	1.88	121.17	58.75				CW	start bail 9:1
	1131				120+3.04	"	121.16	58.74				CW	finish bail: 11:
	1131½				120+3.02	"	121.14	58.72					
	1132				120+3.00		121.12	58.70					14½ gall. rec
	1132½				120+2.99		121.11	58.69					
	1133				120+2.98		121.10	58.68					
	1133½				120+2.96		121.08	58.66					
	1134				120+2.95		121.07	58.65				(READING)	90% - 70.1
	1134½				120+2.94		121.06	58.64					
	1135				120+2.94		121.06	58.64					
	1136				120+2.92		121.04	58.62					
	1137				120+2.91		121.03	58.61					
	1138				120+2.91		121.03	58.61					
	1139				120+2.89		121.00	58.58					
	1140				120+2.87		120.99	58.57					
	1141				120+2.87		120.99	58.57					
	1142				120+2.85		120.97	58.55					
	1143				120+2.84		120.96	58.54					
	1144				120+2.84		120.96	58.54					
	1145				120+2.83		120.95	58.53					
	1147				120+2.81		120.93	58.51					
	1149				120+2.80		120.92	58.50					
	1151				120+2.78		120.90	58.48					
	1153				120+2.77		120.89	58.47					
	1155				120+2.76		120.88	58.46					
	1157				120+2.74		120.86	58.44					
	1159				120+2.71		120.83	58.41					
	1201				120+2.71		120.83	58.41					
	1203				120+2.69		120.81	58.39					
	1205				120+2.68		120.80	58.38					
	1210				120+2.66		120.78	58.36					
	1215				120+2.63		120.75	58.33					
	1220				120+2.60		120.72	58.30					
	1225				120+2.58		120.70	58.28					
	1230				120+2.53		120.65	58.23					
	1235				120+2.50		120.62	58.20					
	1240				120+2.475		120.59	58.17					
	1245				120+2.43		120.55	58.13					
	1250				120+2.42		120.54	58.12					
	1253				120+2.38		120.50	58.08					

AQUIFER TEST DATA

WELL 9-86
PUMPING or OBSERVATION WELL
PUMPING or RECOVERY DATA
PAGE 2 OF 2

TYPE OF AQUIFER TEST Bail Down Rec. Test
HOW Q MEASURED 4 Gal. Bucket
HOW W.L.'s MEASURED Chalk
RAD./DIST. OF/FROM PUMPING WELL 1"
MEAS. POINT FOR W.L.'s
ELEVATION OF MEAS. POINT

DEPTH OF PUMP/AIRPIPE
PUMP ON: date 11-14-86 time 9:15
PUMP OFF: date 11-14-86 time 11:28
DURATION OF AQUIFER TEST

LOCATION
PERSONNEL
PROJECT

TIME t = ____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL 64.30					DISCHARGE		RECORDED BY	COMMENTS
DAY	CLOCK TIME	t	t'		READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	s or s'		READING	Q		
	1305				120+2.33	1.88	120.45	58.03					
	1315				120+2.27		120.39	57.97					
	1325				120+2.22		120.34	57.92					
	1335				120+2.15		120.27	57.85					
	1345				120+2.12		120.24	57.82					
	1355				120+2.05		120.17	57.75					
	1405				120+1.99		120.11	57.69					
1	1415				120+1.93		120.05	57.63					
1	1425				120+1.89		120.01	57.59					
1	1435				120+1.83		119.95	57.53					
4	12:03				100+2.72		100.84	38.42					
4	16:23				100+1.61		99.73	37.31					
5	10:34				95+2.07		95.19	32.77					
5	15:19				95+0.88		94.00	31.58					
								ENOUGH DARREL SAYS					

PACKER TEST ANALYSIS
WELL NO. 9-86
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 106P06222
DATE TESTED: 10/2/86 BY: T. MURPHY
TEST INTERVAL (FEET BELOW G.S.): 87.64 - 97.67
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 67.42

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 40.17 * 2.31 = 166.01
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
K = .00000000 CM/SEC

NOTE: NO WATER GAIN OR LOSS IN INJECTION TUBE;
Q=0

P2/3 TEST

Q = INJECTION RATE = .00008123 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 58.42 * 2.31 = 208.17
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000003 FT/MIN
K = .00000001 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 40.17 * 2.31 = 166.01
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
K = .00000000 CM/SEC

NOTE: NO WATER GAIN OR LOSS IN INJECTION TUBE;
Q=0

PACKER TEST ANALYSIS
WELL NO. 9-86
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 106P06222
DATE TESTED: 10/2/86 BY: T. MURPHY
TEST INTERVAL (FEET BELOW G.S.): 97.67 - 107.70
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 67.42

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00029785 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 44.48 * 2.31 = 175.97
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000012 FT/MIN
K = .00000006 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00016246 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 65.11 * 2.31 = 223.62
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000005 FT/MIN
K = .00000003 CM/SEC

2ND P1/3 TEST

TEST ABORTED

PACKER TEST ANALYSIS
WELL NO. 9-86
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 106P06222
DATE TESTED: 10/2/86 BY: T. MURPHY
TEST INTERVAL (FEET BELOW G.S.): 107.70 - 117.93
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 67.42

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00001354 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.23 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 48.80 * 2.31 = 185.95
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
K = .00000000 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00008123 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.23 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 71.80 * 2.31 = 239.08
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000002 FT/MIN
K = .00000001 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.23 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 48.80 + 5.80 * 2.31 = 129.62
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
K = .00000000 CM/SEC

NOTE: NO WATER GAIN OR LOSS IN INJECTION TUBE;
Q=0.

PACKER TEST ANALYSIS
WELL NO. 9-86
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 106P06222
DATE TESTED: 10/2/86 BY: T. MURPHY
TEST INTERVAL (FEET BELOW G.S.): 121.00 - 131.03
MATERIAL TESTED: ARAPAHOE SANDSTONE
DEPTH TO WATER (FEET BELOW G.S.): 67.42

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00054154 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 54.52 * 2.31 = 199.16
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000019 FT/MIN
K = .00000009 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00027077 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 80.66 * 2.31 = 259.54
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000007 FT/MIN
K = .00000004 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 54.52 * 2.31 = 199.16
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
K = .00000000 CM/SEC

NOTE: NO WATER GAIN OR LOSS IN INJECTION TUBE;
Q=0.

PACKER TEST ANALYSIS
WELL NO. 9-86

ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 106P06222
DATE TESTED: 10/2/86 BY: T. MURPHY
TEST INTERVAL (FEET BELOW G.S.): 135.00 - 145.03
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 67.42

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00074462 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 60.54 * 2.31 = 213.07
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000024 FT/MIN
K = .00000012 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00008123 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 90.00 * 2.31 = 281.12
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000002 FT/MIN
K = .00000001 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00008123 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 10.03 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 67.42 + 5.80 + 60.54 * 2.31 = 213.07
R = BOREHOLE RADIUS = .14 FEET

K = HYDRAULIC CONDUCTIVITY = .00000003 FT/MIN
K = .00000001 CM/SEC

ROCKY FLATS PRESENT LANDFILL

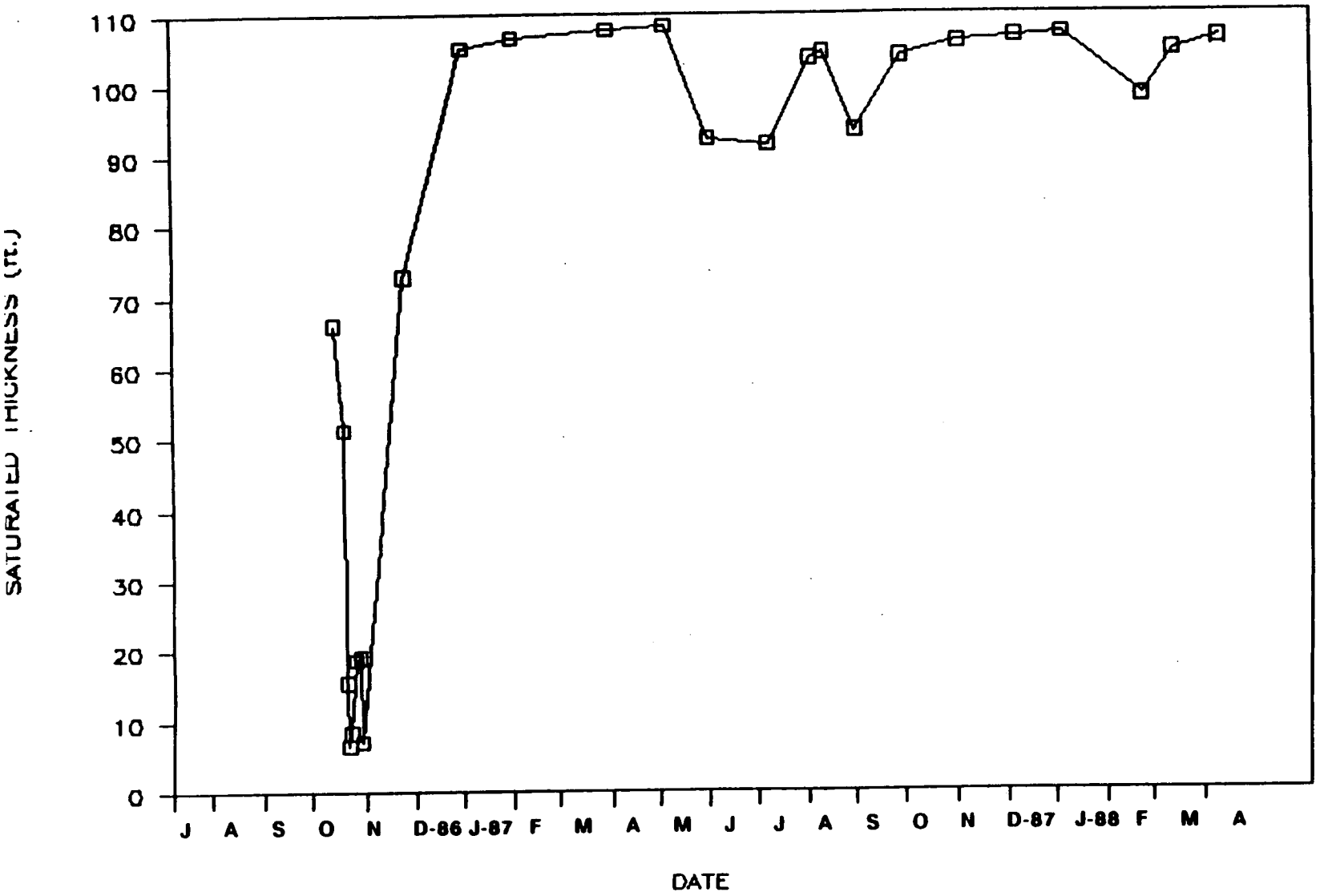
WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
0986	10/14/86	5995.23 ~~5985.23~~	5996.64 ~~5986.64~~	1.41	135.35	69.30	~~5917.34~~ 5927.34
	10/20/86					84.14	~~5902.50~~ 5912.50
	10/22/86					119.9	~~5886.73~~ 5876.73
	10/23/86					128.8	~~5857.83~~ 5867.83
	10/24/86					126.9	~~5859.70~~ 5869.70
	10/27/86					116.6	~~5870.01~~ 5880.01
	10/30/86					116.1	~~5870.52~~ 5880.52
	10/31/86					128.2	~~5858.40~~ 5868.40
	11/26/86					62.56	~~5924.08~~ 5934.08
	01/01/87					30.13	~~5956.51~~ 5966.51
	02/01/87					28.75	~~5957.89~~ 5967.89
	04/01/87					27.60	~~5959.04~~ 5969.04
	05/06/87					27.04	~~5959.60~~ 5969.60
	06/01/87					43.10	~~5943.54~~ 5953.54
	07/08/87					43.90	~~5942.74~~ 5952.74
	08/03/87					31.70	~~5954.94~~ 5964.94
	08/11/87					30.80	~~5955.84~~ 5965.84
	08/31/87					41.90	~~5944.74~~ 5954.74
	09/28/87					31.40	~~5955.24~~ 5965.24
	11/02/87					29.40	~~5957.24~~ 5967.24
	12/07/87					28.60	~~5958.04~~ 5968.04
	01/05/88					28.20	~~5958.44~~ 5968.44
	02/24/88					37.00	~~5949.64~~ 5959.64
	03/14/88					30.60	~~5958.04~~ 5968.04
	04/11/88					28.80	~~5957.84~~ 5967.84

adjusted elevations to fit topographic map
JBB 5/03/88

Survey in progress to verify ground surface elevation.

SATURATED THICKNESS IN WELL # 09-86



INDEX OF DATA

Boring No.: 10-86

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

Project: Rocky Flats Plant

LOG OF BORING NO. 10-86

Date Drilled 9/24/86

Coordinates N 39223.9 E 19400.6

Boring Method Casing driver

Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	0			ROCKY FLATS ALLUVIUM 0.0-10.0'-Cuttings. GRAVEL: granitic pebbles and cobbles; fines less than 1.0%; poorly sorted; unconsolidated; dry.			
	5						
	10			10.0-11.0'-Cuttings. SAND: light olive gray (5Y 5/2) and moderate reddish brown (10R 4/6) fine- to coarse-grained sand; poorly sorted; subrounded; unconsolidated; damp.		▼	
				11.0-15.0'-Cuttings. SILT: moderate yellowish brown (10YR 5/4) gravelly sandy silt; granitic gravel 10%; poorly sorted; unconsolidated; damp.		▽	
	15			15.0-17.0'-Cuttings. GRAVEL: moderate yellowish brown (10 YR 5/4) silty gravel; poorly sorted; unconsolidated; damp.			
				17.0-23.0'-Cuttings. SILT: moderate yellowish brown (10YR 5/4) gravelly sandy silt; gravel 10-20%; poorly sorted; unconsolidated; damp.			
	20						

Remarks Logged by: T. Gulliver

Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant	LOG OF BORING NO. 10-86

Date Drilled 9/24/86 **Coordinates** N 39223.9 E 19400.6

Boring Method Casing driver **Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	20						
				ARAPAHOE FORMATION 23.0-24.0'-Cuttings. SILTSTONE: light olive brown (5Y 5/6) sandy siltstone; well sorted; damp to moist.			
	25			24.0-27.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2) and light olive brown (5Y 5/6) claystone; damp.			
				TOTAL DEPTH: 27.0'			
	30						
	35						
	40						

Remarks Logged by: T. Gulliver Checked by: [illegible]

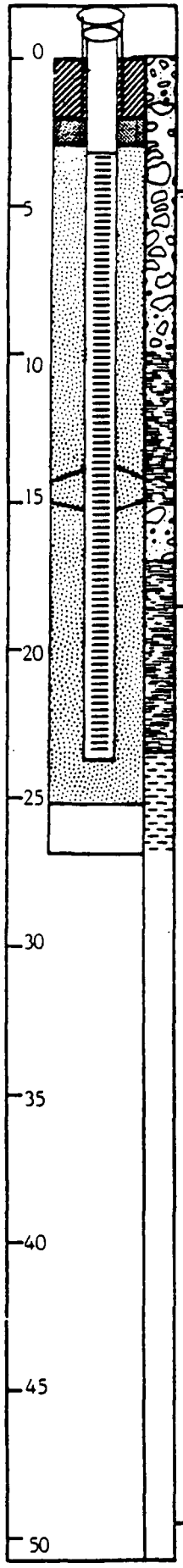
Project No. 106P06222	Hydro-Search, Inc.	Page 2 of2

WELL 10-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 39223.9 E 19400.6

ELEVATION: GROUND LEVEL 5995.02' (est.)
TOP OF CASING 5996.63' (est.)



LOCATION Golden, CO
PERSONNEL T. Gulliver
PROJECT 106P06222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 23.78' Hole: 27.00'

BOREHOLE DIAMETER 0.00' - 23.40': 5 5/8"
23.40' - 27.00': 5"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Arrow Drilling, Tom High)

RIG Casing advancer

BIT(S) Down hole hammer

DRILLING FLUID none

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

CASING STRING(S): C=CASING S=SCREEN

0.00'	3.29'	C1			
3.29'	23.78'	S1			

CASING: C1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
14.08' - 15.33'

FILTER MATERIAL 32-42 silica sand
2.80' - 25.50'

CEMENT Portland Type I
0.00' - 2.00'

OTHER 3/8" bentonite pellets
2.00' - 2.80'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
Casing advancer	9/24	1420	9/24	1600
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/25	0900	9/25	0910
FILTER PLACEMENT:	9/25	0910	9/25	1300
CEMENTING:	9/25	1400	9/25	1410
DEVELOPMENT:	9/29	1345	10/16	1515
OTHER:				
Bentonite	9/25	1300	9/25	1305

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 10' during drilling.

Top of stainless steel casing: 1.61'

Cave from TD to 25.50'

Well No.: 10-86

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
9-29-86	1345				1 Well Bore Volume = 2.30 gals. 10 Well Bore Volumes =23.8 gals.
9-29-86	1345	Bailed	3.5 gals.	Light brown to brown, turbid-dark sand	3.5/23.8 gals. purged to date
10-1-86	1345	Bailed	1.0 gals.	Very light brown slightly turbid no sand	4.5/23.8 gals. purged to date
10-2-86	1720	Airlifted	2.4 gals.	Light-medium brown	———
10-3-86	1000	Bailed	3.5 gals.	Clear - very light brown	8/23.8 gals. purged to date
10-3-86	1600	Bailed	1.5 gals.	Clear - very light brown	9.5/23.8 gals. purged to date
10-6-86	1440	Bailed	3.0 gals.	Clear - very light brown	10.5/23.8 gals. purged to date
10-7-86	1215	Bailed	2.0 gals.	Clear - milky	14.5/23.8 gals. purged to date
10-8-86	1645	Bailed	2.25 gals.	Clear - milky to light brown	16.75/23.8 gals. purged to date
10-9-86	1135	Bailed	2.0 gals.	Clear	20.0/23.8 gals. purged to date
10-9-86	1450	Bailed	1.25 gals.	Clear	20.0/23.8 gals. purged to date
10-10-86	0915	Bailed	2.0 gals.	Clear	22.0/23.8 gals. purged to date
10-10-86	1315	Bailed	2.0 gals.	Clear	24.0/23.8 gals. purged to date
10-14-86	1300	Bailed	2.5 gals.	Clear	26.5/23.8 gals. purged to date
10-16-86	1515	Bailed	———	Clear	Sampled

WESTON

SHEET ____ of ____

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____

DEPT _____ DATE _____

WELL 10-86

Hydraulic Conductivity (cm/sec) = NA

Flowrate (gpm) = 0.429

Screened Interval (ft below G.L.) = 3.29 - 23.78'

Method of Analysis: Residual-drawdown Plot

(Driscoll, 1986 - pg 256.)

WESTON

SHEET ____ of ____

LIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____ DEPT _____ DATE _____

WELL 10-86

$$T\ (gpd/ft) = \frac{264\,Q}{\Delta s'} = \frac{264\ (.429)}{305} = 0.371$$

where $Q\ (gpm) = 3$ gallons / 7 minutes $= 0.429$ gpm

$\Delta s'$ = ft. change in residual drawdown / log cycle

= 305 ft/log cycle (see attached plot)

$$K\ (gpd/ft^2) = T/b = .371/12.73 = 2.91 \times 10^{-2}$$

where $b\ (ft)$ = (base of screen) 23.78 − 11.05 (static W.L.) = 12.7

$$K\ (cm/sec) = 2.91 \times 10^{-2}\ gpd/ft^2 \times \frac{4.72 \times 10^{-5}\ cm/sec}{gpd/ft^2} = 1.4 \times 10^{-6}$$

This method is valid where $u \leq 0.01$

solving for t for $u \leq 0.01$

$$t\ (min) = \frac{r^2 S}{4\,T\,u} = \frac{(.234)^2\ (.1)}{4\ (0.371)\ (.01)} \times \frac{1440\ min}{day} \times \frac{7.482\ gal}{ft^3}$$

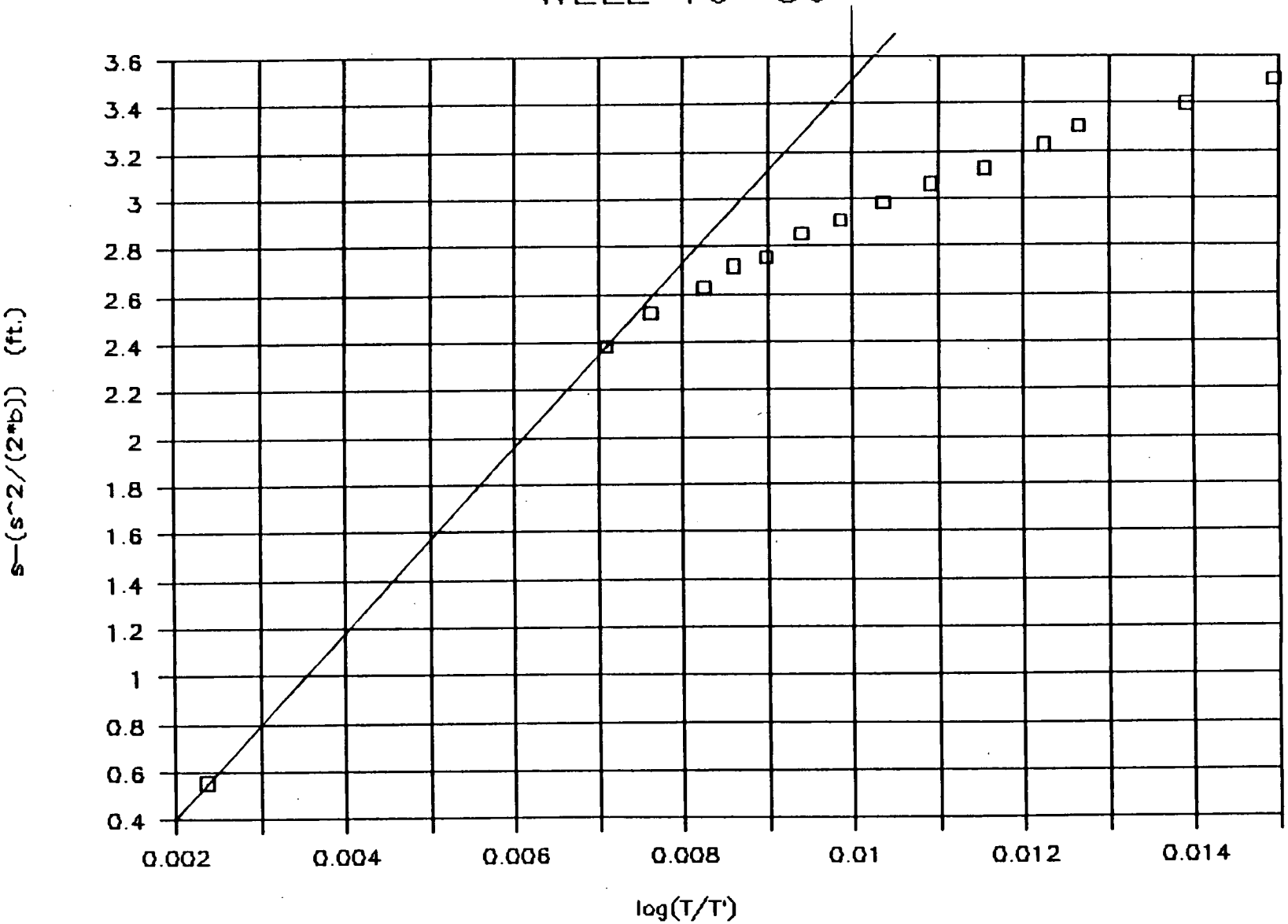
$$= 3975\ min$$

where $r\ (ft) = \left(\frac{5.625}{24}\right) ft = .234\ ft$

$S = 0.1$ assumed S for unconfined aquifer

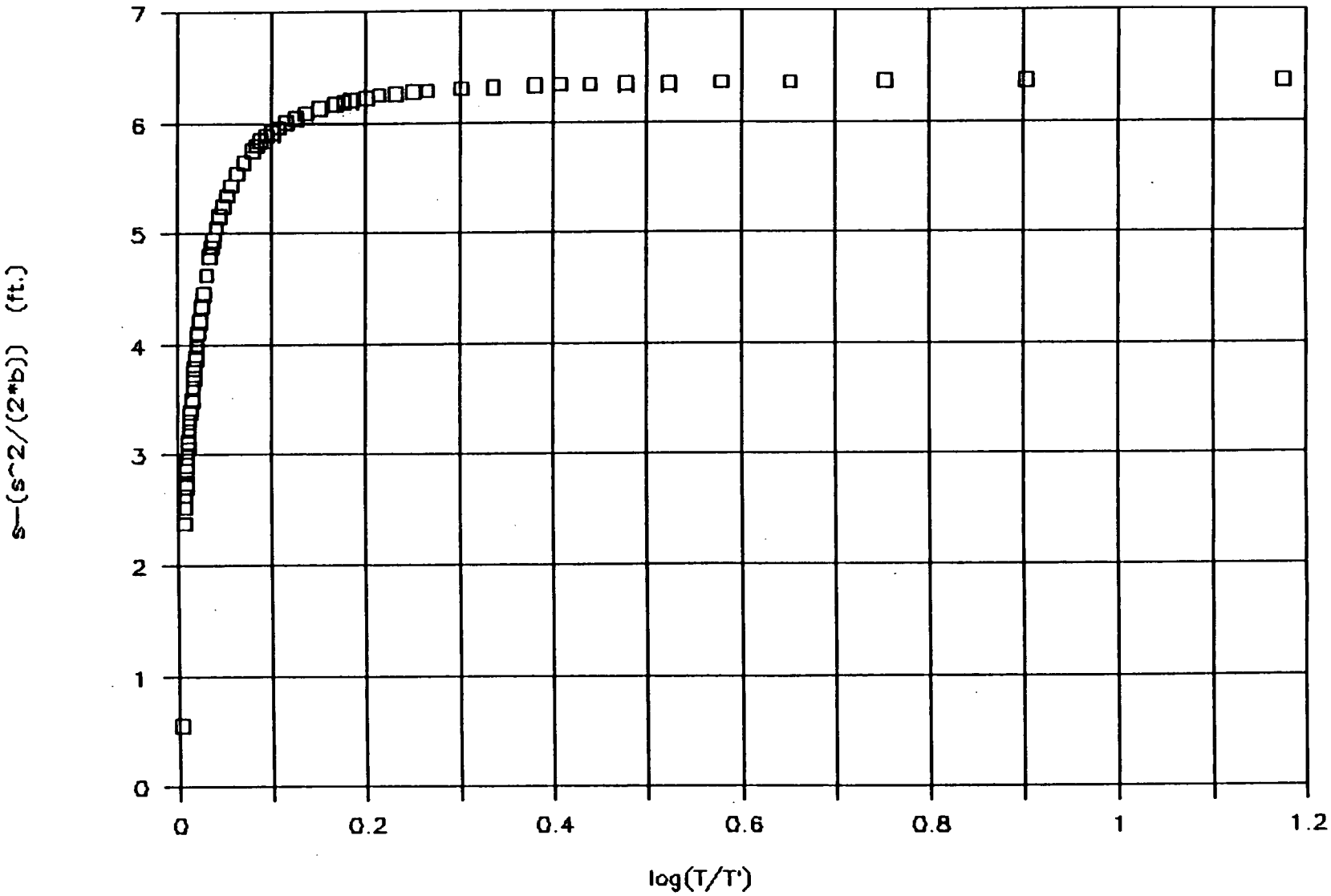
$\Delta s'$ invalid

WELL 10-86

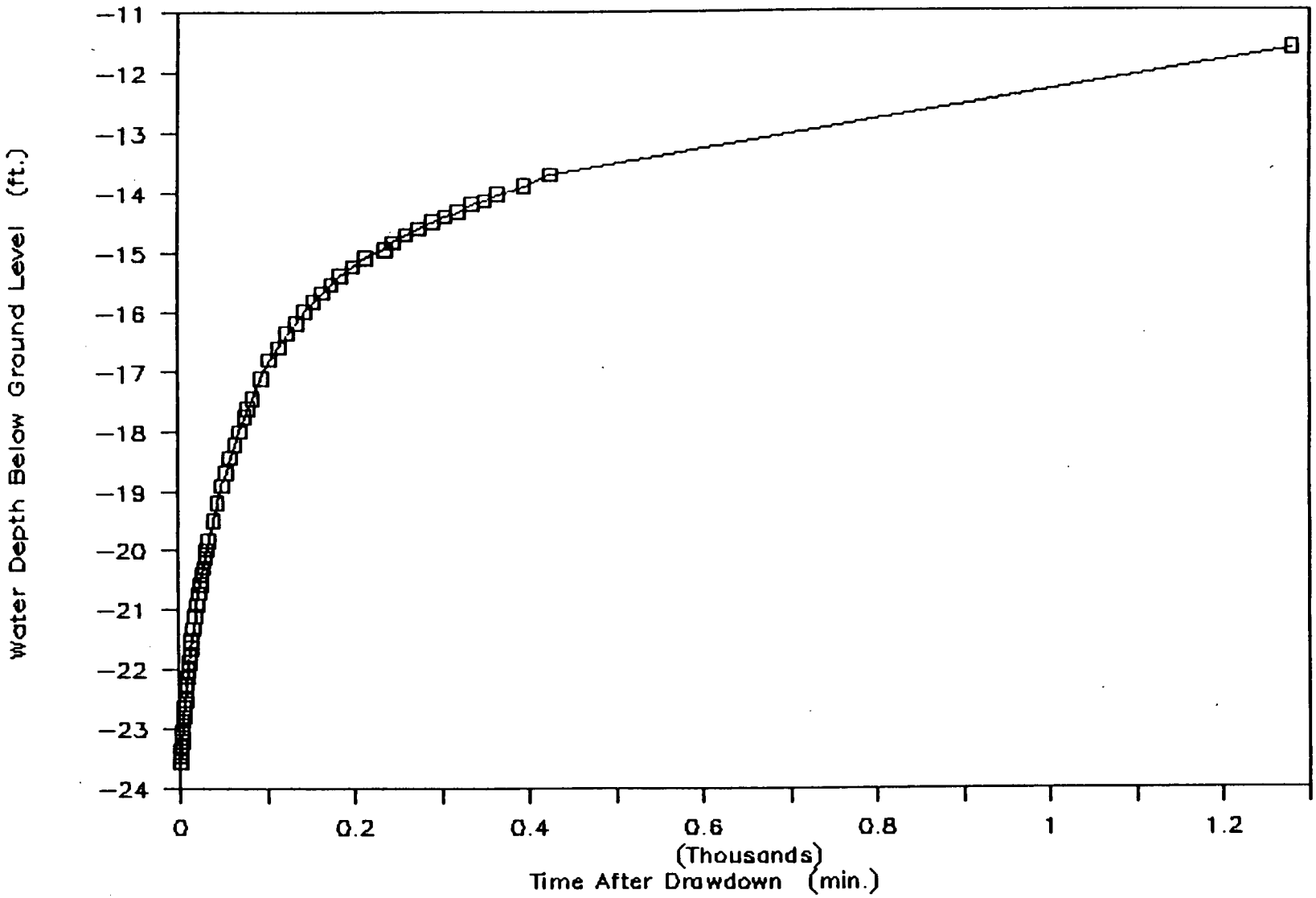


$$\Delta s' = \frac{(3.6 - .4)\ ft}{.0125 - .0020} = 305\ ft/\log\ cycle$$

WELL 10-86



WELL 10-86


-11
-12
-13
-14
-15
-16
-17
-18
-19
-20
-21
-22
-23
-24
Water Depth Below Ground Level (ft.)
0
0.2
0.4
0.6
0.8
1
1.2
(Thousands)
Time After Drawdown (min.)

WELL 10-86

T Time (min.)	T' T Prime (min.)	Water Level (ft.)	s Rsd Drwdn (ft.)	s-(s^2/2b) b=10.82 ft. (ft.)	log(T/T')
7.50	0.50	23.54	12.49	6.36	1.18
8.00	1.00	23.43	12.38	6.36	0.90
8.50	1.50	23.37	12.32	6.36	0.75
9.00	2.00	23.29	12.24	6.36	0.65
9.50	2.50	23.21	12.16	6.35	0.58
10.00	3.00	23.13	12.08	6.35	0.52
10.50	3.50	23.04	11.99	6.34	0.48
11.00	4.00	22.93	11.88	6.34	0.44
11.50	4.50	22.85	11.80	6.33	0.41
12.00	5.00	22.79	11.74	6.33	0.38
13.00	6.00	22.63	11.58	6.31	0.34
14.00	7.00	22.50	11.45	6.30	0.30
15.30	8.30	22.34	11.29	6.28	0.27
16.00	9.00	22.25	11.20	6.27	0.25
17.00	10.00	22.12	11.07	6.26	0.23
18.00	11.00	22.00	10.95	6.24	0.21
19.00	12.00	21.87	10.82	6.22	0.20
20.30	13.30	21.75	10.70	6.20	0.18
21.00	14.00	21.64	10.59	6.19	0.18
22.00	15.00	21.51	10.46	6.16	0.17
24.00	17.00	21.31	10.26	6.13	0.15
26.00	19.00	21.11	10.06	6.08	0.14
28.00	21.00	20.91	9.86	6.04	0.12
30.00	23.00	20.72	9.67	6.00	0.12
32.00	25.00	20.56	9.51	5.96	0.11
34.00	27.00	20.40	9.35	5.92	0.10
36.00	29.00	20.28	9.23	5.88	0.09
38.00	31.00	20.12	9.07	5.84	0.09
40.00	33.00	19.98	8.93	5.80	0.08
42.00	35.00	19.83	8.78	5.75	0.08
47.00	40.00	19.50	8.45	5.65	0.07
52.00	45.00	19.20	8.15	5.54	0.06
57.00	50.00	18.92	7.87	5.44	0.06
62.00	55.00	18.69	7.64	5.35	0.05
67.00	60.00	18.44	7.39	5.24	0.05
72.00	65.00	18.23	7.18	5.16	0.04
77.00	70.00	18.02	6.97	5.06	0.04
83.00	76.00	17.76	6.71	4.94	0.04
87.00	80.00	17.63	6.58	4.88	0.04
92.00	85.00	17.46	6.41	4.80	0.03
102.00	95.00	17.13	6.08	4.63	0.03
112.00	105.00	16.81	5.76	4.46	0.03
122.00	115.00	16.61	5.56	4.35	0.03
132.00	125.00	16.37	5.32	4.21	0.02
142.00	135.00	16.19	5.14	4.10	0.02

WELL 10-86

T Time (min.)	T' T Prime (min.)	Water Level (ft.)	s Rsd Drwdn (ft.)	s-(s^2/2b) b=10.82 ft. (ft.)	log(T/T')
152.00	145.00	15.99	4.94	3.98	0.02
162.00	155.00	15.83	4.78	3.88	0.02
172.00	165.00	15.68	4.63	3.79	0.02
182.00	175.00	15.54	4.49	3.70	0.02
192.00	185.00	15.40	4.35	3.61	0.02
147.00	140.00	15.24	4.19	3.50	0.02
162.00	155.00	15.09	4.04	3.40	0.02
244.00	237.00	14.95	3.90	3.30	0.01
252.00	245.00	14.84	3.79	3.23	0.01
267.00	260.00	14.70	3.65	3.13	0.01
282.00	275.00	14.61	3.56	3.06	0.01
297.00	290.00	14.50	3.45	2.98	0.01
312.00	305.00	14.40	3.35	2.91	0.01
327.00	320.00	14.32	3.27	2.85	0.01
342.00	335.00	14.19	3.14	2.75	0.01
357.00	350.00	14.14	3.09	2.71	0.01
372.00	365.00	14.03	2.98	2.63	0.01
402.00	395.00	13.89	2.84	2.52	0.01
432.00	425.00	13.71	2.66	2.38	0.01
1287.00	1280.00	11.62	0.57	0.56	0.00

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

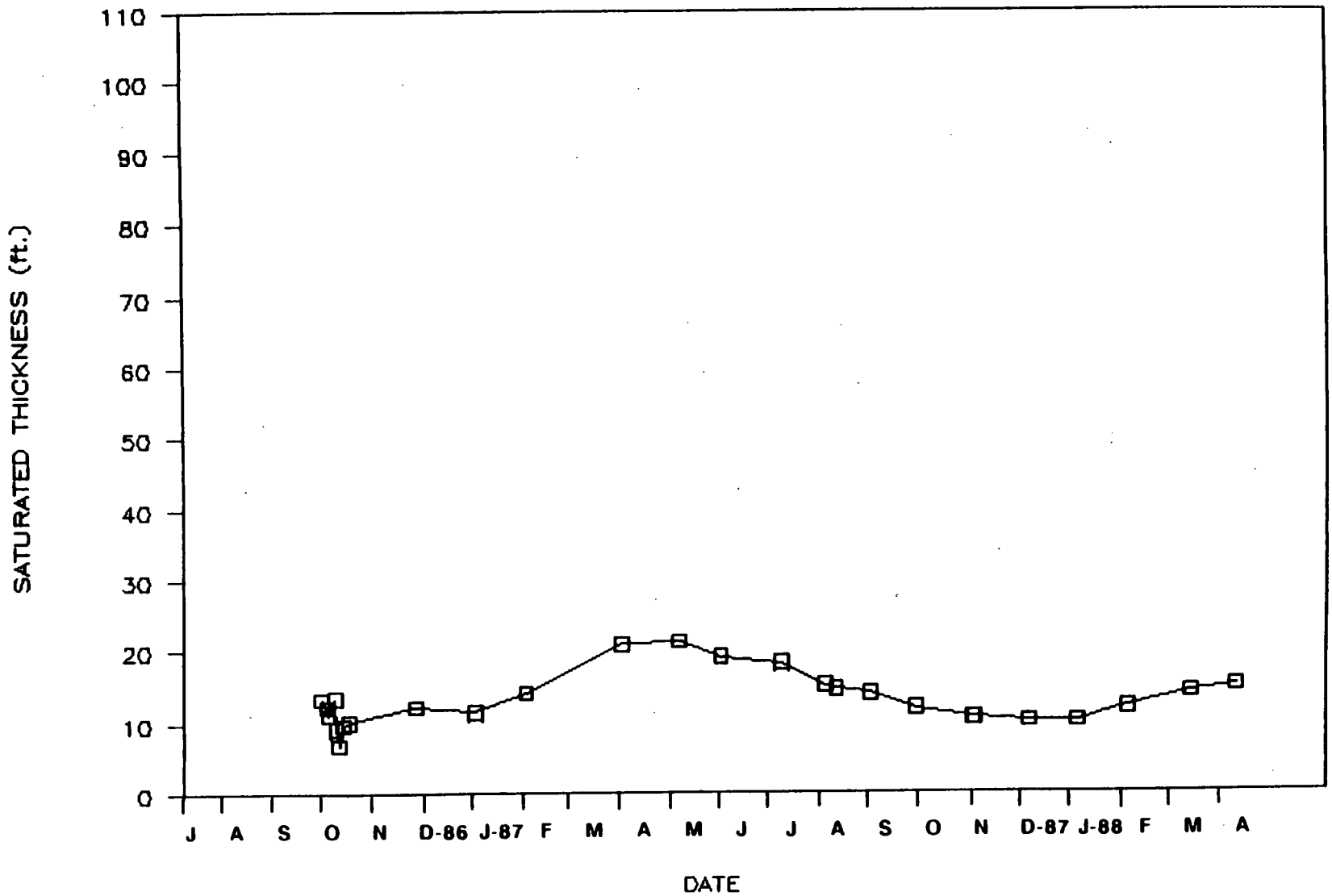
WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION	
1086	09/29/86	5995.02 ~~5985.02~~	5996.63 ~~5986.63~~	1.61	23.78	10.35	~~5976.28~~	5986.28
	10/02/86					11.53	5975.10	5985.10
	10/03/86					12.71	5973.92	5983.92
	10/07/86					10.30	5976.33	5986.33
	10/08/86					14.43	5972.20	5982.20
	10/10/86					16.90	5969.73	5979.73
	10/13/86					14.09	5972.54	5982.54
	10/16/86					13.59	5973.04	5983.04
	11/26/86					11.56	5975.07	5985.07
	01/01/87					12.19	5974.44	5984.44
	02/01/87					9.56	5977.07	5987.07
	04/01/87					2.90	5983.73	5993.73
	05/06/87					2.44	5984.19	5994.19
	06/01/87					4.71	5981.92	5991.92
	07/08/87					5.50	5981.13	5991.13
	08/03/87					8.60	5978.03	5988.03
	08/10/87					9.10	5977.53	5987.53
	08/31/87					9.70	5976.93	5986.93
	09/28/87					11.70	5974.93	5984.93
	11/02/87					13.00	5973.63	5983.63
	11/03/87					13.00	5973.63	5983.63
	12/07/87					13.50	5973.13	5983.13
	01/05/88					13.50	5973.13	5983.13
	02/04/88					11.60	5975.03	5985.03
	03/14/88					9.50	5977.13	5987.13
	04/11/88					8.70	5977.93	5987.93

Adjusted elevations to fit topographic map

JBB
5/23/88

Survey in progress to verify ground surface elevation

SATURATED THICKNESS IN WELL # 10-86



INDEX OF DATA

Boring No.: 45-86

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

Project:	Rocky Flats Plant	LOG OF BORING NO.	5-86
Date Drilled	10/2/86	Coordinates	N 37396.4 E 16363.1
Boring Method	Casing Driver	Ground Surface Elevation	6035.00'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			ROCKY FLATS ALLUVIUM			
				0-3.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); 60% granitic pebbles and cobbles; 40% sand and silt; poorly sorted, unconsolidated; damp.			
				3.0-8.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); granite and quartzite pebbles and cobbles; <5% sand and silt; poorly sorted, unconsolidated; damp.			
	5						
				8.0-10.0'-Cuttings. GRAVEL: Same as above; moist.			
	10			10.0-14.5'-Cuttings. GRAVEL: Same as above; moist.			
	15			14.5-19.0'-Cuttings. BOULDERS: quartzite cobbles and boulders; poorly sorted; unconsolidated; damp.			
	20						

Remarks Logged by: T. Gulliver Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	45-86
Date Drilled	10/2/86	Coordinates	N 37396.4 E 16363.1
Boring Method	Casing Driver	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	20			19.0-23.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); granitic pebbles and cobbles; sandy and silty; poorly sorted; unconsolidated; damp.			
				23.0-25.0'-Cuttings. GRAVEL: Same as above; damp.			
	25			25.0-28.0'-Cuttings. SAND: light olive gray (5Y 5/2); medium to coarse-grained; some granitic pebbles; poorly sorted; subrounded; unconsolidated; damp.			
				28.0-43.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); some silt and sand; poorly sorted; unconsolidated; wet.			
	30						
	35						
	40						

Remarks Logged by: T. Gulliver Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	45-86
Date Drilled	10/2/86	Coordinates	N 37396.4 E 16363.1
Boring Method	Casing Driver	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	40			43.0-47.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); 20-30% sand and silt; poorly sorted; unconsolidated; wet.			
	45			ARAPAHOE FORMATION 47.0-55.0'-Cuttings. SILTSTONE: light olive brown (5Y 5/6); well sorted; damp.			
	50						
	55			TOTAL DEPTH: 55.0'			
	60						

Remarks Logged by: T. Gulliver Checked by:

Project No. 106P06222

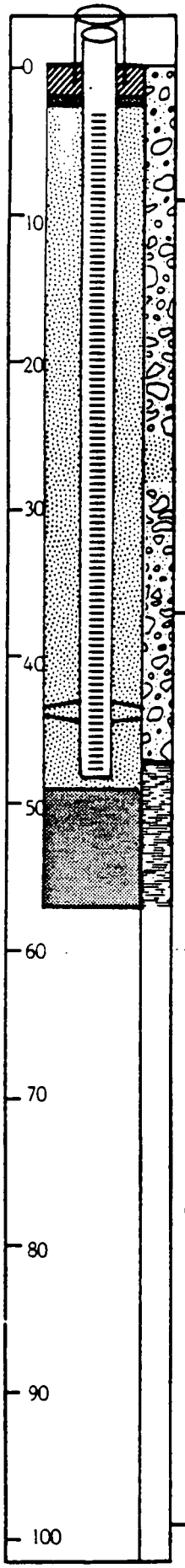
Hydro-Search, Inc.

WELL 45-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 37396.4 E 16363.1

ELEVATION: GROUND LEVEL 6035.00'
TOP OF CASING 6036.97'



LOCATION Golden, CO
PERSONNEL T. Gulliver
PROJECT 106R06222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 48.20' Hole: 57.00'
BOREHOLE DIAMETER 5 5/8"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue, Golden, CO
(Subcontracted Arrow Drilling, Tom High)
RIG Casing Advancer
BIT(S) Down hole hammer

DRILLING FLUID None

SURFACE CASING 5" x 4.5' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

CASING STRING(S): C=CASING S=SCREEN

0.00'	2.99'	C1			
2.99'	48.20'	S1			

CASING: C1 2" I.D. Sch. 5 type 316, stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
43.47' - 44.70'

FILTER MATERIAL 32-42 silica sand
2.48' - 49.30'

CEMENT Portland Type I
0.00' - 1.80'

OTHER 3/8" bentonite pellets
1.80' - 2.48'
49.30' - 57.00'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
5 5/8" casing driver	10/2	0900	10/2	1515
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	10/3	0950	10/3	1000
FILTER PLACEMENT:	10/3	1000	10/3	1600
CEMENTING:	10/3	1605	10/3	1620
DEVELOPMENT:				
OTHER:				
Bentonite	10/3	0935	10/3	0950
	10/3	1600	10/3	1605

WELL DEVELOPMENT

See Well Development Summary Sheet

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 1.97'

Well No.: 45-36

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
10-7-86	0915				1 Well Bore Volume = 4.24 gals. 10 Well Bore Volumes = 42.2 gals.
10-7-86	0915	Airlifted	4.2 gals.	Light to medium spray - lots of sand	7' of sand lifted out before reaching T.D.
10-8-86	1540	Bailed	12 gals.	Medium to dark brown, highly turbid, lots of sand	12/42.4 gals. purged to date
10-9-86	0700	Airlifted	4.2 gals.	Medium to dark brown spray	-----
10-9-86	1500	Bailed	16 gals.	Medium brown, clearing slightly	28/42.4 gals. purged to date
10-10-86	1410	Bailed	16 gals.	Bottom 3' - light brown, rest of well med. brown	44/42.4 gals. purged to date
10-14-86	1200	Bailed	12 gals.	Light to medium brown	56/42.4 gals. purged to date
10-15-86	0830	Airlifted	---	Medium brown mist - sandy	-----
10-15-86	1400	Bailed	25 gals.	Medium brown, clearing	81/42.4 gals. purged to date
10-16-86	1200	Bailed	---	Clear	Sampled

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SHEET ____ of ____

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____

DEPT _____ DATE _____

WELL 45-86

Hydraulic Conductivity (cm/sec) = 2.1×10^{-5}

Static Water Level (ft below G.L.) = 22.01'

Screened Interval (ft below G.L.) = 2.99' - 48.20'

2.99 - 25.0 gravel

25.0 - 28.0 sand

28.0 - 47.0 gravel

47.0 - 48.20 siltstone

Method of Analysis: (Bouwer, 1978)

RAW DATA

WELL # 45-86

WELL DIAMETER= 5.63 INCHES
CASING DIAMETER= 2.00 INCHES
VOLUME OF WATER= 1.53 GALLONS*
LENGTH OF AQUIFER TESTED= 26.19 FEET
VALUE OF HO= 9.36 FEET
STATIC WATER LEVEL= 22.01 FEET
LENGTH OF SCREEN= 45.21 FEET
WATER TABLE TO BOTTOM OF WELL= 26.19 FEET

* No water recovered from well. Volume of 1.53 gallon back calculated from initial reported residual drawdown (9.36 ft) at t = 6.5 min.

SLUG TEST DATA:

TIME	WATER LEVEL (FEET)	TIME SINCE TEST BEGAN (MINUTES)
0. 6.18	31.37	6.30
0. 6.48	29.62	6.80
0. 7. 0	28.90	7.00
0. 7.30	28.03	7.50
0. 8. 0	27.43	8.00
0. 8.30	27.10	8.50
0. 9. 0	26.72	9.00
0. 9.30	26.34	9.50
0.10. 0	25.97	10.00
0.10.30	25.58	10.50
0.11. 0	25.27	11.00
0.11.30	25.00	11.50
0.12.30	24.73	12.50
0.13.30	24.45	13.50
0.14.30	24.16	14.50
0.15.30	23.97	15.50
0.16.30	23.63	16.50
0.17.30	23.43	17.50
0.18.30	23.25	18.50
0.19.30	23.08	19.50
0.20.30	22.98	20.50

WELL # 45-86

WELL DIAMETER= 5.63 INCHES
CASING DIAMETER= 2.00 INCHES
VOLUME OF WATER REMOVED OR ADDED TO WELL= 1.53 GALLONS
LENGTH OF AQUIFER TESTED= 26.19 FEET
VALUE OF HO= 9.36 FEET
STATIC WATER LEVEL= 22.01 FEET

SLUG TEST DATA:

TIME SINCE TEST BEGAN (MINUTES)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	HEAD RATIO	RECIPROCAL TIME (1/MINUTES)
6.30	31.37	9.36	1.000	.159
6.80	29.62	7.61	.813	.147
7.00	28.90	6.89	.736	.143
7.50	28.03	6.02	.643	.133
8.00	27.43	5.42	.579	.125
8.50	27.10	5.09	.544	.118
9.00	26.72	4.71	.503	.111
9.50	26.34	4.33	.463	.105
10.00	25.97	3.96	.423	.100
10.50	25.58	3.57	.381	.095
11.00	25.27	3.26	.348	.091
11.50	25.00	2.99	.319	.087
12.50	24.73	2.72	.291	.080
13.50	24.45	2.44	.261	.074
14.50	24.16	2.15	.230	.069
15.50	23.97	1.96	.209	.065
16.50	23.63	1.62	.173	.061
17.50	23.43	1.42	.152	.057
18.50	23.25	1.24	.132	.054
19.50	23.08	1.07	.114	.051
20.50	22.98	.97	.104	.049

```
WELL # 45-86

--------------------

PERMEABILITY BASED ON COOPER, BREDEHOEFT, AND PAPADOPULOS METHOD

          PERMEABILITY=1.35E-04/ MATCH TIME (IN MINUTES)
          STORAGE COEF=  .13     * ALPHA
     COMPUTER CALCULATES
          ALPHA=1.00E-05 MATCH TIME=  3.5
          PERMEABILITY= 3.88E-05 CM/SEC
          STORAGE COEF=1.26E-06
          CORRELATION NUMBER=    .99

--------------------

PERMEABILITY BASED ON REGRESSION FIT OF HEAD RATIO DATA

          HVORSLEV PERMEABILITY=3.18E-04 / LAG TIME
          BOUWER PERMEABILTY=3.35E-04 * -SLOPE

     COMPUTER CALCULATES
          HVORSLEV PERMEABILITY=2.83E-05 CM/SEC
          BOUWER PERMEABILITY=2.09E-05 CM/SEC
               REGRESSION STATISTICS
                    X ON Y
                      INTERCEPT=  .27
                      SLOPE=-6.22E-02
                    Y ON X
                      INTERCEPT=  .27
                      SLOPE=-6.28E-02
                    CORRELATION COEFFICIENT=-1.00
     CALCULATIONS INDICATE THAT A VALUE OF  49.03 FEET FOR HO
          OR A VALUE OF     .874 INCHES FOR EFFECTIVE CASING DIA.
          MAY YIELD BETTER RESULTS

--------------------

PERMEABILITY BASED ON REGRESSION FIT OF DATA - FERRIS & KNOWLES MET

          PERMEABILITY=3.15E-04 / SLOPE
          PERMEABILITY=4.61E-06 CM/SEC
               REGRESSION STATISTICS
                    X ON Y
                      INTERCEPT=-2.60
                      SLOPE= 6.76E+01
                    Y ON X
                      INTERCEPT=-2.76
               SLOPE= 6.93E+01
                    CORRELATION COEFFICIENT=  .99
```

WELL #	PERMEABILITY METHOD 1	PERMEABILITY METHOD 2	STORAGE COEF METHOD 2	PERMEABILITY METHOD 3	PERMEABILI METHOD 4
45-86	2.83E-05	3.88E-05	1.26E-06	4.61E-06	2.09E-05

* METHOD 1 IS HVORSLEV
METHOD 2 IS COOPER, BREDEHOEFT, AND PAPADOPULOS
METHOD 3 IS FERRIS AND KNOWLES
METHOD 4 IS BOUWER

AQUIFER TEST DATA

WELL 45-86
PUMPING or OBSERVATION WELL
PUMPING or RECOVERY DATA
PAGE 1 OF 1

TYPE OF AQUIFER TEST Airlift Recovery Test
HOW Q MEASURED 4 1/2 Gallon Bucket
HOW W.L.'s MEASURED Olympic Well Probe
RAD./DIST. OF/FROM PUMPING WELL —
MEAS. POINT FOR W.L.'s top of PVC
ELEVATION OF MEAS. POINT —

DEPTH OF PUMP/AIRPIPE
PUMP ON: date 10-22-86 time 15:08:3
PUMP OFF: date 10-22-86 time 15:14:c
DURATION OF AQUIFER TEST 20.5 minutes

TIME t = 5:30 at t' = 0				WATER LEVEL DATA STATIC WATER LEVEL 22.01'					DISCHARGE		RECORDED BY	COMMENTS
DAY	CLOCK TIME	t	t'	READING	CONVERSIONS OR CORRECTIONS	WATER LEVEL	s or s'		READING	Q		
	1502			20+2.95	1.94	22.01	—				OP	STATIC
												TD @ 50 ft.
	1502	30 Ø										3 times Surged 2 hr.
	1514	5.5	Ø		2.48 NA							Stop Air lift
	1514:45	6	.25	.75	30+3.85	1.94+0.54	31.37	9.36				
	1515:	13	6.75	1.25	30+2.10	"	29.62	7.61				No water
	30	7.0	1.5		30+1.38	"	28.90	6.89				come out of
	1516	7.5	2		30+0.51	"	28.03	6.02				[illegible]
	30	8.0	2.5		25+4.91	2.48	27.43	5.42				[illegible]
	1517	8.5	3		25+4.58	"	27.10	5.09				[illegible]
	30	9.0	3.5		25+4.20	"	26.72	4.71				[illegible]
	1518	9.5	4		25+3.92	"	26.34	4.33				
	30	10.0	4.5		25+3.35	"	25.87	3.86				
	1519	10.5	5		25+3.06		25.58	3.57				
	30	11.0	5.5		25+2.75		25.27	3.26				
	1520	11.5	6		25+2.48		25.00	2.99				
	1521	12.5	7		25+2.21		24.73	2.72				
	1522	13.5	8		25+1.93		24.45	2.44				
	1523	14.5	9		25+1.64		24.16	2.15				
	1524	15.5	10		25+1.35		23.87	1.86				90% @ 20.5
	1525	16.5	11		25+1.11		23.63	1.62				
	1526	17.5	12		25+0.91		23.43	1.42				
	1527	18.5	13		25+0.73		23.25	1.24				
	1529	19.5	14		25+0.56		23.08	1.07				
	1529	20.5	15		25+0.46		22.98	0.97				Stop Test

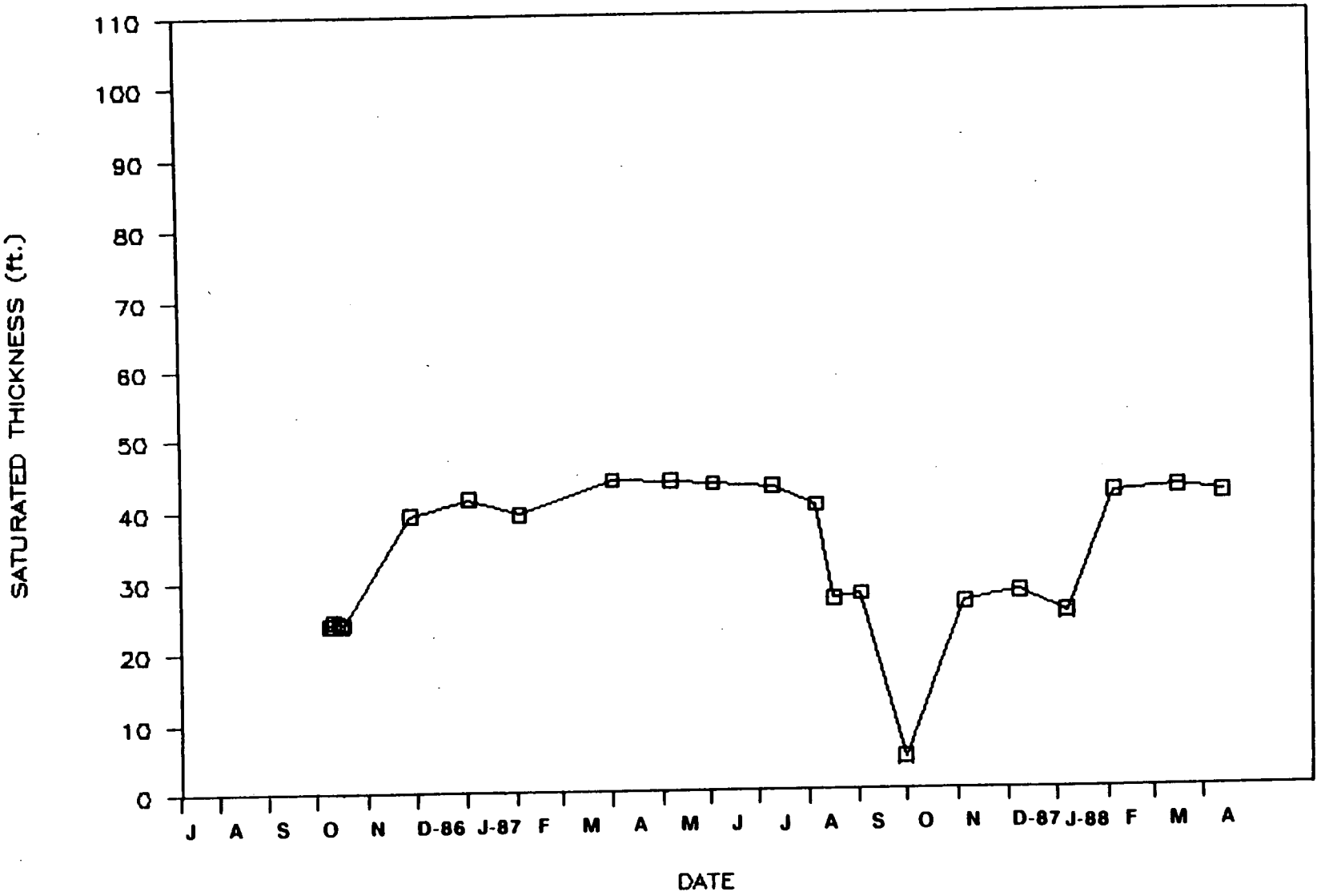
LOCATION
PERSONNEL
PROJECT

ROCKY FLATS SOLAR PONDS

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
4586	10/07/86	6035.00	6036.97	1.97	48.20	24.15	6012.82
	10/08/86					24.15	6012.82
	10/10/86					23.62	6013.35
	10/13/86					23.81	6013.16
	10/15/86					24.13	6012.84
	10/16/86					24.05	6012.92
	11/26/86					9.03	6027.94
	01/01/87					6.75	6030.22
	02/01/87					8.90	6028.07
	03/31/87					4.31	6032.66
	05/06/87					4.52	6032.45
	06/01/87					4.83	6032.14
	07/08/87					5.35	6031.62
	08/03/87					8.00	6028.97
	08/14/87					21.10	6015.87
	08/31/87					20.40	6016.57
	09/28/87					43.50	5993.47
	11/03/87					21.60	6015.37
	12/07/87					20.20	6016.77
	01/05/88					23.10	6013.87
	02/03/88					6.50	6030.47
	03/14/88					5.80	6031.17
	04/11/88					6.70	6030.27

SATURATED THICKNESS IN WELL # 45-86



APPENDIX B-2

1987 MONITOR WELLS

INDEX OF DATA

Boring No.: 40-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area
Coordinates N 40158.03 E 21727.76
Total Depth 13.0'

Borehole/Well No. 40-87
Ground Surface Elevation 5882.69'
Water Level Encountered None
Static 3.30' (4/11/88)

Drilling Company Boyles Bros.
Date Drilled June 8, 1987
Drilling Method Hollow Stem Auger
Logged By J. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**TOPSOIL** 0.0-2.0' SAMPLE. Recovered 0.6/2.0' = 30%. TOP SOIL: dark yellowish brown (10 YR 4/2); clayey; abundant roots and grasses; few moderate brown (5 YR 4/4) colorations; 2 gray quartzite pebbles; moist.	HNu background=0.2. OVA background=15. No readings above background.
5			**VALLEY FILL** 2.0-4.0' SAMPLE. Recovered 0.0/2.0' = 0%. No recovery due to rocks. Rock sound stopped at approximately 6'. 4.0-8.0' SAMPLE. Recovered 3.5/4.0' = 88%. 4.0-6.2': GRAVEL AND CLAY: moderate yellowish brown (10 YR 5/4) clay; abundant gray quartzite pebbles and cobbles; angular, unsorted.	
10			**ARAPAHOE FORMATION** 6.2-7.5': CLAYSTONE: moderate yellowish brown (10 YR 5/4); few pale brown (5 YR 5/2) mottles; abundant caliche; strongly effervesces in HCl; organic rich; sandy (patches of sand throughout 6.5-7.5'); weathered; damp.	
15				
20				

LOG OF BOREHOLE

Location- Rocky Flats Plant; Landfill Area
Coordinates N 40158.03 E 21727.76
Total Depth 13.0'

Borehole Well No. 40-87
Ground Surface Elevation 5882.69'
Water Level Encountered None
Static 3.30' (4/11/88)

Drilling Company Boyles Bros.
Date Drilled June 8, 1987
Drilling Method Hollow Stem Auger
Logged By J. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			8.0-10.5' SAMPLE. Recovered 3.0/2.5' = 120%. CLAYSTONE: grayish brown (5 YR 3/2); abundant light brown (5 YR 5/6) mottles and FeO concretions; abundant black organic fragments; sandy patches yellowish gray (5 Y 7/2) very fine-grained; weathered; silty; abundant caliche; moist.	
			10.5-13.0' SAMPLE. Recovered 3.2/2.5' = 124%. CLAYSTONE: dark yellowish brown (10 YR 6/2); sandy; few dark yellowish orange (10 YR 6/6) mottles at 11.5'; abundant black organic fragments in top 0.5'; decrease in sand content to less than 20% over 12.0-13.0'; weathered; damp.	
			TOTAL DEPTH: 13.0'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 40-87

Coordinates N 40158.03 E 21727.76

Elevation: Ground Surface 5882.69'

Total Depth: Well 6.70'

Top of Casing 5884.69'

Borehole 13.00'

Formation of Completion Valley Fill Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed June 9, 1987

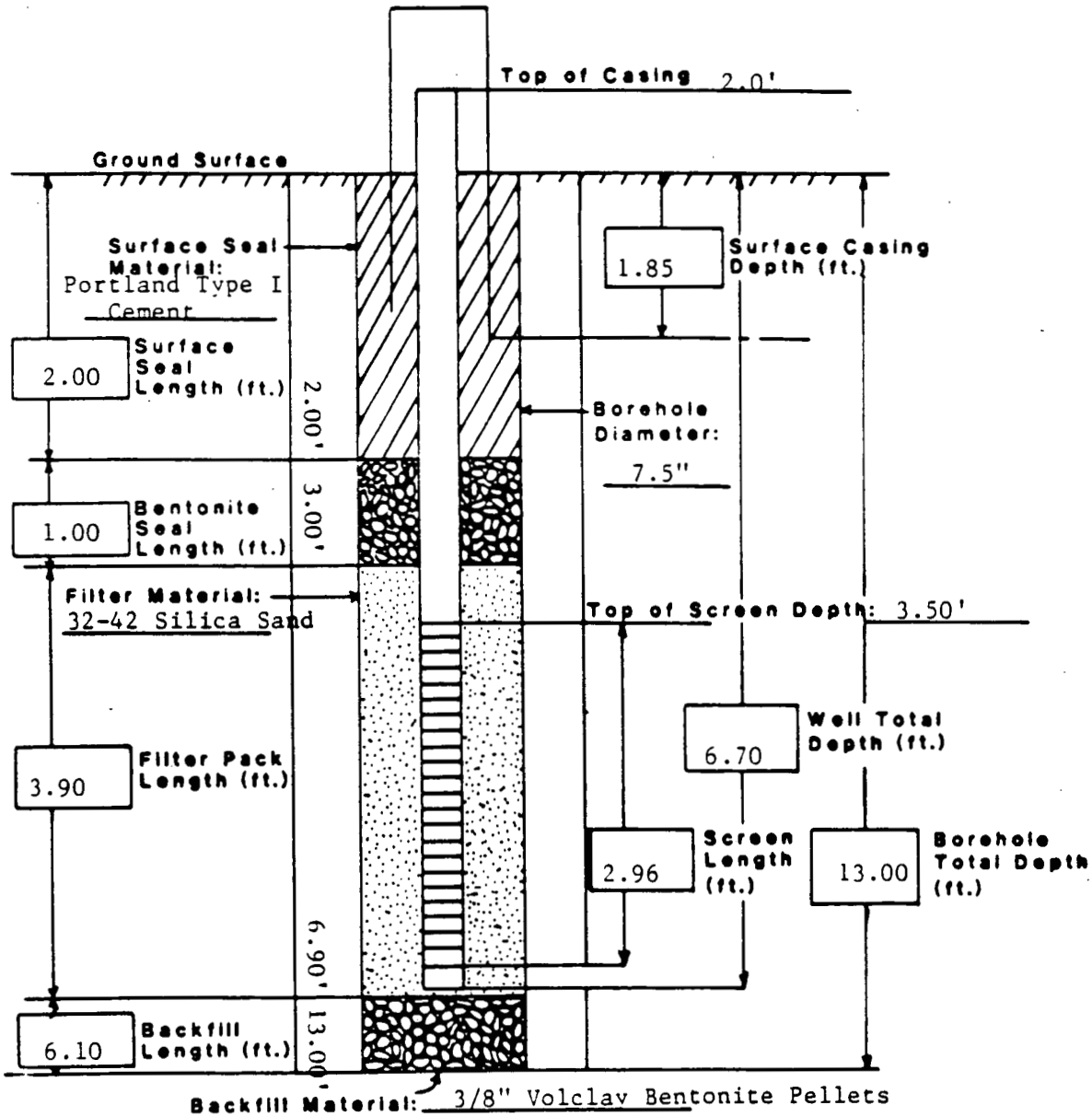
Approved By

Site Manager

Installed By J. Bergman
Geologist

CEARP Manager

Comments Centralizer at 3.96-5.15'

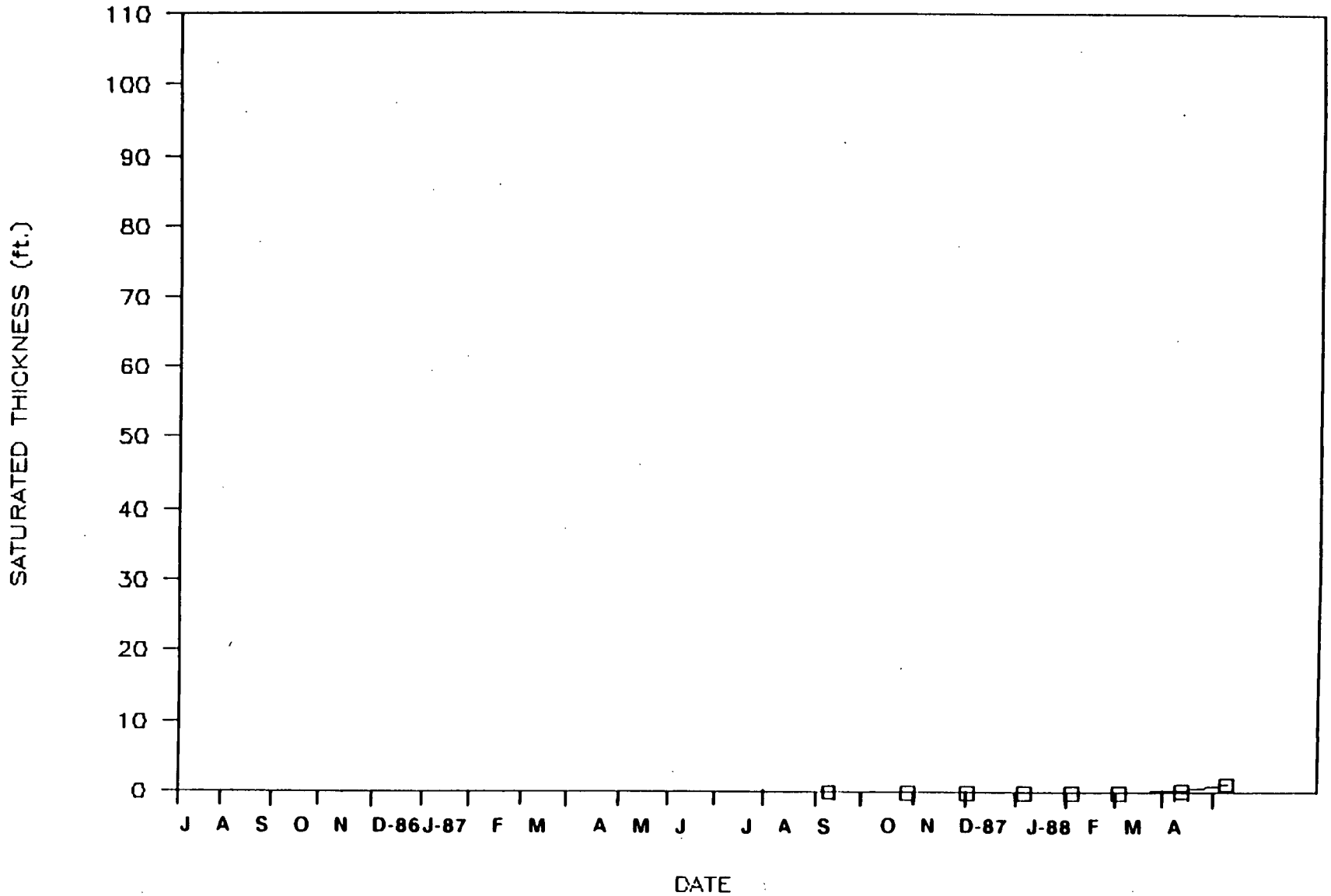


ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
4087	08/10/87	5882.69	5884.69	2.00	6.46	-1.00	DRY
	09/28/87					-1.00	DRY
	11/03/87					8.00	5876.69
	12/08/87					8.00	5876.69
	01/06/88					7.60	5877.09
	02/04/88					7.50	5877.19
	03/14/88					6.20	5878.49
	04/11/88					5.30	5879.39

SATURATED THICKNESS IN WELL # 40-87



INDEX OF DATA

Boring No.: 41-87BR

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

X Hydraulic Conductivity Test Data and Results

X Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40133.61 E 21725.75
Total Depth: 110.00'

Borehole/Well No.: 41-87BR
Ground Surface Elevation: 5882.78'
Water Level Encountered: None
Static: 41.83' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: June 9 and July 28-29, 1987
Drilling Method: 0.0' - 17.0' Hollow Stem Auger; 17.0' - 110.0' NC Core
Logged By: J. Bergman; K.D. Holliway
Geologist

Driller: R. Sharp/ P. Bushkovski
Helper: T. Merritt/ K. Parker
Drilling Fluid: 0.0'-17.0' None; 17.0'-110.0' Water
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: Surface casing set June 9, 1987 to 17.0 feet by J. Bergman

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**VALLEY FILL ALLUVIUM** 0-2.0' SAMPLE. Recovered 1.3/2.0' = 65%. CLAY: dusky brown (5 YR 2/2) abundant roots and grasses; abundant gray quartzite pebbles and cobbles; trace light brown (5 YR 5/6) stains; damp to moist.	HNu background = 0.2. OVA background = 15. No readings above background.
5			2.0-4.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY: pale yellowish brown (10 YR 6/2); abundant gray quartzite pebbles and cobbles; caliche in last 2"; trace light brown (5 YR 6/4) mottles; moist.	
10			4.0-7.0' SAMPLE. Recovered 3.0/3.0' = 100%. 4.0-4.5': CLAY: pale brown (5 YR 5/2); abundant light brown (5 YR 5/6) mottles; quartzite gravels; some caliche; damp.	
			ARAPAHOE FORMATION 4.5-7.0': CLAYSTONE: pale brown (5 YR 5/2); no cobbles; abundant light brown (5 YR 5/6) mottles; abundant organics; damp.	
15			7.0-9.5' SAMPLE. Recovered 2.5/2.5' = 100%. CLAYSTONE: pale brown (5 YR 5/2); abundant light brown (5 YR 5/6) mottles; consolidated; weathered; some caliche; abundant organics and FeO concretions; silty in bottom 0.5'; slightly damp.	
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant: Landfill Area
Borehole/Well No.: 41-87BR (con't.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			9.5-12.0' SAMPLE. Recovered 2.4/2.5' = 96%. CLAYSTONE: pale yellowish brown (10 YR 6/2); few dark yellowish orange (10 YR 6/6) mottles; organic-rich; silty layer @ 11.0'; few fractures; weathered; damp.	20.85-30.50': Packer Test Interval # 8.
			12.0-14.5' SAMPLE. Recovered 2.8/2.5' = 115%. 12.0-12.2: same as above. 12.2-14.5': CLAYSTONE: moderate olive brown (5 Y 4/4); no mottles; few organics; consolidated; unweathered; slightly damp.	22.85-32.50': Packer Test Interval # 7, failed.
25			14.5-17.0' SAMPLE. Recovered 3.7/2.5' = 148%. CLAYSTONE: same as above but silty.	
30			15.7-18.5' SAMPLE. Recovered 1.3' rubber plug.	32.50-42.15': Packer Test Interval # 6.
			18.5-21.5' SAMPLE. Recovered 0.6/3.0 = 20%. CLAYSTONE: light olive gray (5 Y 5/2); trace silt; trace very fine-grained sand; trace iron staining in small fractures; indurated; weathered; damp.	
35			21.5-25.0' SAMPLE. Recovered 3.0/3.5' = 86%. CLAYSTONE: same as above, but more fractures; dark yellowish orange (10 YR 6/6) staining in fractures; damp.	
40				

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area
Borehole/Well No. 41-87BR (con't.)
Coordinates _____
Ground Surface Elevation _____
Total Depth _____
Water Level Encountered _____
Static _____
Drilling Company _____
Driller _____
Date Drilled _____
Helper _____
Drilling Method _____
Drilling Fluid _____
Logged By _____ Geologist
Checked By _____ Site Manager
_____ CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			25.0-28.5' SAMPLE. Recovered 2.15/3.5 = 61.5%. 25.0-25.8': CLAYSTONE: same as above. 25-8-27.15': CLAYSTONE: dusky yellowish brown (10 YR 2/2); unweathered; indurated; trace very fine-grained sand; trace dark yellowish orange (10 YR 6/6) iron staining; slightly damp.	41.55-51.20': Packer Test Interval # 5.
45			28.5-32.5' SAMPLE. Recovered 0.7/4.0' = 18%. CLAYSTONE: olive black (5 Y 2/1); same as above; damp.	
50			32.5-35.0' SAMPLE. Recovered 5.2/2.5 - 208%. SANDSTONE: olive black (5 Y 2/1); very fine-grained; well sorted; consolidated; indurated; possible plant fossils from 33.5-35.0'; some clay and silt; slightly damp.	53.05-62.70': Packer Test Interval # 4.
55			35.0-38.5' SAMPLE. Recovered 3.2/3.5 = 91%. SANDSTONE: olive black (5 Y 2/1); 3.5-4.0 Ø and finer-grained; fairly well sorted; consolidated; trace clay; some silt; possible plant fossils and imprints; slightly damp.	
60			38.5-43.0' SAMPLE. Recovered 4.3/4.5' = 96%. SANDSTONE: same as above, but less clay and fewer possible fossils.	

LOG OF BOREHOLE

Location: Rocky Flats Plant: Landfill Area

Borehole/Well No. 41-87BR (con't.)

Coordinates _____

Ground Surface Elevation _____

Total Depth _____

Water Level Encountered _____

Static _____

Drilling Company _____

Driller _____

Date Drilled _____

Helper _____

Drilling Method _____

Drilling Fluid _____

Logged By _____ Geologist

Checked By _____ Site Manager

_____ CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
60			43.0-47.5 SAMPLE. Recovered 1.9/4.5' = 42%. 43.0-44.1': SANDSTONE: same as above, but increased clay. 44.1-44.9' SANDSTONE: light gray (N 7/0) to trace olive black (5 Y 2/1); 3.5-4.0 phi to very fine-grained; fracture with black slightly glossy organics at 44.5'.	62.70-72.35': Packer Test Interval # 3.
65			47.5-50.5' SAMPLE. Recovered 1.9/3.0' = 63%. SANDSTONE: olive black (5 Y 2/1); 3.4-4.0 Ø and smaller; few organics; trace clay; slightly damp.	
70			50.5-53.0' SAMPLE. Recovered 2.5/2.5' = 100%. SANDSTONE: olive black (5 Y 2/1); some clay; some silt; becoming claystone with silt and sand from 51.2-52.3' and 52.4-53.0'; damp.	72.35-82.00': Packer Test Interval # 2.
			53.0-57.0' SAMPLE. Recovered 3.2/4.0' = 80%. CLAYSTONE: medium dark gray (N 4/0); trace very fine-grained sand; dry.	
75			57.0-61.0' SAMPLE. Recovered 0.9/4.0' = 23%. RQD = 0/4.0 = 0%. CLAYSTONE: dark gray (N 3/0); indurated; trace silt; damp.	
80				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Borehole/Well No.: 41-87BR (con't.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
80			61.0-63.0' SAMPLE. Recovered 5.0/2.0' = 250%. RQD = 4.48/5.0 = 89.6%. CLAYSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); trace silt; upper 3' mottled; damp.	82.0-91.65': Packer Test Interval # 1.
85			63.0-67.0' SAMPLE. Recovered 4.0/4.0 = 100%. RQD = 3.07/4.0 = 76.8%. 63.0-64.7': CLAYSTONE: dark gray (N 3/0) to dusky yellowish brown (10 YR 2/2): very fine-grained; trace silt; some plant leaf and stem fossils; damp. 64.7-67.0': SANDSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); sand grades from very fine to 3.5-3.0 phi to 2.5-2.0 phi prominent at 66.50 to 67.0'; subangular to subrounded; fairly well sorted; some organics present to 66.50', then decreasing; some to no clays; damp to slightly moist.	
90			67.0-71.0' SAMPLE. Recovered 4.0/4.0 = 100%. RQD = 3.61/4.0 = 90.25%. 67.0-68.35': SANDSTONE: medium light gray (N 6/0); 2.0-3.0 phi; subrounded to subangular; fairly well sorted; trace clay; some silt; damp to slightly moist.	
95			68.35-68.85': SANDSTONE: same as above but olive black (5 Y 2/1); 3.5-4.0 phi some clay; some silt; lens of clay and plant organics (fossils) from 68.35-68.45'; damp. 68.85-70.25': SANDSTONE: same as above; moist.	
100				

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area
Borehole/Well No. 41-87BR (con't.)
Coordinates _____
Ground Surface Elevation _____
Total Depth _____
Water Level Encountered _____
Static _____

Drilling Company _____
Driller _____
Date Drilled _____
Helper _____
Drilling Method _____
Drilling Fluid _____
Logged By _____ Geologist
Checked By _____ Site Manager
_____ CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
100			70.25-71.0': SANDSTONE: olive black (5 Y 2/1) to medium dark gray (N 4/0); some organics; clay; 3.5-4.0 phi and very fine-grained. 71.0-73.5' SAMPLE. Recovered 0.0/2.5 = 0%.	
105			73.5-75.0' SAMPLE. Recovered 2.3/1.5' = 153%. RQD = 1.6/2.3 = 69.56%. CLAYSTONE AND SANDSTONE: medium dark gray (N 5/0) to dark gray (N 3/0); very fine-grained sand; occasional fossils (plant leaves and stems); some silt; damp.	
110			75.0-79.0' SAMPLE. Recovered 3.3/4.0' = 82.5%. RQD = 2.4/3.3' = 72.7%. CLAYSTONE: medium dark gray (N 5/0) to olive black (5 Y 2/1); very fine-grained sand; occasional fossils (plant leaves and stems), also a marine fossil at 76.0'; damp.	
115			79.0-82.0' SAMPLE. Recovered 3.0/3.0' = 100%. RQD = 2.20/3.0 = 73.3%. 79.0-79.6': CLAYSTONE: same as above; damp. 79.6-82.0': SANDSTONE; medium dark gray (N 5/0) to dark gray (N 3/0); trace clay; small lenses of claystone; sand 2.5-2.0 phi; fairly well sorted; damp.	
120				

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Borehole, Well No. 41-87BR (con't.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			82.0-86.0' SAMPLE. Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. SANDSTONE: same as above except less clay; subangular to subrounded sand; occasional organics (plant fossils) throughout; damp to slightly moist.	
			86.0-90.0' SAMPLE. Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. SANDSTONE: medium dark gray (N 5/0) to dark gray (N 3/0); 1.0-2.0 phi (fine to very fine); fairly well sorted, subrounded, mostly quartzose, trace feldspathic; occasional fossils (plant leaves and stems); damp to slightly moist.	
			90.0-94.0' SAMPLE. Recovered 3.56/4.0' = 90%. RQD 3.3/3.6 = 91.67%. SANDSTONE: same as above; damp to slightly moist.	
			94.0-98.0' SAMPLE. Recovered 4.4/4.0 = 110%. RQD = 4.24/4.4 = 96.36%. 94.0-96.5': CLAYSTONE, SANDSTONE AND SILTSTONE: same as above but very fine-grained sand; damp. 96.5-98.0: SANDSTONE: same as above, except fine-grained; damp.	

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Coordinates

Total Depth

Drilling Company

Date Drilled

Drilling Method

Logged By

Geologist

Borehole/Well No. 41-87ER (con't.)

Ground Surface Elevation

Water Level Encountered

Static

Driller

Helper

Drilling Fluid

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			98.0-102.0' SAMPLE. Recovered 3.0/4.0' = 75%. RQD = 2.97/3.0 = 99%. 98.0-101.0': SANDSTONE: same as above; damp. 101.0-102.0': CLAYSTONE, SANDSTONE, SILTSTONE: medium dark gray (N 5/0); very fine-grained sand; damp.	
			102.0-106.0' SAMPLE. Recovered 5.0/4.0' = 125%. RQD = 4.0/5.0' = 80%. 102.0-106.0': CLAYSTONE, SANDSTONE, SILTSTONE: medium dark gray (N 5/0) to olive black (5 Y 2/1); very fine-grained sand.	
			106.0-110.0' SAMPLE. Recovered 4.4/4.0' = 110%. RQD = 1.31/4.4' = 42.05%. CLAYSTONE, SANDSTONE, SILTSTONE: same as above, damp.	
			TOTAL DEPTH: 110.0'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 41-87BR

Coordinates N 40133.61 E 21725.75

Elevation: Ground Surface 5882.78'

Total Depth: Well 94.03'

Top of Casing 5884.55'

Borehole 110.00'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed August 3, 1987

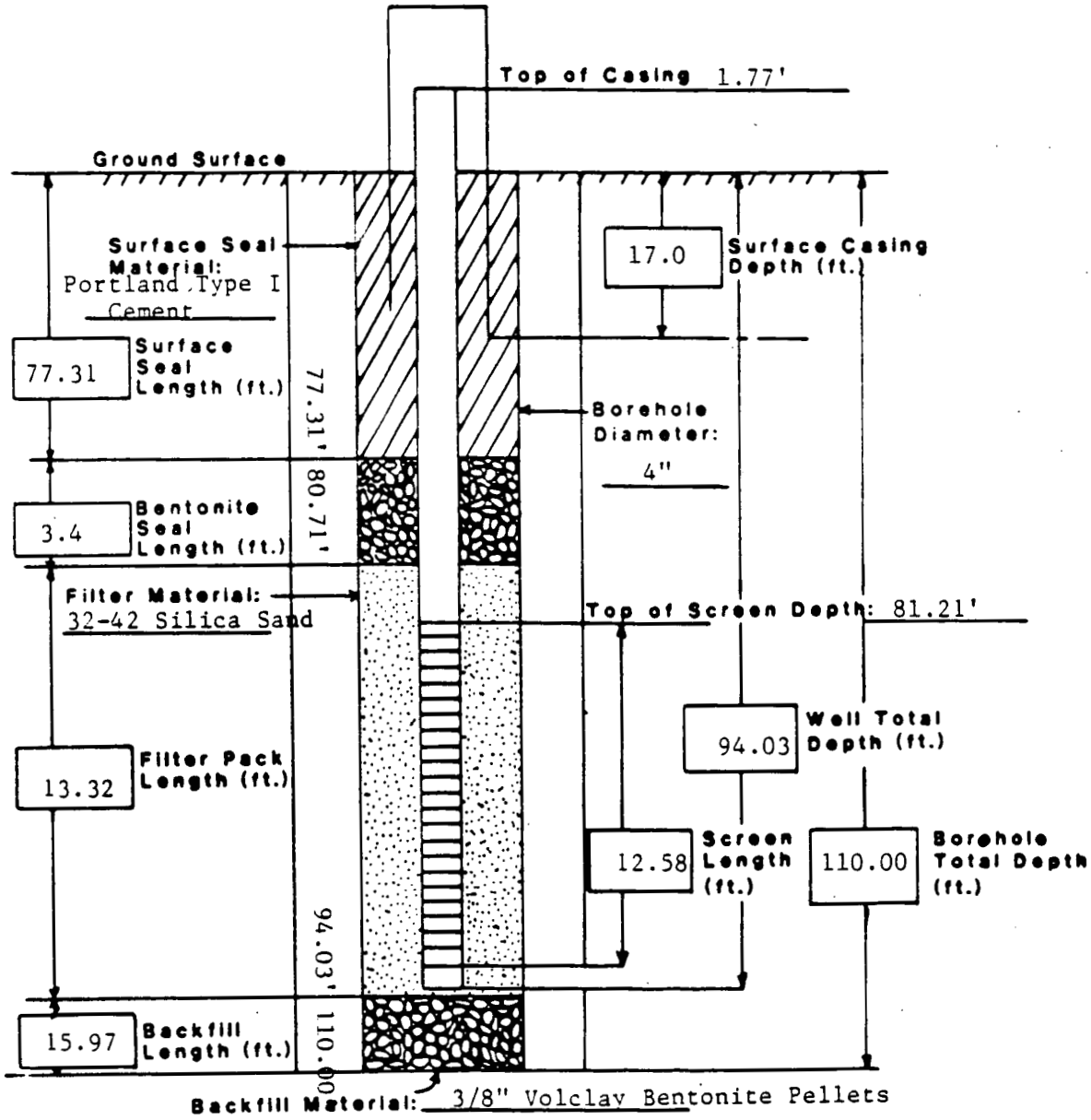
Approved By

Site Manager

Installed By K.D. Holliway
Geologist

CEARP Manager

Comments Surface casing set to 17.0' by J.B. Bergman on June 9, 1987.



PROGRAM SLUGT, VERSION 4,OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87 CLIENT: Rockwell International

SITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-26-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 41-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 4.00 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 12.58 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 52.11 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 100.00 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 17

TIME (sec)	HEAD (FEET)
101.00	1.240
111.00	1.230
141.00	1.230
171.00	1.230
203.00	1.230
233.00	1.230
293.00	1.230
353.00	1.230
413.00	1.230
473.00	1.230
593.00	1.230
773.00	1.230
953.00	1.230
1073.00	1.220
1673.00	1.220
2093.00	1.210
2693.00	1.210

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED VALUES FOR H0 (FEET)

1.2223
1.2249

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = 1.25 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	1.776E-08	1.776E-10	5.171E-09	4.838E-08	2.432522	674.75	.00
1.000E-02	1.000E-02	9.124E-08	9.124E-10	2.970E-08	2.550E-07	2.468993	640.84	33.92
1.000E-03	1.000E-03	2.952E-07	2.952E-09	8.074E-08	8.245E-07	2.519426	693.59	-52.76
1.000E-04	1.000E-04	5.578E-07	5.578E-09	1.389E-07	1.553E-06	2.535838	716.65	-23.05
1.000E-05	1.000E-05	8.239E-07	8.239E-09	1.964E-07	2.291E-06	2.542120	726.59	-9.94
1.000E-06	1.000E-06	1.083E-06	1.083E-08	2.527E-07	3.009E-06	2.544209	731.39	-4.80
1.000E-07	1.000E-07	1.339E-06	1.339E-08	3.080E-07	3.716E-06	2.546218	734.50	-3.11
1.000E-08	1.000E-08	1.590E-06	1.590E-08	3.624E-07	4.412E-06	2.547479	736.52	-2.02
1.000E-09	1.000E-09	1.839E-06	1.839E-08	4.165E-07	5.101E-06	2.547812	737.90	-1.38
1.000E-10	1.000E-10	2.086E-06	2.086E-08	4.702E-07	5.789E-06	2.549436	738.99	-1.09

****

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 7.66E-09 FT/sec = 2.34E-07 CM/sec

TRANSMISSIVITY = 7.66E-07 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 9.05E-09 FT/sec = 2.76E-07 CM/sec

TRANSMISSIVITY = 9.05E-07 FT**2/sec

WELL NO.: 41-97

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES LENGTH OF SCREEN OR INTAKE PORTION = 10.58 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25 FALLING--END INDEX = 0 ('1' IF FALLING,'0' IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 17

TIME (sec	HEAD (FEET)
101.00	1.240
111.00	1.230
141.00	1.230
171.00	1.230
203.00	1.230
233.00	1.230
293.00	1.230
353.00	1.230
413.00	1.230
473.00	1.230
593.00	1.230
773.00	1.230
953.00	1.230
1073.00	1.220
1673.00	1.220
2093.00	1.210
2693.00	1.210

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF 'T' RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	1.140E-06	1.140E-08	1.435E-07	3.081E-06	2.576438	838.30	.00
1.000E-02	1.000E-02	3.510E-06	3.510E-08	4.291E-07	9.613E-06	2.616390	841.96	-3.66
1.000E-03	1.000E-03	6.447E-06	6.447E-08	7.770E-07	1.777E-05	2.635974	843.70	-1.74
1.000E-04	1.000E-04	9.401E-06	9.401E-08	1.126E-06	2.599E-05	2.644392	844.47	-.77
1.000E-05	1.000E-05	1.223E-05	1.223E-07	1.466E-06	3.401E-05	2.649049	844.86	-.39
1.000E-06	1.000E-06	1.512E-05	1.512E-07	1.801E-06	4.183E-05	2.651777	845.10	-.24
1.000E-07	1.000E-07	1.791E-05	1.791E-07	2.131E-06	4.965E-05	2.653473	845.25	-.15
1.000E-08	1.000E-08	2.067E-05	2.067E-07	2.457E-06	5.734E-05	2.654779	845.36	-.11
1.000E-09	1.000E-09	2.342E-05	2.342E-07	2.782E-06	6.498E-05	2.655632	845.45	-.09

PACKER TEST ANALYSIS
WELL NO. 41-87BR
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 2029-17-02
DATE TESTED: 7/31/87 BY: KD HOLLIWAY
TEST INTERVAL (FEET BELOW G.S.): 20.85 - 30.50
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 41.83

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00055026 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 25.67 + 7.43 + .00 * 2.31 = 33.10
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000111 FT/MIN
K = .00000057 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00188246 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 25.67 + 5.70 + 2.60 * 2.31 = 37.38
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000337 FT/MIN
K = .00000171 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00098467 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 25.67 + 8.09 + .00 * 2.31 = 33.76
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000195 FT/MIN
K = .00000099 CM/SEC

PACKER TEST ANALYSIS
WELL NO. 41-87BR
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 2029-17-02
DATE TESTED: 7/31/87 BY: KD HOLLIWAY
TEST INTERVAL (FEET BELOW G.S.): 32.50 - 42.15
MATERIAL TESTED: ARAPAHOE SANDSTONE
DEPTH TO WATER (FEET BELOW G.S.): 41.83

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00049234 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 37.33 + 10.19 + .00 * 2.31 = 47.51
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000069 FT/MIN
K = .00000035 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00015205 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 37.33 + 5.70 + 4.80 * 2.31 = 54.11
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000019 FT/MIN
K = .00000010 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00001448 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 37.33 + 9.11 + .00 * 2.31 = 46.44
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000002 FT/MIN
K = .00000001 CM/SEC

PACKER TEST ANALYSIS
WELL NO. 41-87BR
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 2029-17-02
DATE TESTED: 7/31/87 BY: KD HOLLIWAY
TEST INTERVAL (FEET BELOW G.S.): 41.55 - 51.20
MATERIAL TESTED: ARAPAHOE SANDSTONE
DEPTH TO WATER (FEET BELOW G.S.): 41.83

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00149149 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 46.38 + 9.84 + .00 * 2.31 = 56.22
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000178 FT/MIN
K = .00000090 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00489440 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 46.38 + 5.70 + 6.80 * 2.31 = 67.78
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000483 FT/MIN
K = .00000246 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00283817 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS ABOVE WATER TABLE
HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 46.38 + 8.76 + .00 * 2.31 = 55.14
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000345 FT/MIN
K = .00000175 CM/SEC

PACKER TEST ANALYSIS
WELL NO. 41-87BR
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 2029-17-02
DATE TESTED: 7/30/87 BY: KD HOLLIWAY
TEST INTERVAL (FEET BELOW G.S.): 53.05 - 62.70
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 41.83

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00030409 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 9.57 + .00 * 2.31 = 51.40
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000040 FT/MIN
K = .00000020 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00078195 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 5.70 + 9.07 * 2.31 = 68.48
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000076 FT/MIN
K = .00000039 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00014480 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 9.37 + .00 * 2.31 = 51.20
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000019 FT/MIN
K = .00000010 CM/SEC

PACKER TEST ANALYSIS
WELL NO. 41-87BR
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 2029-17-02
DATE TESTED: 7/30/87 BY: KD HOLLIWAY
TEST INTERVAL (FEET BELOW G.S.): 62.70 - 72.35
MATERIAL TESTED: ARAPAHOE SANDSTONE
DEPTH TO WATER (FEET BELOW G.S.): 41.83

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00065162 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 11.47 + .00 * 2.31 = 53.30
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000082 FT/MIN
K = .00000042 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00146253 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 5.70 + 11.87 * 2.31 = 74.95
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000131 FT/MIN
K = .00000066 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00026065 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 10.20 + .00 * 2.31 = 52.03
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000034 FT/MIN
K = .00000017 CM/SEC

PACKER TEST ANALYSIS
WELL NO. 41-87BR
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 2029-17-02
DATE TESTED: 7/30/87 BY: KD HOLLIWAY
TEST INTERVAL (FEET BELOW G.S.): 72.35 - 82.00
MATERIAL TESTED: ARAPAHOE CLAYSTONE
DEPTH TO WATER (FEET BELOW G.S.): 41.83

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00141909 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 11.23 + .00 * 2.31 = 53.06
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000179 FT/MIN
K = .00000091 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00608180 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 5.70 + 14.20 * 2.31 = 80.33
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000507 FT/MIN
K = .00000258 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 8.88 + .00 * 2.31 = 50.71
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
K = .00000000 CM/SEC

NOTE: NO WATER GAIN OR LOSS IN INJECTION TUBE;
Q=0

PACKER TEST ANALYSIS
WELL NO. 41-87BR
ROCKY FLATS PLANT; LANDFILL AREA JOB NO. 2029-17-02
DATE TESTED: 7/30/87 BY: KD HOLLIWAY
TEST INTERVAL (FEET BELOW G.S.): 82.00 - 91.65
MATERIAL TESTED: ARAPAHOE SANDSTONE
DEPTH TO WATER (FEET BELOW G.S.): 41.83

$$K = \frac{Q}{2(PI)(L)(H)} LN\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00086883 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 9.65 + .00 * 2.31 = 51.48
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000113 FT/MIN
K = .00000057 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00011584 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 5.70 + 16.50 * 2.31 = 85.65
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000009 FT/MIN
K = .00000005 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET3/MIN)
L = LENGTH OF TEST INTERVAL = 9.65 FEET
TEST INTERVAL IS BELOW WATER TABLE
HEAD = DEPTH TO WATER + GAGE HEIGHT
+ GAGE PRESSURE (IN FEET)
= 41.83 + 9.16 + .00 * 2.31 = 50.99
R = BOREHOLE RADIUS = .17 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
K = .00000000 CM/SEC

NOTE: NO WATER GAIN OR LOSS IN INJECTION TUBE;
Q=0

PACKER TEST DATA SHEET

Job No.: 2029-17-02

Location: Rocky Flats Plant; Landfill Area

Well No.: 41-87BR

Borehole Diameter: 0.333'

Acrylic Tube Diameter: 0.1663'

Static Water Level: 41.83'

Date of Water Level: 4/11/88

Page 1 of 2

Comments: Interval #7 (22.85 - 32.50') failed

Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H_2O Height	Gage Height +Avg. H_2O Height	Δh	Date of Test	Lithology	Geologist
1	82.00	91.65	15	0	5.70	3.95	9.65	0.60	7/30/87	Kass	KDH
			15	16.5	5.70	-	5.70	0.08	7/30/87	Kass	KDH
			15	0	5.70	3.46	9.16	0.00	7/30/87	Kass	KDH
2	72.35	82.00	15	0	5.70	5.53	11.23	0.98	7/30/87	KCL	KDH
			15	14.2	5.70	-	5.70	4.20	7/30/87	KCL	KDH
			15	0	5.70	3.18	8.88	0.00	7/30/87	KCL	KDH
3	62.70	72.35	15	0	5.70	5.77	11.47	0.45	7/30/87	Kass/KCL	KDH
			15	11.87	5.70	-	5.70	1.01	7/30/87	Kass/KCL	KDH
			15	0	5.70	4.50	10.20	0.18	7/30/87	Kass/KCL	KDH
4	53.05	62.70	15	0	5.70	3.87	9.57	0.21	7/30/87	KCL	KDH
			15	9.07	5.70	-	5.70	0.54	7/30/87	KCL	KDH
			15	0	5.70	3.67	9.37	0.10	7/30/87	KCL	KDH
5	41.55	51.20	15	0	5.70	4.14	9.84	1.03	7/31/87	Kass	KDH
			15	6.8	5.70	-	5.70	3.38	7/31/87	Kass	KDH
			15	0	5.70	3.06	8.76	1.96	7/31/87	Kass	KDH
6	32.50	42.15	15	0	5.70	4.49	10.19	0.34	7/31/87	Kass	KDH
			15	4.8	5.70	-	5.70	0.105	7/31/87	Kass	KDH
			15	0	5.70	3.41	9.11	0.01	7/31/87	Kass	KDH

PACKER TEST DATA SHEET

Job No.: 2029-17-02

Location: Rocky Flats Plant; Landfill Area

Well No.: 41-87BR(cont'd.)

Borehole Diameter:

Acrylic Tube Diameter:

Static Water Level:

Date of Water Level:

Page 2 of 2

Comments:

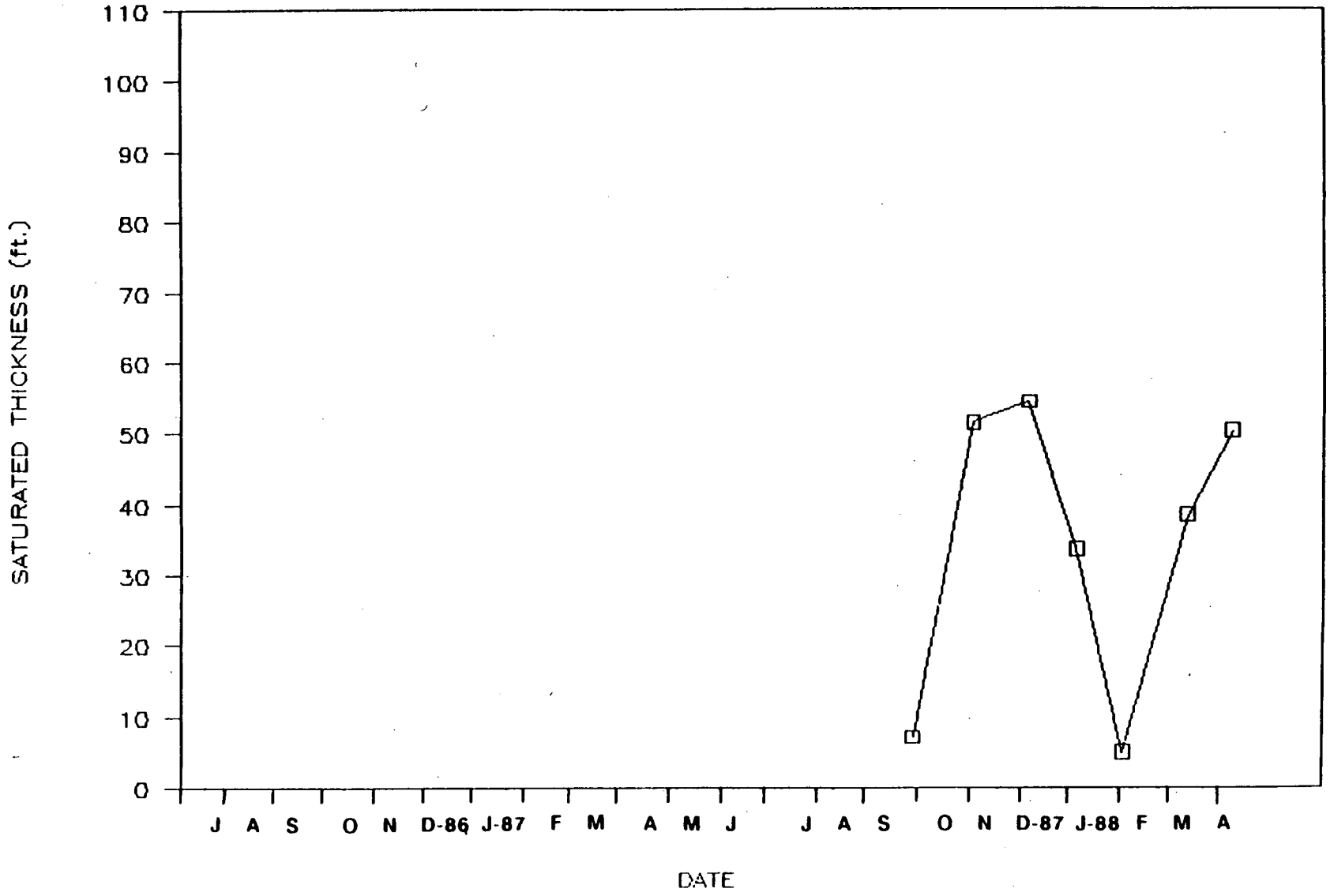
Test Interval No.	Top of Test Interval	Bottom of Test Interval	Test Length (minutes)	Gage Pressure	Gage Height	Avg. H_2O Height	Gage Height +Avg. H_2O Height	Δh	Date of Test	Lithology	Geologist
8	20.85	30.50	15	0	5.70	1.73	7.43	0.38	7/31/87	KCL	KDH
			15	2.6	5.70	–	5.70	1.30	7/31/87	KCL	KDH
			15	0	5.70	2.39	8.09	0.68	7/31/87	KCL	KDH

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
4187	09/28/87	5882.78	5884.55	1.77	93.79	86.60	5797.95
	11/04/87					42.40	5842.15
	12/08/87					39.50	5845.05
	01/06/88					60.20	5824.35
	02/04/88					88.80	5795.75
	03/14/88					55.40	5829.15
	04/11/88					43.60	5840.95

SATURATED THICKNESS IN WELL # 41-87



INDEX OF DATA

Boring No.: 42-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40355.10 E 22430.99
Total Depth: 12.40'

Borehole Well No.: 42-87
Ground Surface Elevation: 5854.05'
Water Level Encountered: 2.0'
Static: 1.62' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: June 10, 1987
Drilling Method: Hollow Stem Auger
Logged By: J.B. Bergman
Geologist

Driller: R. Sharp
Helper: T. Merritt
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**TOPSOIL** 0.0-2.0' SAMPLE. Recovered 0.5/2.0' = 25%. TOP SOIL: dark yellowish brown (10 YR 4/2); clay rich; abundant roots and grasses; large gray quartzite cobbles and pebbles; moist.	HNu background = 0.6-0.4. No readings above background.
5			**VALLEY FILL ALLUVIUM** 2.0-4.0' SAMPLE. Recovered 0.9/2.0' = 45%. CLAY: same as above; no vegetation; wet. 4.0-7.4' SAMPLE. Recovered 2.9/3.4 = 85%. 4.0-6.1': CLAY AND GRAVEL: grayish orange pink (5 YR 7/2); abundant quartzite, granite, and schistose gravel, pebbles, and cobbles; unsorted; angular; wet.	
10			**ARAPAHOE FORMATION** 6.1-6.9': CLAYSTONE: moderate yellowish brown (10 YR 5/4); trace grayish brown (5 YR 3/2) stains; trace organics; damp.	
15			7.4-9.9' SAMPLE. Recovered 2.5/2.5 = 100%. CLAYSTONE: olive gray (5 YR 3/2); abundant moderate brown (5 YR 4/4) mottles; trace organics; consolidated; damp.	
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40355.10 E 22430.99
Total Depth: 12.40'

Borehole Well No.: 42-87
Ground Surface Elevation: 5854.05'
Water Level Encountered: 2.0'
Static: 1.62' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: June 10, 1987
Drilling Method: Hollow Stem Auger
Logged By: J.B. Bergman
Geologist

Driller: R. Sharp
Helper: T. Merritt
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			9.9-12.4' SAMPLE. Recovered 2.5/2.5' = 100%. CLAYSTONE: same as above.	
			TOTAL DEPTH: 12.40'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 42-87

Coordinates N 40355.10 E 22430.99

Elevation: Ground Surface 5854.05'

Total Depth: Well 6.60'

Top of Casing 5855.93'

Borehole 12.40'

Formation of Completion Valley Fill Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed June 10, 1987

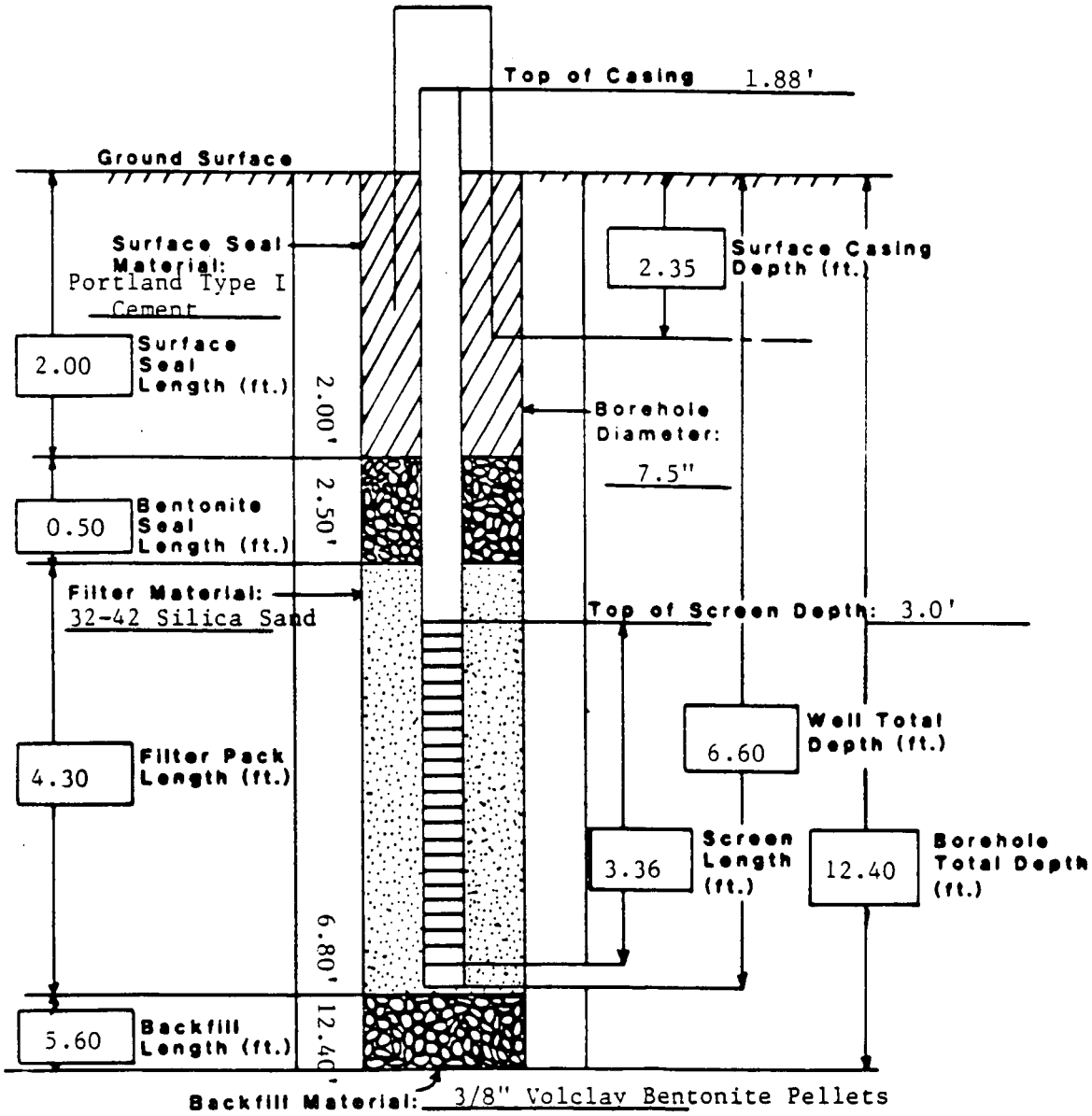
Approved By

Installed By J. Bergman
Geologist

Site Manager

CEARP Manager

Comments

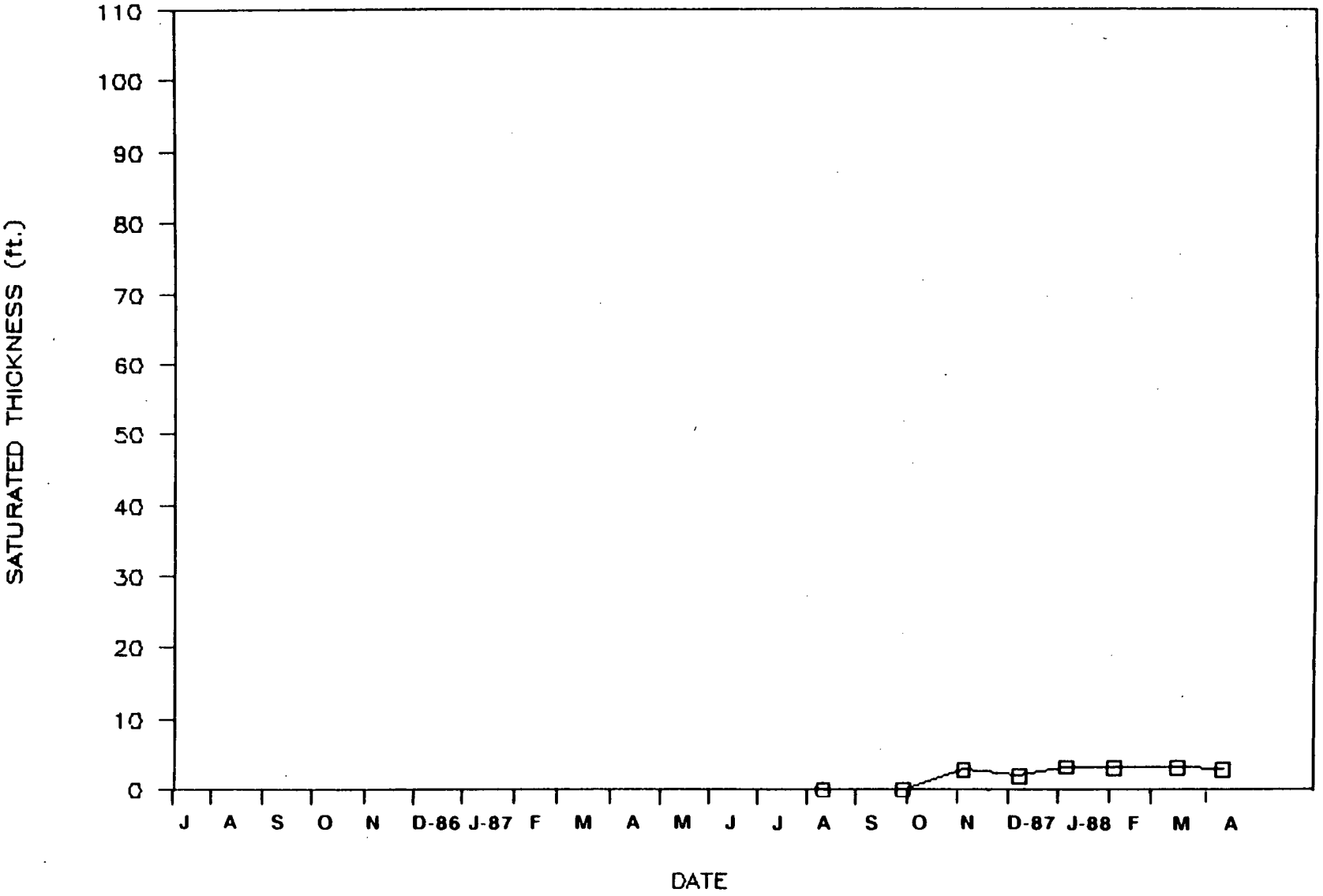


ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
4287	08/10/87	5854.05	5855.93	1.88	6.36	-1.00	DRY
	09/28/87					-1.00	DRY
	11/04/87					3.50	5852.43
	12/08/87					4.40	5851.53
	01/06/88					3.20	5852.73
	02/04/88					3.30	5852.63
	03/14/88					3.30	5852.63
	04/11/88					3.50	5852.43

SATURATED THICKNESS IN WELL # 42-87



INDEX OF DATA

Boring No.: 58-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39257.05 E 19431.75
Total Depth: 32.0'

Borehole Well No.: 58-87
Ground Surface Elevation: 5995.10'
Water Level Encountered: None
Static: 7.20' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 17, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**TOPSOIL** 0.0-2.0' SAMPLE. Recovered 1.2/2.0' = 60%. 0.0-0.25': TOP SOIL: dusky brown (5 YR 2/2) silty sand (3.0-2.5 Ø); numerous roots; scattered gravel; weakly cemented; moist.	HNu background=0.0. OVA background = 0.0. Ludlum background = 0.
5			**ROCKY FLATS ALLUVIUM** 0.25-1.20': GRAVEL AND CLAYEY SAND: moderate brown (5 YR 4/4) to light brown (5 YR 5/6) and moderate reddish brown (10 R 4/6); moderately cemented; gravel, 4.50 mm and as small as 0.55 mm; subrounded and rounded and subangular; noted cobbles; sand ranges (3.0-2.5 Ø) up to (0.5-0.0 Ø); well sorted; light; moist.	
10			2.0-4.0' SAMPLE. Recovered 0.3/2.0' = 15%. SAND AND GRAVEL: light brown (5 YR 6/4) and light brown (5 YR 5/6) to moderate brown (5 YR 4/4); rounded, subrounded, and subangular; well sorted, 0.50 mm to 5.0 mm with scattered cobbles; moderately cemented to weakly cemented; moist.	
15			4.0-7.0' SAMPLE. Recovered 0.4/3.0 = 13%. SAND AND GRAVEL: pale yellowish brown (10 YR 6/2) to light brown (5 YR 6/4); several cobbles; soils appearing as above; light moist.	17.0-19.5': Readings on core: HNu: 112; OVA: 2.1.
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Borehole/Well No.: 58-87 (con't.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			7.0-9.5' SAMPLE. Recovered 0.2/2.5 = 8%. GRAVEL: one subangular, quartzite gravel.	
			9.5-12.0' SAMPLE. Recovered 0.0/2.5 = 0%. Cuttings indicate sand and gravel as noted in previous runs.	
25			12.0-14.5' SAMPLE. Recovered 0.2/2.5 = 8%. CLAYEY SAND AND GRAVEL: light brown (5 YR 6/4) to (5 YR 5/6); fine-grained sand (2.5-2.0 Ø) weakly cemented; poorly sorted; subangular and subrounded gravel; moist.	27.5-29.5': Readings on core: HNu: 5.5; OVA: 0.0.
30			14.5-17.0' SAMPLE. Recovered 0.4/2.5' = 16%. CLAYEY SAND AND GRAVEL: moderate brown (5 YR 6/4) to light brown (5 YR 5/6); poorly sorted sand; fine-grained (2.5-2.0 Ø) with small gravel and scattered, large (5.25 mm) cobbles; weakly to moderately cemented; moist.	29.5-32.0': Readings in augers: HNu: 105; OVA: 50.
35			17.0-19.5' SAMPLE. Recovered 1.4/2.5 = 56%. CLAYEY SAND: varying brown as stated above; slightly clayey; weakly cemented; poorly sorted; fine- to medium-grained sands and gravel (ranging from 0.75 to 25 mm); subrounded; rounded with few subangular.	
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 58-87 (con't.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			19.5-22.0' SAMPLE. Recovered 1.5/2.5' = 60%. 19.5-20.5': SAND AND GRAVEL: light brown (5 YR 5/6) to moderate yellowish brown (10 YR 5/4); poorly sorted sand (2.0-2.5 Ø) to (0.5-0.0 Ø) with gravel ranging 0.75 mm to 2.75 mm; subrounded; rounded; weakly cemented; moist. 20.5-21.0': SANDY CLAY: light brown (5 YR 6/4); few scattered gravel; fine- and medium-grained sands; low plastic; moist.	
			ARAPAHOE FORMATION	
			22.0-24.5' SAMPLE. Recovered 0.0/2.5 = 0%. Cuttings indicate weathered sandy claystone with gray and brown fine-grained sand.	
			24.5-27.0' SAMPLE. Recovered 0.0/2.5 = 0%.	
			27.0-27.5' SAMPLE. Center bit drill .	
			27.5-29.5' SAMPLE. Recovered 2.0/2.0 = 100%. SANDY CLAYSTONE: dark yellowish orange (10 YR 6/6) to moderate yellowish brown (10 YR 5/4) and light gray (N 7/0); fine-grained sand (3.0-2.5 Ø); low to medium plastic; massive; severely oxide (Fe) stained; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 58-87 (con't.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			29.5-32.0' SAMPLE. Recovered 2.5/2.5 = 100%. CLAYEY SANDSTONE: light gray (N 7/0) to medium light gray (N 6/0); slightly to moderately oxide (Fe) stained; massive; low plastic; weakly to moderately cemented; fine-grained sand (2.5-2.0 Ø); moist.	
			TOTAL DEPTH: 32.0'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 58-87

Coordinates N 39257.05 E 19431.75

Elevation: Ground Surface 5995.10'

Total Depth: Well 22.5'

Top of Casing 5996.75'

Borehole 32.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed November 18, 1987

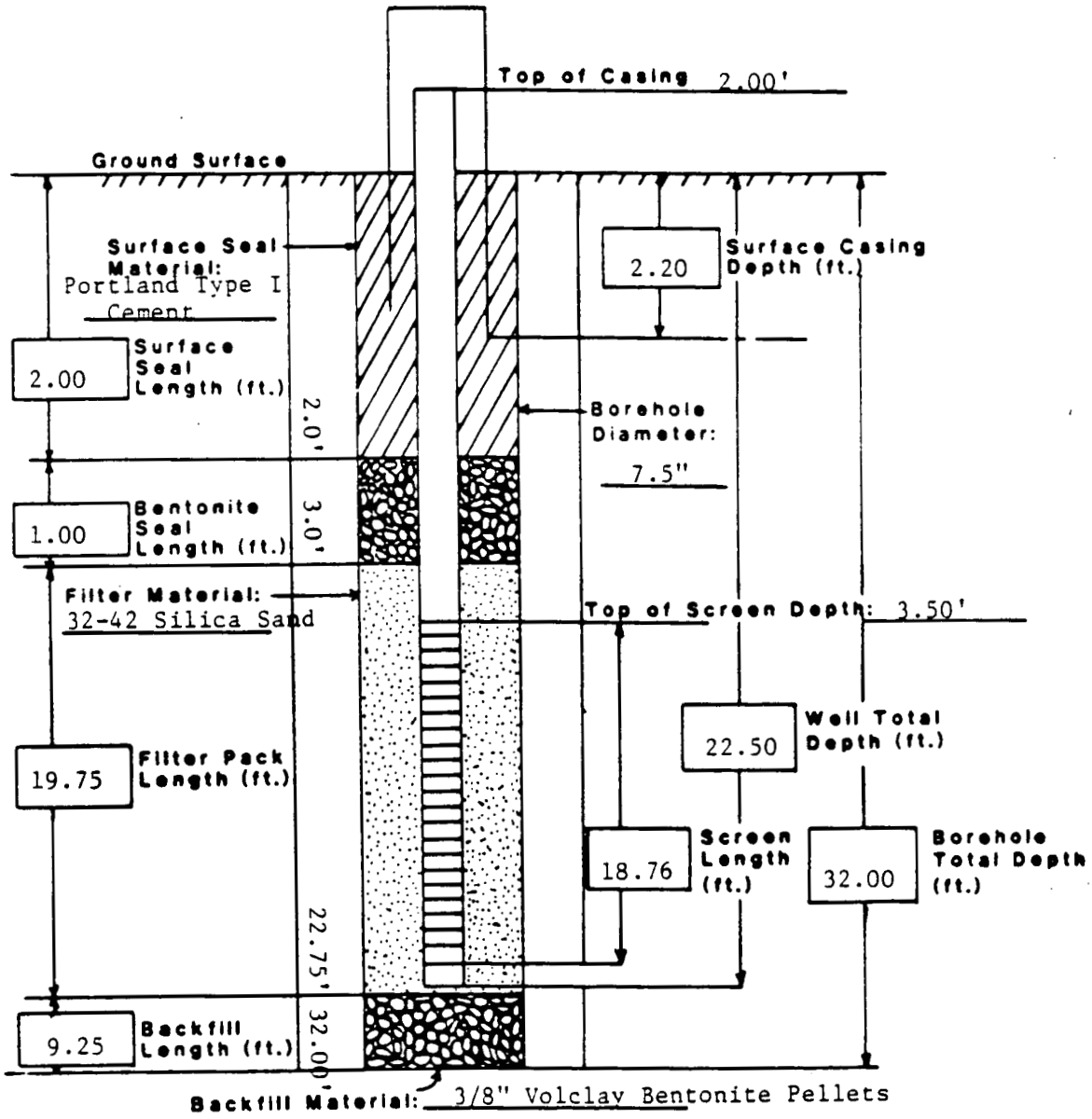
Approved By

Installed By R. Treat
Geologist

Site Manager

CEARP Manager

Comments



Well No.: 58-87

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
12/3/87	---	Pumping	-------	Clear; small amount of sand	Water level 10.15' before pumping Water level 10.4' after pumping

PROGRAM SLUGT, VERSION 4,OCT.7 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-97 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-29-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 58-97

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .15
LENGTH OF SCREEN OR INTAKE PORTION = 3.46 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 12.05 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 3.46 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 6

TIME (sec)	HEAD (FEET)
567.00	.680
687.00	.640
807.00	.600
927.00	.570
1107.00	.530
1407.00	.480

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED VALUES FOR H0 (FEET)

.3472
.3791

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = .38 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO MEAN	ROOT MEAN SQUARE OF TIME	DIFFERENCE IN RMS

1.000E-01	1.000E-01	1.334E-06	1.601E-07	9.790E-07	1.848E-06	.434225	153.14	.00
1.000E-02	1.000E-02	3.241E-06	7.830E-07	2.721E-06	3.516E-06	.243506	76.32	36.31
1.000E-03	1.000E-03	5.311E-06	6.277E-07	4.777E-06	5.580E-06	.151204	41.12	35.70
1.000E-04	1.000E-04	7.349E-06	8.687E-07	6.515E-06	7.603E-06	.107175	28.63	12.49
1.000E-05	1.000E-05	9.348E-06	1.105E-06	8.805E-06	9.632E-06	.088133	24.74	3.99
1.000E-06	1.000E-06	1.132E-05	1.338E-06	1.077E-05	1.165E-05	.078564	24.67	.07
1.000E-07	1.000E-07	1.326E-05	1.569E-06	1.270E-05	1.367E-05	.073438	25.29	-.62
1.000E-08	1.000E-08	1.519E-05	1.796E-06	1.461E-05	1.568E-05	.070147	25.97	-.68
1.000E-09	1.000E-09	1.711E-05	2.023E-06	1.651E-05	1.766E-05	.067319	26.90	-.93
1.000E-10	1.000E-10	1.902E-05	2.248E-06	1.831E-05	1.964E-05	.069750	27.64	-.74

****

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 5.11E-07 FT/sec = 1.56E-05 CM/sec

TRANSMISSIVITY = 4.32E-06 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 7.22E-07 FT/sec = 2.20E-05 CM/sec

TRANSMISSIVITY = 6.11E-06 FT**2/sec

WELL NO.: E9-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 3.46 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 10.35 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 3.46 FEET
FALLING--HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 5

TIME (sec)	HEAD (FEET)
567.00	.680
687.00	.640

907.00	.570
1107.00	.530
1407.00	.480

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

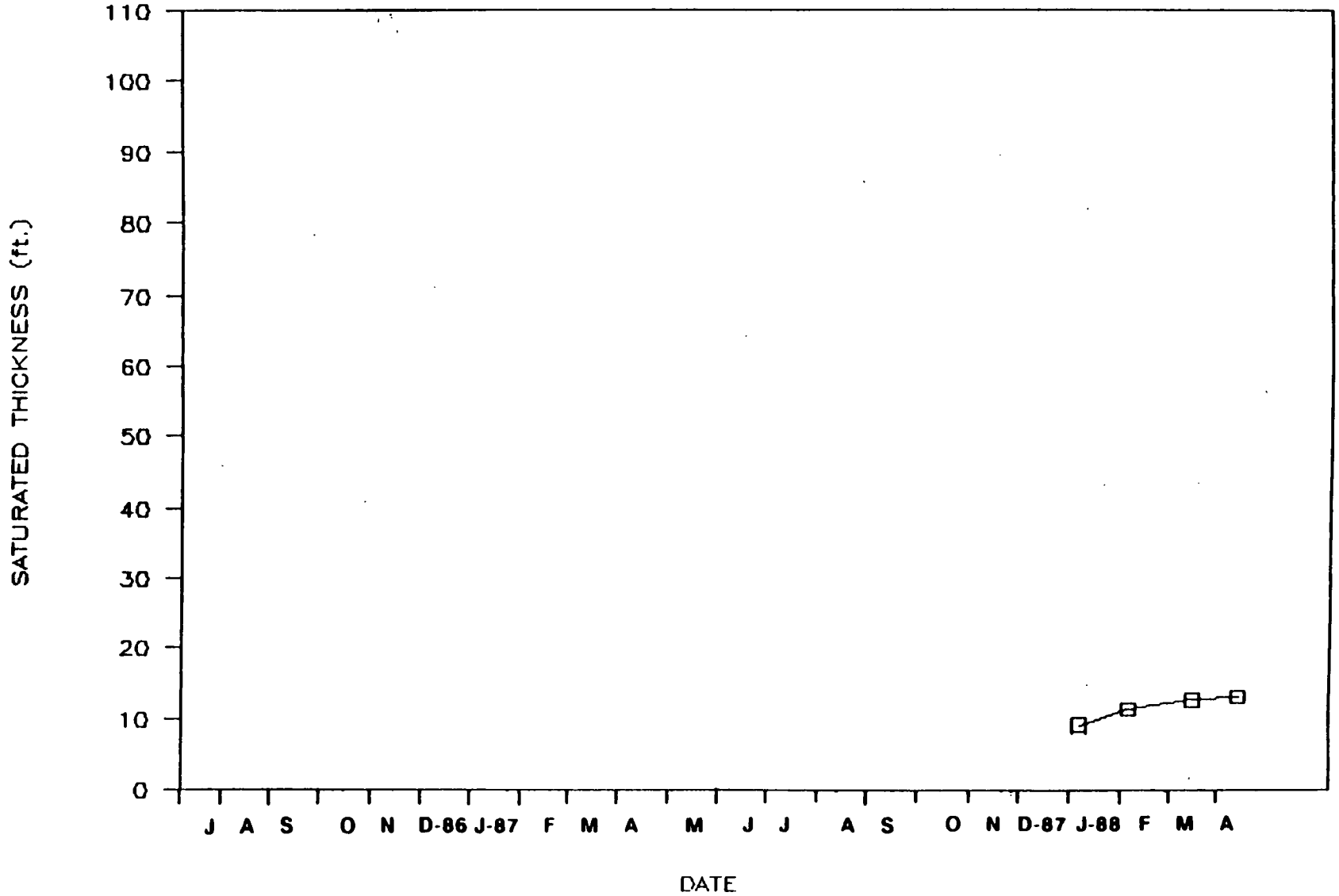
ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	5.502E-06	6.504E-07	4.694E-06	6.285E-06	.289241	98.71	.00
1.000E-02	1.000E-02	1.025E-05	1.212E-06	8.231E-06	1.240E-05	.406171	136.02	-37.32
1.000E-03	1.000E-03	1.514E-05	1.790E-06	1.181E-05	1.852E-05	.442744	149.94	-13.92
1.000E-04	1.000E-04	1.992E-05	2.355E-06	1.537E-05	2.471E-05	.468921	157.27	-7.33
1.000E-05	1.000E-05	2.462E-05	2.910E-06	1.883E-05	3.066E-05	.480235	161.81	-4.54
1.000E-06	1.000E-06	2.926E-05	3.459E-06	2.225E-05	3.662E-05	.490919	164.96	-3.14
1.000E-07	1.000E-07	3.386E-05	4.002E-06	2.565E-05	4.246E-05	.496296	166.91	-1.96
1.000E-08	1.000E-08	3.842E-05	4.542E-06	2.903E-05	4.829E-05	.501246	168.45	-1.54
1.000E-09	1.000E-09	4.296E-05	5.078E-06	3.239E-05	5.407E-05	.504654	169.61	-1.16
1.000E-10	1.000E-10	4.748E-05	5.612E-06	3.574E-05	5.984E-05	.507574	170.55	-.94

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
5887	01/05/88	5995.10	5996.75	1.65	22.26	13.00	5983.75
	02/04/88					10.90	5985.85
	03/14/88					9.50	5987.25
	04/11/88					9.20	5987.55

SATURATED THICKNESS IN WELL # 58-87



INDEX OF DATA

Boring No.: 59-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area
Coordinates N 39257.06 E 19431.75
Total Depth 26.0'

Borehole/Well No. 59-87
Ground Surface Elevation 5992.90'
Water Level Encountered None
Static 15.05' (4/11/88)

Drilling Company Boyles Bros.
Date Drilled November 20, 1987
Drilling Method Hollow Stem Auger
Logged By J. Bacchus
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM**	HNu background = 2.0-3.0. OVA background = 1.8.
			0-2.0' SAMPLE. Recovered 1.4/2.0' = 70%. CLAY: dark yellowish brown (10 YR 4/2), large angular quartzite clasts, coarse-grained sand; pockets of caliche; moist.	0.0-2.0': Readings on core: HNu: 1.6; OVA: 40.0; Ludlum: 0.
5			2.0-4.0' SAMPLE. Recovered 1.1/2.0' = 55%. CLAY: same as above except wood in the shoe.	2.0-4.0': Readings on core: HNu: 1.5; OVA: 20.0; Ludlum: 0.
			4.0-5.0' SAMPLE. Recovered 0.4/1.0 = 40%. WOOD: dusky brown (5 YR 2/2); frayed.	4.0-5.0': Readings on core: HNu: 1.3; OVA: 0; Ludlum: 0.
10			5.0-8.0' SAMPLE. Recovered 0.0/3.0' = 0%.	8.0-10.5': Readings on core: OVA: 29.0; Ludlum: 0.
			8.0-10.5' SAMPLE. Recovered 1.3/2.5 = 52%. 8.0-8.3': WOOD: same as above. 8.3-9.3': CLAY: dusky yellowish brown (10 YR 4/2), caliche, wood; sand, moist.	8.0-9.3': Readings in augers: OVA: off scale.
15			10.5-13.0' SAMPLE. Recovered 1.3/2.5 = 52%. 10.5-11.3': CLAY: same as above except the sample contains small cobbles, moist. 11.3-11.8': CLAY: light olive gray (5 Y 5/2), mottled with dark yellowish orange (10 YR 6/6) large subrounded pebbles, moist.	10.5-11.8': Readings on core: OVA: 1.2; Ludlum:0.
				10.5-11.8': Readings in augers: OVA off scale.
				12.8-14.9': Readings on core: OVA: 40; Ludlum: 0.
20			Total depth measured 12.8'. Adjust depth.	

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Borehole/Well No. 59-87 (con't.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			12.8-15.3' SAMPLE. Recovered 2.1/2.5' = 84%. 12.8-13.0': SAND: light olive gray (5 Y 5/2), large rounded pebbles, moist. 13.0-14.9': SAND: light brown (5 YR 5/6); coarse-grained; mottled with pale yellowish orange (10 YR 8/6) immature sand, high amount of k-feldspar and large angular quartz, small angular cobbles of quartzite, some clay; moist.	15.3-17.8': Readings on core: OVA: 13; Ludlum: 2.
25			15.3-17.8' SAMPLE. Recovered 1.8/2.5 = 72%. SAND: same as above.	17.8-20.5': Readings on core: OVA: 1.8; Ludlum: 5.
			17.8-20.5' SAMPLE. Recovered 1.8/2.5' = 72%. SAND; same as above.	20.5-23.0': Readings on core: OVA: 6.8; Ludlum: 0.
30			**ARAPAHOE FORMATION**	23.0-25.5': Readings on core: OVA: 3.8; Ludlum: 0.
			20.5-23.0' SAMPLE. Recovered 3.5/2.5' = 140%. CLAYSTONE: light olive gray (5 Y 5/2) mottled with dark yellowish orange (10 YR 6/6); sandy; blocky structure.	
35			23.0-25.5' SAMPLE. Recovered 2.8/2.5' = 112%. CLAYSTONE: same as above.	
			TOTAL DEPTH: 26.0'.	
40				

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 59-87

Coordinates N 39336.25 E 19463.99

Elevation: Ground Surface 5992.90'

Total Depth: Well 21.20'

Top of Casing 5994.67'

Borehole 26.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

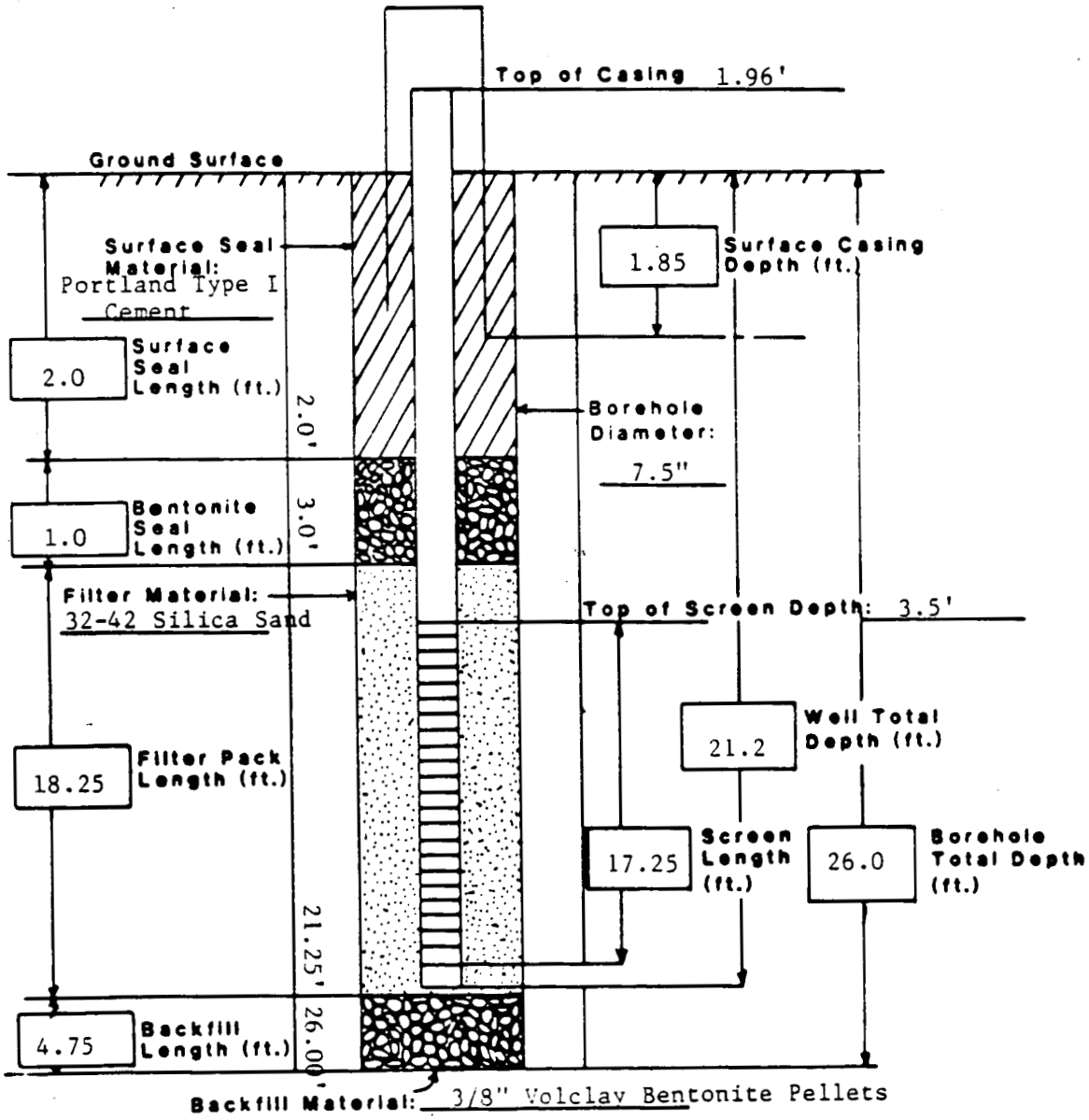
Date Installed November 23, 1987

Approved By _____
Site Manager

Installed By J. Bacchus
Geologist

_____
CEARP Manager

Comments _____



Well No.: 59-37

WELL DEVELOPMENT SUMMARY SHEET

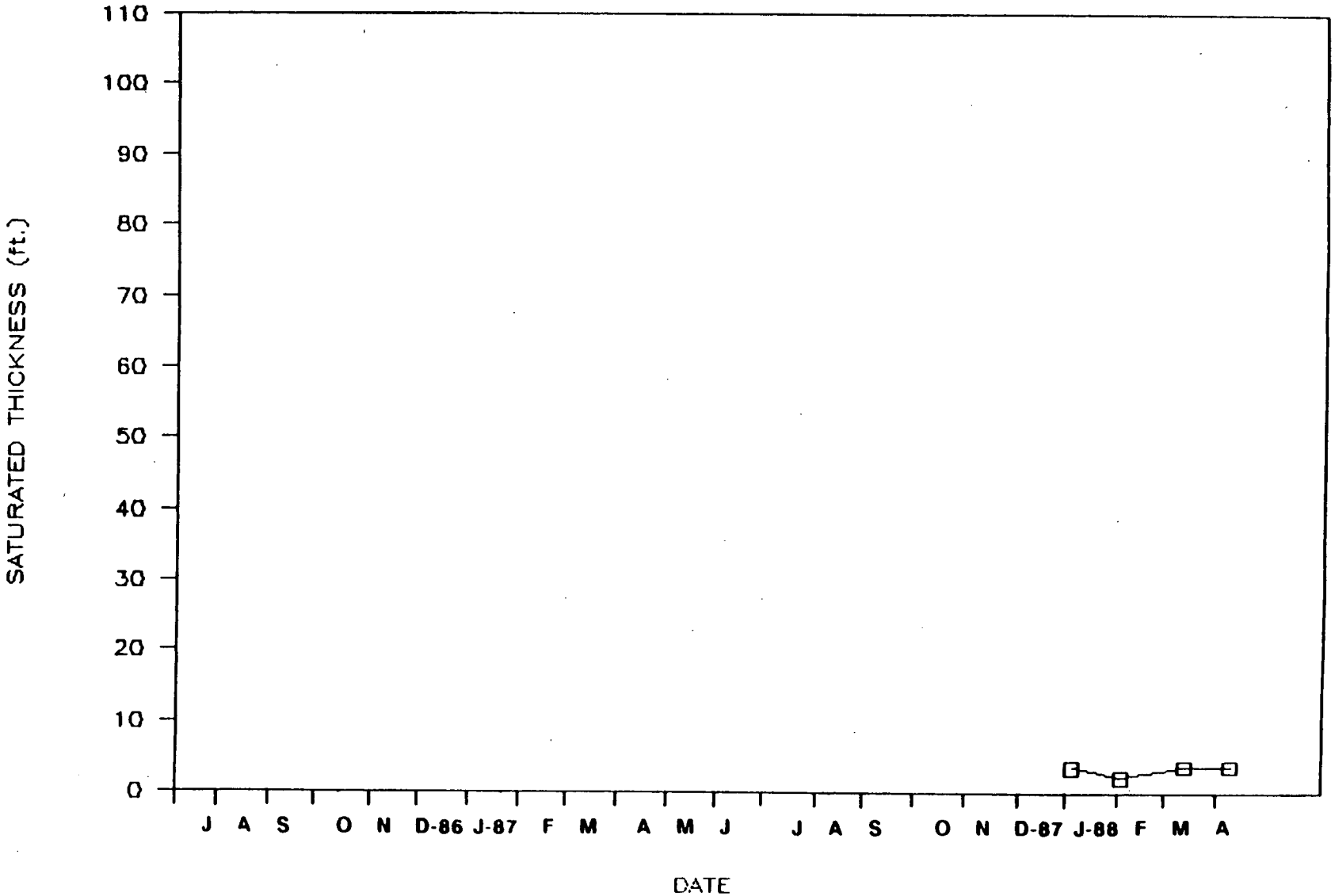
DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
12/3/87	---	Pumping	--------	Small amount of sand	Water level decreased 7.7' after 10 minutes of pumping

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
5987	01/05/88	5992.90	5994.67	1.77	20.75	17.10	5977.57
	02/04/88					18.50	5976.17
	03/14/88					17.00	5977.67
	04/11/88					16.90	5977.77

SATURATED THICKNESS IN WELL # 59-87



INDEX OF DATA

Boring No.: 60-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39951.63 E 19938.52
Total Depth: 32.0'

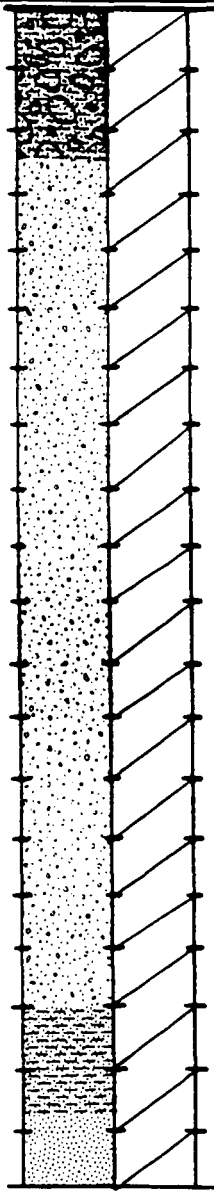
Borehole-Well No.: 60-87
Ground Surface Elevation: 5984.03'
Water Level Encountered: 19.3'
Static: 8.30' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 19, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM** 0.0-2.5' SAMPLE. Recovered 1.2/1.5' = 48%. GRAVEL AND SANDY CLAY: dusky brown (5 YR 2/2) to dark yellowish brown (10 YR 4/2) and moderate brown (5 YR 3/4); gravel ranging 0.25 mm up to cobble size, angular, subangular, and sub-rounded; weakly cemented; moist.	HNu background = 0.3. OVA background = 0.0. Ludlum background = 0.0.
5			2.5-4.0' Center bit drill.	
			4.0-7.0' SAMPLE. Recovered 0.4/3.0' = 13%. SAND AND GRAVEL: light brown (5 YR 5/6); slightly silty; gravel to 4.75 mm, subrounded, subangular, much of quartzite composition; sand ranging (3.0-2.5 Ø) to scattered (2.0-1.5 Ø) weakly cemented, moist.	10.5': Readings in augers: OVA: 3.5; HNu: 210.
10			7.0-9.5' SAMPLE. Recovered 0.0/2.5' = 100%. Cuttings indicate same materials as above.	
15			9.5-10.5' SAMPLE. Recovered 0.6/1.0' = 60%. SAND AND GRAVEL: light brown (5 YR 6/4) to moderate brown (5 YR 4/4) with angular and subangular gravel; range 0.25 mm to 2.75 mm with well sorted sand (2.5-2.0 Ø) to (0.5-1.0 Ø); slightly clayey; weakly cemented; moist.	
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole/Well No. 60-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			10.5-12.0' SAMPLE. Recovered 0.7/1.5' = 47%. SAND AND GRAVEL: same as above.	22.0': Readings in augers: HNu = 3.2; OVA = 9.5.
			12.0-14.5' SAMPLE. Recovered 1.2/2.5 = 48%. SAND AND GRAVEL: moderate brown (5 YR 4/4) to pale yellowish brown (10 YR 6/2) and light brown (5 YR 6/4); well sorted sand; poorly sorted gravel with 0.25 mm to 3.25 mm; slightly clayey; weakly cemented; very moist at 12.5' to light moist.	
25			14.5-17.0' SAMPLE. Recovered 0.4/2.5' = 16%. SAND AND GRAVEL: same as above.	
30			17.0-19.5' SAMPLE. Recovered 2.5/2.5' = 100%. 17.0-18.6': CLAYEY SAND: moderate yellowish brown (10 YR 5/4) to light gray (N 7/0); sand range (3.0-2.5 Ø) some coarser-grained.; low plastic; moderately cemented; moist. 18.6-19.5': SAND: light brown (5 YR 5/6) fine to coarse-grained; slightly clayey; ranging (2.5-2.0 Ø to 0.5-1.0 Ø) with some small size scattered gravels; weakly cemented; very moist to wet at 19.3'.	
35			19.5-22.0' SAMPLE. Recovered 0.7/2.5' = 34%. SAND: light brown (5 YR 6/6) with (1.0-0.5 Ø) and finer-grained; weakly to non-cemented; poorly sorted; wet.	
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 60-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			22.0-24.5' SAMPLE. Recovered 2.5/2.5' = 100%. 22.0-24.3': SAND : light brown (5 YR 6/6) sand (2.0-1.5 Ø) with occasional scattered gravel, subangular, subrounded, non to weakly cemented, wet. 24.3-24.5': CLAYEY SAND: moderate brown (5 -YR 4/4) with (3.0-2.5 Ø) to scattered (2.0-1.5 Ø) moderately cemented: poorly sorted; very moist. 24.5-27.0' SAMPLE. Recovered 0.4/2.5' = 16%. CLAY: dark yellowish orange (10 YR 6/6) pale yellowish brown (10 YR 6/2) with blotches of dusky brown (5 YR 2/2) to medium gray (N 6/0) and light gray (N 7/0); sandy; low to medium plastic; sand (2.5-2.0 Ø) small quartzite gravel to 0.75 mm; moderately cemented; moist. 27.0-29.0' SAMPLE. Recovered 1.1/2.0' = 55%. 27.0-27.2': CLAY: pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2); slightly sandy; fine-grained sand; sand (2.5-2.0 Ø) moderately (Fe) oxide stained; medium plastic; moderately cemented; moist.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 60-87 (cont'd.)

Coordinates: _____

Ground Surface Elevation: _____

Total Depth: _____

Water Level Encountered: _____

Static: _____

Drilling Company: _____

Driller: _____

Date Drilled: _____

Helper: _____

Drilling Method: _____

Drilling Fluid: _____

Logged By: _____ Geologist

Checked By: _____ Site Manager

_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			ARAPAHOE FORMATION	
			27.2-28.1': CLAYSTONE: light brown (5 YR 5/6) to predominantly light olive gray (5 Y 6/1); moderately oxide (Fe) stained; blocky and layered; massive; medium to highly plastic; fine-grained; slightly sandy; weathered; moist.	
			29.0-31.0' SAMPLE. Recovered 0.0/2.0' = 0%.	
			31.0-32.0 SAMPLE. Recovered 1.5/1.0' = 150%. CLAYSTONE: dark gray (N 3/0) with lignite seams; massive; moderately cemented; blocky; highly plastic; weathered; moist.	
			TOTAL DEPTH: 32.0'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 60-87

Coordinates N 39951.63 E 19938.52

Elevation: Ground Surface 5984.03'

Total Depth: Well 27.7'

Top of Casing 5985.96'

Borehole 32.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed November 20, 1987

Approved By

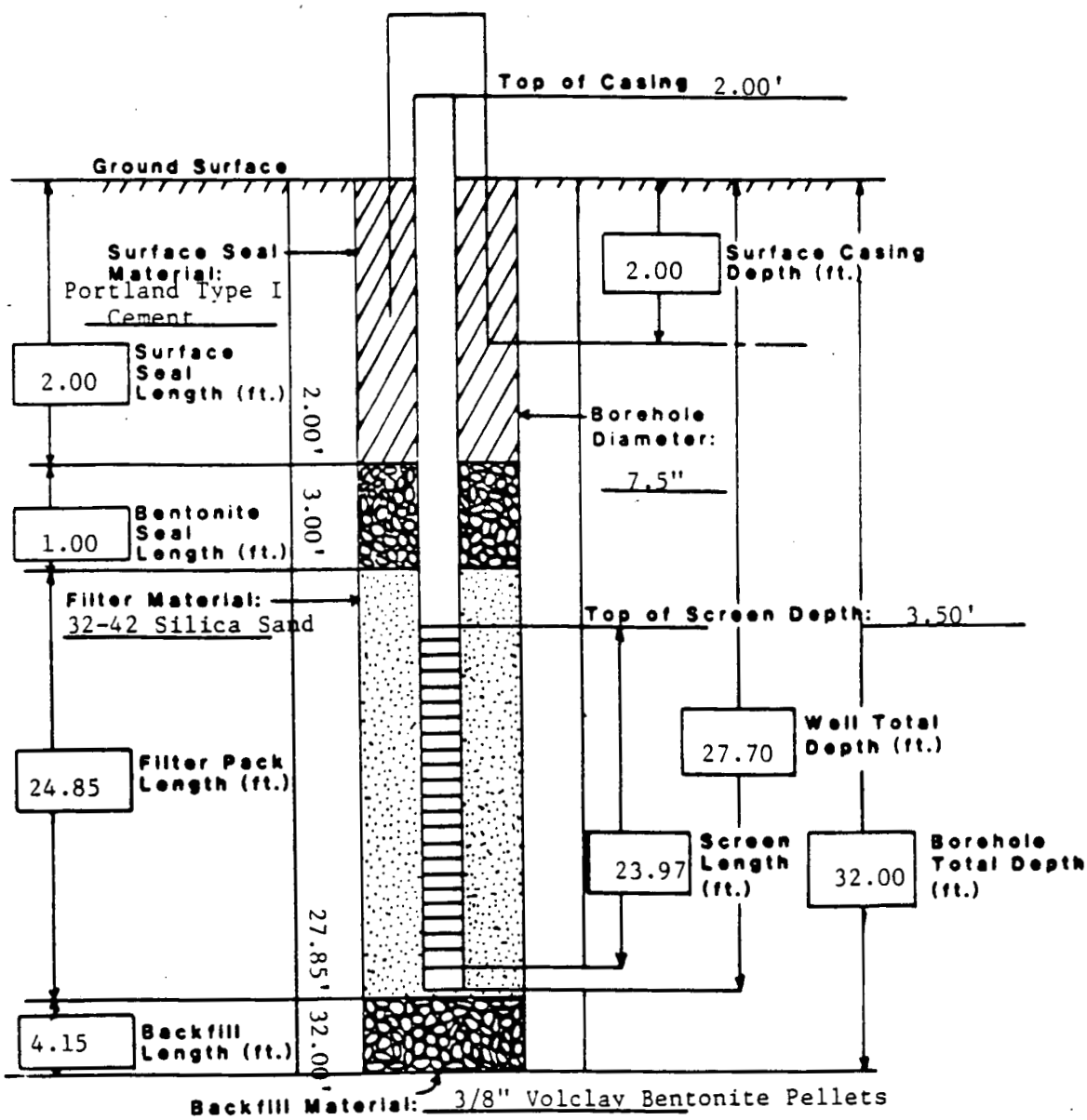
Site Manager

Installed By R. Treat

Geologist

CEARP Manager

Comments



Well No.: 50-87

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
12/3/87	----	Pumping	----------	Sandy	Water level 11.55' before pumping; Water level 11.4' after pumping

PROGRAM SLUGT, VERSION 4.OCT.1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0113-87 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-26-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 60-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 23.97 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 16.15 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 16.15 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 25

TIME (sec)	HEAD (FEET)
17.00	.950
18.00	.940
19.00	.920
20.00	.910
25.00	.850
30.00	.790
35.00	.740
40.00	.690
45.00	.640
50.00	.600
55.00	.560
60.00	.520
65.00	.480
70.00	.450
75.00	.410
80.00	.390
90.00	.340
100.00	.290
110.00	.240
120.00	.210
130.00	.180
140.00	.150
150.00	.130
160.00	.110
180.00	.080

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED

FEET)

1.2588
1.2515

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = 1.25 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	8.790E-05	5.442E-06	3.682E-05	2.038E-04	1.900141	67.52	.00
1.000E-02	1.000E-02	1.523E-04	9.431E-06	9.959E-05	2.643E-04	1.081476	38.29	29.24
1.000E-03	1.000E-03	2.188E-04	1.355E-05	1.717E-04	3.236E-04	.694447	25.06	13.23
1.000E-04	1.000E-04	2.846E-04	1.762E-05	2.431E-04	3.844E-04	.496462	18.36	6.70
1.000E-05	1.000E-05	3.455E-04	2.139E-05	3.130E-04	4.221E-04	.315690	11.25	7.11
1.000E-06	1.000E-06	4.040E-04	2.502E-05	3.645E-04	4.661E-04	.251635	8.18	3.07
1.000E-07	1.000E-07	4.613E-04	2.856E-05	4.140E-04	5.120E-04	.212586	5.89	2.29
1.000E-08	1.000E-08	5.215E-04	3.229E-05	4.725E-04	5.655E-04	.178314	5.43	.46
1.000E-09	1.000E-09	5.842E-04	3.618E-05	5.416E-04	6.584E-04	.199926	5.84	-.41
1.000E-10	1.000E-10	6.484E-04	4.015E-05	6.018E-04	7.532E-04	.233469	6.37	-.74

****

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 4.24E-05 FT/sec = 1.29E-03 CM/sec

TRANSMISSIVITY = 6.84E-04 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 1.36E-05 FT/sec = 4.14E-04 CM/sec

TRANSMISSIVITY = 2.19E-04 FT**2/sec

WELL NO.: 66-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 15.67 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 16.15 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 16.15 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 25

TIME (sec)	HEAD (FEET)
17.00	.950
18.00	.940
19.00	.920
20.00	.910
25.00	.850
30.00	.790
35.00	.740
40.00	.680
45.00	.640
50.00	.600
55.00	.560
60.00	.520
65.00	.480
70.00	.450
76.00	.410
80.00	.390
90.00	.340
100.00	.290
110.00	.240
120.00	.210
130.00	.180
140.00	.150
150.00	.130
160.00	.110
180.00	.080

H0 WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	1.178E-04	7.297E-06	3.181E-05	2.373E-04	1.319168	50.11	.00

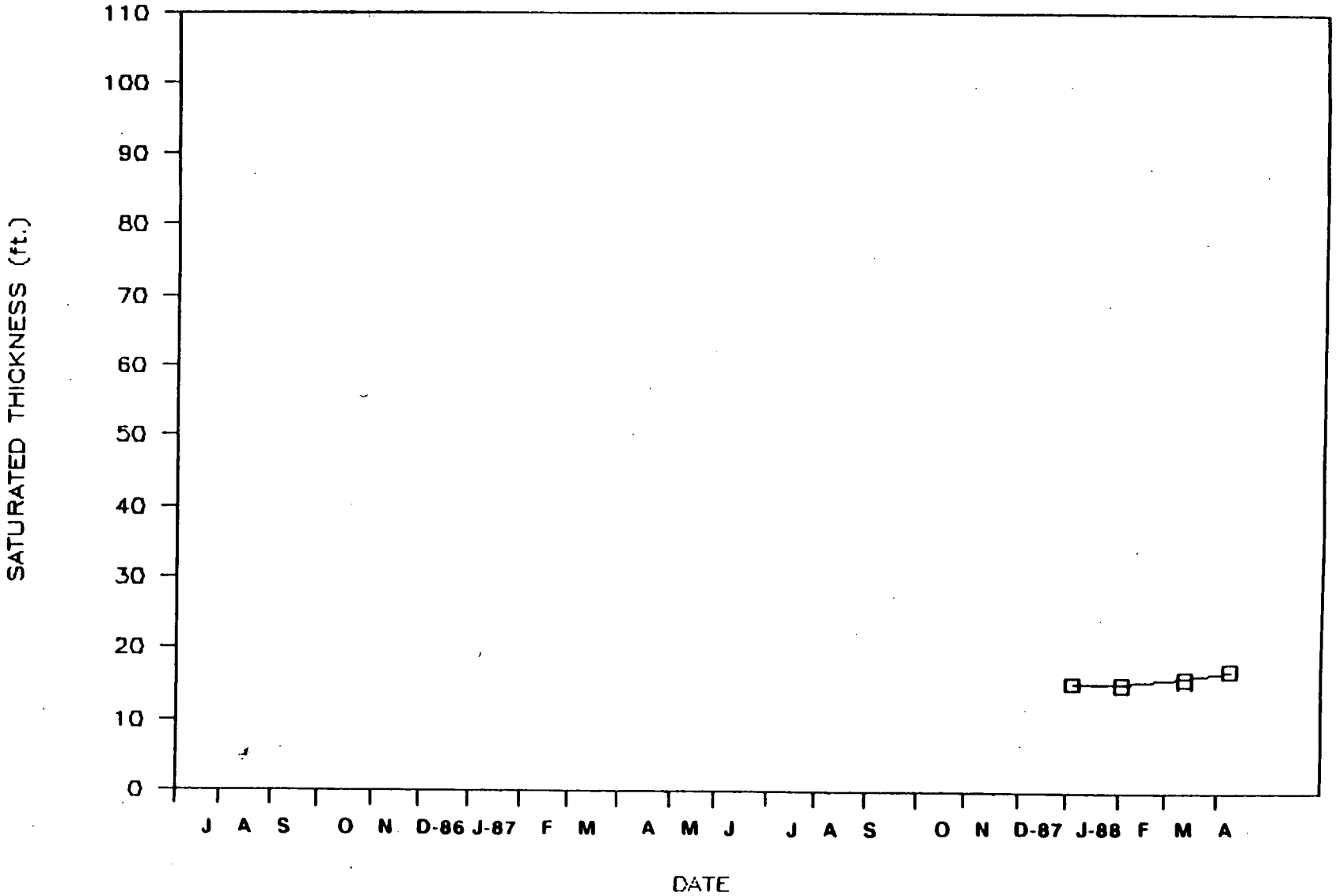
1.000E-03	1.000E-03	2.326E-04	1.750E-05	2.527E-04	3.602E-04	.380515	13.03	11.20
1.000E-04	1.000E-04	3.623E-04	2.244E-05	3.299E-04	4.327E-04	.283902	5.53	7.51
1.000E-05	1.000E-05	4.381E-04	2.712E-05	3.516E-04	5.476E-04	.447376	8.33	-2.81
1.000E-06	1.000E-06	5.099E-04	3.157E-05	3.920E-04	6.616E-04	.528837	11.79	-3.46
1.000E-07	1.000E-07	5.836E-04	3.613E-05	4.424E-04	7.747E-04	.569314	13.15	-1.36
1.000E-08	1.000E-08	6.608E-04	4.092E-05	5.128E-04	8.861E-04	.564974	12.73	.42
1.000E-09	1.000E-09	7.406E-04	4.586E-05	5.810E-04	9.970E-04	.561689	11.79	.94
1.000E-10	1.000E-10	8.193E-04	5.073E-05	6.583E-04	1.108E-03	.548369	10.92	.87

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6087	01/05/88	5984.03	5985.96	1.93	27.47	12.10	5973.86
	02/04/88					12.20	5973.76
	03/14/88					11.40	5974.56
	04/11/88					10.30	5975.66

SATURATED THICKNESS IN WELL # 60-87



INDEX OF DATA

Boring No.: 61-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39881.26 E 19974.80
Total Depth: 34.1'

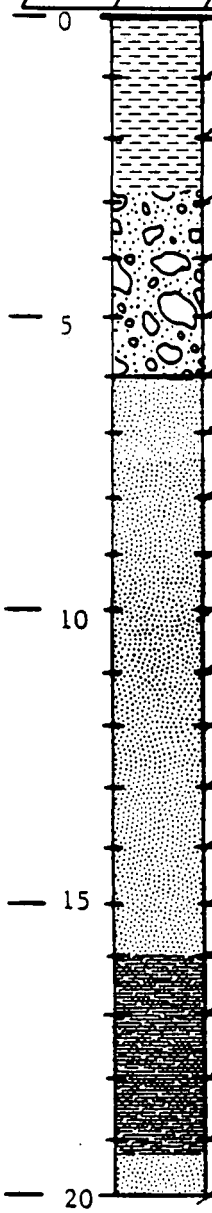
Borehole Well No.: 61-87
Ground Surface Elevation: 5984.00'
Water Level Encountered: 19.3'; 21.3'
Static: 10.95' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 24, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus
Geologist

Driller: S. Bradfield
Helper: P. Mesa
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____



Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 1.5/2.0' = 75%. 0.0-1.1': CLAY: dusky yellowish brown (10 YR 2/2); large angular clasts of quartzite; sand; roots; no HCl reaction; moist. 1.1-1.5': CLAY: same as above except dark reddish brown (10 YR 3/4); dry. 2.0-4.0' SAMPLE. Recovered 1.8/2.0' = 90%. 2.0-2.7': CLAY: same as above. 2.7-3.8': GRAVEL: pale reddish brown (10 R 5/4); clasts are supported by fine- to coarse-grained sand; no HCl reaction; dry. 4.0-6.0' SAMPLE. Recovered 1.9/2.0' = 95%. GRAVEL: same as above. **ROCKY FLATS ALLUVIUM** 6.0-8.0' SAMPLE. Recovered 1.8/2.0' = 90%. SAND: light brown (5 YR 5/6); fine-grained; large angular pebbles; coarse sand; silt; clay; no HCl reaction; slightly moist to dry. 8.0-10.0' SAMPLE. Recovered 1.3/2.0' = 65%. SAND: same as above except moist.	HNu Background=0.4 OVA Background=0.2 0.0-1.5': Readings on core: HNu = 0.4; OVA = 0.2; Ludlum = 0. 2.0-3.8': Readings on core: HNu = 0.6; OVA = 0.4; Ludlum = 1. 4.0-5.9': Readings on core: HNu = 0.6; OVA = 3.0; Ludlum = 1. 6.0': Readings in breathing zone: Hnu = 0.6; OVA = 0.6. 6.0': Readings in augers: HNu = 4.0; OVA = 30.0. 6.0-7.8': Readings on core: HNu = 0.6; OVA = 0.8; Ludlum = 1. 8.0-9.3': Readings on core: HNu = 0.6; OVA = 0.5; Ludlum = 2.
5				
10				
15				
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Borehole/Well No.: 61-87 (cont'd.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			10.0-12.0' SAMPLE. Recovered 0.8/2.0' = 40%. SAND: same as above.	10.0-10.8': Readings on core: HNu = 0.6; OVA = 0.2; Ludlum = 0.
			12.0-14.0' SAMPLE. Recovered 2.2/2.0' = 110%. SAND: pale olive (10 Y 6/2) mottled dark yellowish brown (10 YR 4/2) and light brown (5 YR 5/6); small angular cobbles, angular pebbles; coarse- and fine-grained sand; micaceous; very slight HCl reaction; moist.	12.0-14.0': Readings on core: HNu = 0.4; OVA = 0.6; Ludlum = 2.
25				14.0-15.3': Readings on core: HNu = 0.8; OVA = 1.0; Ludlum = 1.
			14.0-16.0' SAMPLE. Recovered 1.3/2.0' = 65%. SAND: light brown (5 YR 6/6); clay angular pebbles; small angular cobbles; no HCl reaction; slightly moist to dry.	16.0-18.0': Readings on core: HNu = 0.4; OVA = 0.6; Ludlum = 0.
30			16.0-18.0' SAMPLE. Recovered 2.1/2.0' = 105%. SAND AND SILT: moderate brown (5 YR 4/4); fine-grained sand; coarse sand; angular pebbles; small angular cobbles; no HCl reaction; moist.	18.0-19.8': Readings on core: HNu = 0.4; OVA = 0.6; Ludlum = 0.
			18.0-20.0' SAMPLE. Recovered 1.8/2.0' = 90%. 18.0-19.3': SAND AND SILT: same as above. 19.3-19.8': SAND: moderate brown (5 YR 4/4); grains are well rounded; some clay; some angular pebbles; wet.	20.0-21.8': Readings on core: HNu = 0.4; OVA = 1.2; Ludlum = 0.
35				22.0-22.6': Readings on core: HNu = 0.4; OVA = 0.8; Ludlum = 1.
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates:
Total Depth:

Borehole Well No.: 61-87 (cont'd.)
Ground Surface Elevation:
Water Level Encountered:
Static:

Drilling Company:
Date Drilled:
Drilling Method:
Logged By: Geologist

Driller:
Helper:
Drilling Fluid:
Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			20.0-22.0' SAMPLE. Recovered 1.8/2.0' = 90%. 20.0-21.3': CLAY: light olive gray (5 Y 5/2); mottled with dark yellowish orange (10 YR 6/6); clay; moist. 21.3-21.8': GRAVEL: dark yellowish orange (10 YR 6/6); small angular cobbles; coarse sand; clay; wet. 22.0-24.0' SAMPLE. Recovered 0.6/2.0' = 30%. GRAVEL: same as above. 24.0-26.0' SAMPLE. No recovery. 26.0-28.0' SAMPLE. No recovery. **ARAPAHOE FORMATION** 28.0-29.0' SAMPLE. No recovery. Drilled with center bit. 29.0-31.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: light olive gray (5 Y 5/2); stained with dark yellowish orange (10 YR 6/6); dense; moist.	29.0-31.0': Readings on core: HNu = 36; OVA = 0.8; Ludlum = 0. 31.1-33.1': Readings on core: HNu = 120.0; OVA = 0.4; Ludlum = 0. 33.1-34.1': Readings on core: HNu = 40; OVA = 0.4; Ludlum = 0.

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 61-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			Total depth measured 31.1'. Adjust depth. 31.1-33.1' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above. 33.1-34.1' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above. TOTAL DEPTH: 34.1'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 61-87

Coordinates N 39881.26 E 19974.80

Elevation: Ground Surface 5984.00'

Total Depth: Well 28.5'

Top of Casing 5985.75'

Borehole 34.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed November 25, 1987

Approved By

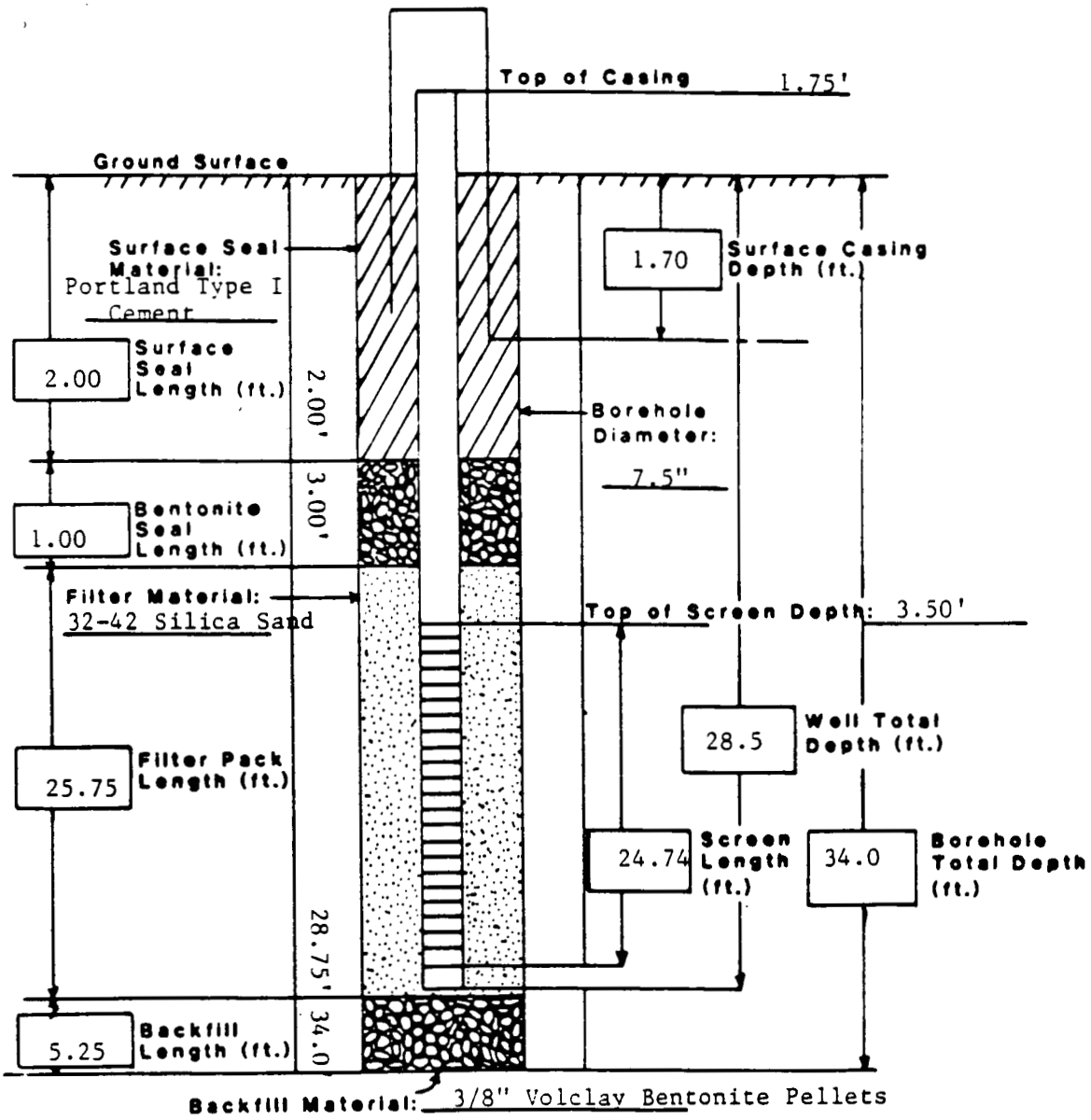
Site Manager

Installed By J. Bacchus

Geologist

CEARP Manager

Comments



Well No.: 61-37

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
11/7/87	1000	Pumping	----------	Sandy	Water level 11.4' before pumping Water level 9.8' after pumping
					Hole depth 27.1'

PROGRAM SLUGT, VERSION 4,OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-27-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 61-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 24.74 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 15.78 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 15.78 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 20

TIME (sec)	HEAD (FEET)
50.00	.440
55.00	.400
60.00	.380
65.00	.350
70.00	.320
75.00	.300
80.00	.280
85.00	.260
90.00	.240
95.00	.230
100.00	.220
110.00	.190
120.00	.170
140.00	.140
160.00	.110
180.00	.090
200.00	.070
220.00	.060
241.00	.050
271.00	.040

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED VALUES FOR H0 (FEET)

.0824

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = .71 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF 'T' RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	7.933E-05	5.027E-06	3.107E-05	1.507E-04	1.508078	82.78	.00
1.000E-02	1.000E-02	1.282E-04	8.122E-06	7.128E-05	1.916E-04	.939104	47.74	35.04
1.000E-03	1.000E-03	1.773E-04	1.123E-05	1.144E-04	2.320E-04	.663757	31.35	16.39
1.000E-04	1.000E-04	2.245E-04	1.423E-05	1.565E-04	2.708E-04	.509031	20.44	10.91
1.000E-05	1.000E-05	2.673E-04	1.694E-05	1.978E-04	3.160E-04	.442568	17.14	3.30
1.000E-06	1.000E-06	3.070E-04	1.946E-05	2.387E-04	3.504E-04	.363523	16.29	.85
1.000E-07	1.000E-07	3.504E-04	2.220E-05	2.793E-04	3.966E-04	.334889	13.67	2.62
1.000E-08	1.000E-08	3.973E-04	2.518E-05	3.192E-04	4.391E-04	.301769	9.96	3.72
1.000E-09	1.000E-09	4.464E-04	2.829E-05	3.591E-04	4.886E-04	.290243	8.38	1.57
1.000E-10	1.000E-10	4.946E-04	3.134E-05	3.988E-04	5.377E-04	.281024	7.06	1.32

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METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 3.24E-05 FT/sec = 9.87E-04 CM/sec

TRANSMISSIVITY = 5.11E-04 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 1.04E-05 FT/sec = 3.17E-04 CM/sec

TRANSMISSIVITY = 1.64E-04 FT**2/sec

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25

LENGTH OF SCREEN OR INTAKE PORTION = 15.56 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 15.78 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 15.78 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 20

TIME (sec)	HEAD (FEET)
50.00	.440
55.00	.400
60.00	.380
65.00	.350
70.00	.320
75.00	.300
80.00	.280
85.00	.260
90.00	.240
95.00	.230
100.00	.220
110.00	.190
120.00	.170
140.00	.140
160.00	.110
180.00	.090
200.00	.070
220.00	.060
241.00	.050
271.00	.040

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	1.874E-04	1.188E-05	1.488E-04	2.759E-04	.677929	43.00	.00
1.000E-02	1.000E-02	2.684E-04	1.688E-05	2.521E-04	3.011E-04	.183879	12.63	30.36
1.000E-03	1.000E-03	3.402E-04	2.156E-05	3.019E-04	3.673E-04	.192231	8.44	4.20
1.000E-04	1.000E-04	4.102E-04	2.600E-05	3.099E-04	4.724E-04	.395998	20.52	-12.08
1.000E-05	1.000E-05	4.808E-04	3.047E-05	3.412E-04	5.775E-04	.491413	25.44	-4.92
1.000E-06	1.000E-06	5.562E-04	3.525E-05	3.770E-04	6.902E-04	.547047	25.10	.34

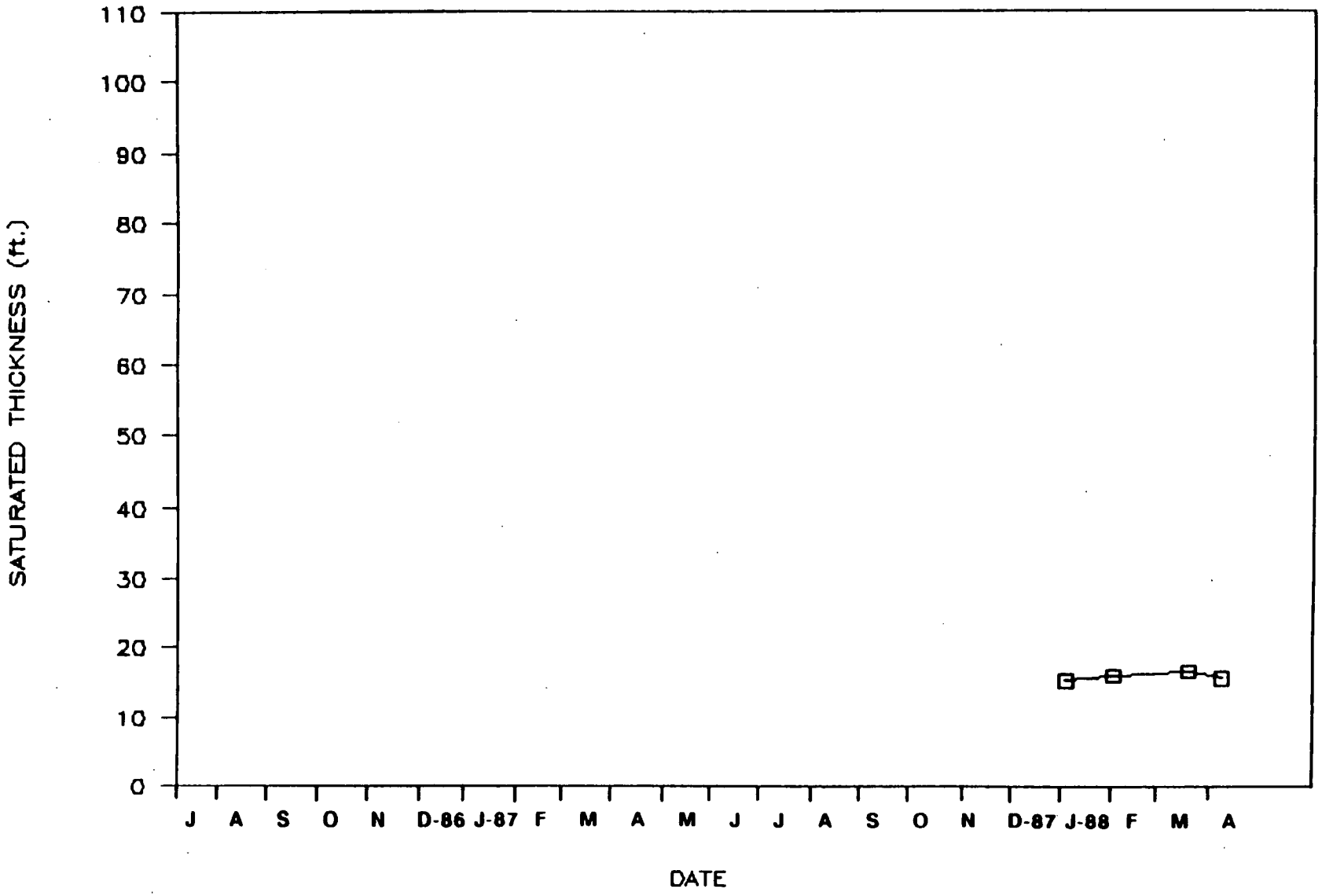
1.000E-07	1.000E-07	6.307E-04	3.997E-05	4.498E-04	7.839E-04	.529774	24.32	.78
1.000E-08	1.000E-08	7.023E-04	4.451E-05	5.310E-04	8.862E-04	.505748	24.05	.27
1.000E-09	1.000E-09	7.697E-04	4.878E-05	6.136E-04	9.880E-04	.486402	22.98	1.08
E-10	1.000E-10	8.435E-04	5.345E-05	6.806E-04	1.089E-03	.484592	21.24	1.73

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6187	01/06/88	5984.00	5985.75	1.75	28.24	13.00	5972.75
	02/04/88					12.30	5973.45
	03/21/88					11.80	5973.95
	04/11/88					12.70	5973.05

SATURATED THICKNESS IN WELL # 61-87



INDEX OF DATA

Boring No.: 62-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area
Coordinates N 39821.22 E 19999.70
Total Depth 30.0'

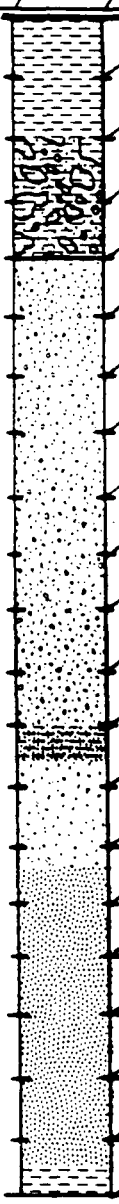
Borehole. Well No. 62-87
Ground Surface Elevation 5984.16'
Water Level Encountered 16.5'
Static 11.50' (4/11/88)

Drilling Company Boyles Bros.
Date Drilled November 24, 1987
Drilling Method Hollow Stem Auger
Logged By R.T. Treat
Geologist

Driller T. High
Helper B. Keeney
Drilling Fluid None
Checked By _____
Site Manager

_____
CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 1.3/2.0' = 65%. CLAY: light brown (5 YR 5/6) to moderate brown (5 YR 4/4) with grayish brown (5 YR 3/2) blotches; fine-grained sand (3.0-2.5 Ø); small size gravel subrounded and rounded; some minor fragments of claystone; low plastic; weakly cemented; moist. 2.0-4.0' SAMPLE. Recovered 0.3/2.0' = 15%. CLAY AND GRAVEL: slightly sandy; moderate brown (5 YR 3/4) to varying light brown (5 YR 5/6) to grayish brown (5 YR 3/2); sand ranging from 3.0-3.5 Ø to 1.0-0.5 Ø; rounded and subrounded gravel; subangular gravel of quartzite composition; scattered cobbles; weakly cemented; poorly sorted; low plastic; moist. **ROCKY FLATS ALLUVIUM** 4.0-7.0' SAMPLE. Recovered 0.0/3.0' = 0%. SAND AND GRAVEL: varying brown; slightly clayey; fine- to medium-grained sand; some scattered cobbles; poorly sorted; weakly cemented; moist. Description based on cuttings. 7.0-8.0' SAMPLE. Center bit used.	HNu Background=0.3 OVA Background=0.0 Ludlum background = 0.0 9.5': Readings in augers: HNu = 75; OVA = 185. 9.5-10.5': Readings on core: HNu = 4.5; OVA = 12.5; Ludlum = 0. 10.5-11.9': Readings on core: HNu = 0; OVA = 8.5; Ludlum = 0. 14.5': Readings in augers: HNu = 0; OVA = 1,000+.
5				
10				
15				
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole/Well No.: 62-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			8.0-9.5' SAMPLE. Recovered 0.0/1.5' = 0%.	
			9.5-10.5' SAMPLE. Recovered 1.3/1.0' = 130%. SAND AND GRAVEL: light brown (5 YR 6/4 and 5 YR 5/6); quartzose gravel (0.2 mm to 2.75 mm); few cobbles; slightly calcareous sand (3.0-2.5 Ø to 1.0-0.5 Ø); weakly cemented; moist.	
25			10.5-12.0' SAMPLE. Recovered 1.4/1.5' = 93%. SAND AND GRAVEL: slightly clayey; otherwise as stated in previous run.	
			12.0-14.5' SAMPLE. Recovered 2.2/2.5' = 88%. 12.0-12.4': CLAYEY SAND: light gray (N 7/0) to varying light brown (5 YR 6/4); fine-grained sand (3.0-2.5 Ø); moderately cemented; moist.	
30			12.4-14.2': SAND AND GRAVEL: moderate brown (5 YR 4/4) to varying lighter brown (5 YR 5/6 and 5 YR 6/4); sand ranging from 2.0-1.5 Ø to 0.0-0.5 Ø; gravel ranging 0.25 mm to 2.50 mm; gravel subrounded, subangular, with few angular; weakly cemented; well sorted; moist.	30.0': Readings in augers: HNu = 0; OVA = 75.
35				
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 62-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.5-17.0' SAMPLE. Recovered 2.1/2.5' = 84%. SAND: moderate brown (5 YR 4/4) to some light brown (5 YR 5/6); slightly clayey; sand ranging from 3.0-2.5 Ø to scattered 1.5-1.0 Ø; some scattered gravel; weakly to non-cemented; very moist to wet at 16.5-16.7', then moist below.	
			17.0-19.5' SAMPLE. Recovered 2.5/2.5' = 100%. SAND: light brown (5 YR 5/6) to pale yellowish brown (10 YR 6/2) with light gray (N 7/0); fine-grained sand (3.0-2.5 Ø); non to weakly cemented; poorly sorted sand; rounded; slightly clayey to very clayey streaked; wet to very moist.	
			19.5-22.0' SAMPLE. Recovered 2.5/2.5' = 100%. 19.5-21.0': CLAY: light gray (N 7/0) with some pale yellowish browns (10 YR 6/2); highly plastic, moderately cemented; slightly sandy (3.0-2.5 Ø); moist. 21.0-22.0': SAND: moderate brown (5 YR 4/6); scattered gravel; fine- to medium-grained sand ranging from 2.5-2.0 Ø to 2.0-1.5 Ø; weakly cemented; very moist.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 62-87 (cont'd.)

Coordinates: _____

Ground Surface Elevation: _____

Total Depth: _____

Water Level Encountered: _____

Static: _____

Drilling Company: _____

Driller: _____

Date Drilled: _____

Helper: _____

Drilling Method: _____

Drilling Fluid: _____

Logged By: _____ Geologist

Checked By: _____ Site Manager

_____ CERP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			22.0-24.5' SAMPLE. Recovered 2.5/2.5' = 100%. 22.0-22.5': SAND AND GRAVEL: light brown (5 YR 5/6); fine-, medium-, and coarse-grained sand ranging from 2.0-1.5 Ø to 0.5-1.0 Ø; small gravel (0.25 mm and to cobble size); weakly to non-cemented; well sorted sand and gravel; wet. 22.5-24.5': SANDY CLAY: light brown (5 YR 5/6) and light brownish gray (5 YR 6/1); fine-grained sand (3.0-2.5 Ø); moderately cemented; low to medium plastic; moist.	
			24.5-26.5' SAMPLE. Recovered 2.0/2.0' = 100%. 24.5-26.3': SANDY CLAY: varying brown with gray; fine-grained sand (3.5-3.0 Ø); moderately cemented; medium plastic; moist.	
			ARAPAHOE FORMATION	
			26.3-26.5': CLAYSTONE: varying dark yellowish brown (10 YR 4/2) to light brown (5 YR 5/6); medium plastic; moderately cemented; weathered; moist.	
			26.5-27.5' SAMPLE. Recovered 1.5/1.0' = 150%. CLAYSTONE: varying brown and gray streaks; moderately oxide stained; moderately cemented; blocky; weathered; moist.	

OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area
Coordinates
Total Depth

Drilling Company
Date Drilled
Drilling Method
Logged By
Geologist

Borehole Well No. 62-87 (cont'd.)
Ground Surface Elevation
Water Level Encountered
Static
Driller
Helper
Drilling Fluid
Checked By
Site Manager
CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			27.5-28.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: pale yellowish brown (10 YR 6/2) to pale brown (5 YR 5/2) and medium light gray (N 6/0); slightly sandy; fine-grained; moderately cemented; highly plastic; blocky; weathered; moist.	
			28.5-30.0' SAMPLE. Recovered 1.5/1.5' = 100%. CLAYSTONE: gray and brown; moderately to slightly oxide stained; massive; medium plastic; blocky; weathered; moist.	
			TOTAL DEPTH: 30.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Coordinates N 39821.22 E 19999.70

Total Depth: Well 26.80'

Borehole 30.0'

Well No. 62-87

Elevation: Ground Surface 5984.16'

Top of Casing 5986.36'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

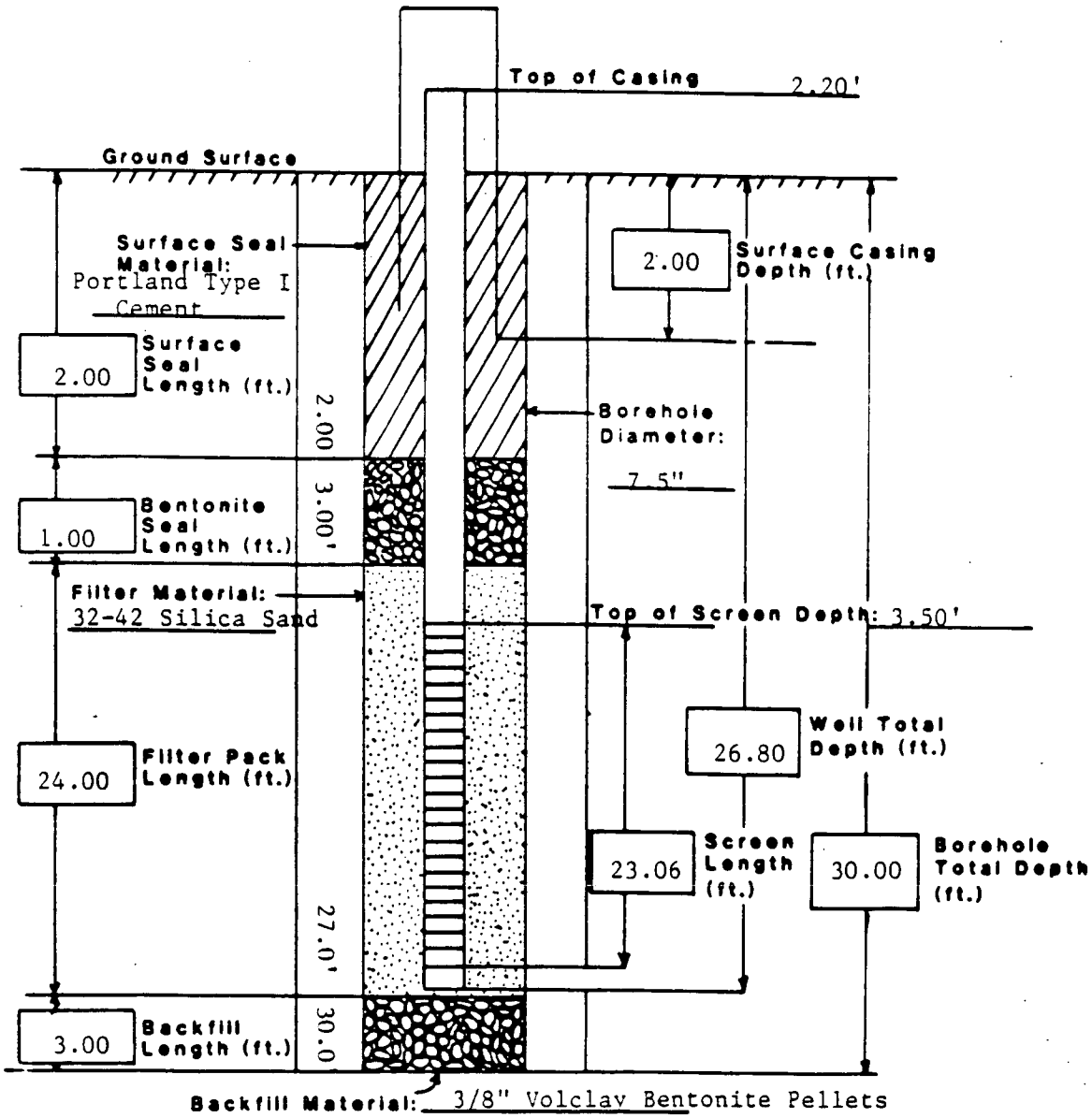
Date Installed November 25, 1987

Approved By _____ Site Manager

Installed By R. Treat Geologist

_____ CEARP Manager

Comments _____



Well No.: 62-3

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
11/7/87	1100	Pumping	-------	Sandy and clayey	Water level 13.7' before pumping Water level 9.3' after pumping-
					Hole depth: 18.1'

PROGRAM SLUGT, VERSION 4,OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-27-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 62-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 23.06 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 13.90 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 13.90 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 26

TIME (sec)	HEAD (FEET)
50.00	.800
55.00	.750
60.00	.730
65.00	.700
70.00	.670
75.00	.640
80.00	.610
90.00	.570
100.00	.520
110.00	.480
120.00	.450
130.00	.420
140.00	.390
150.00	.360
160.00	.340
180.00	.300
200.00	.260
220.00	.230
243.00	.200
263.00	.180
283.00	.160
313.00	.140
343.00	.110
373.00	.100
403.00	.080
463.00	.060

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

.9931
1.0107

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.01 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	3.873E-05	2.786E-06	9.457E-06	8.453E-05	1.938165	157.30	.00
1.000E-02	1.000E-02	6.590E-05	4.741E-06	2.718E-05	1.083E-04	1.231562	89.60	67.71
1.000E-03	1.000E-03	9.372E-05	6.742E-06	4.830E-05	1.318E-04	.890692	58.72	30.88
1.000E-04	1.000E-04	1.209E-04	8.697E-06	6.938E-05	1.520E-04	.683098	40.25	18.47
1.000E-05	1.000E-05	1.462E-04	1.052E-05	8.997E-05	1.744E-04	.577646	29.37	10.88
[illegible]E-06	1.000E-06	1.707E-04	1.228E-05	1.102E-04	2.013E-04	.533890	26.50	2.87
1.000E-07	1.000E-07	1.948E-04	1.402E-05	1.302E-04	2.224E-04	.473586	22.75	3.75
1.000E-08	1.000E-08	2.205E-04	1.586E-05	1.499E-04	2.503E-04	.455033	20.08	2.66
1.000E-09	1.000E-09	2.468E-04	1.775E-05	1.696E-04	2.779E-04	.438897	17.96	2.12
1.000E-10	1.000E-10	2.731E-04	1.965E-05	1.891E-04	3.060E-04	.428030	15.75	2.18

****

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 2.04E-05 FT/sec = 6.21E-04 CM/sec

TRANSMISSIVITY = 2.33E-04 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 6.61E-06 FT/sec = 2.01E-04 CM/sec

TRANSMISSIVITY = 9.19E-05 FT**2/sec

WELL NO.: 62-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25

LENGTH OF SCREEN OR INTAKE PORTION = 13.50 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 13.90 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 13.90 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 26

TIME (sec)	HEAD (FEET)
50.00	.800
55.00	.750
60.00	.730
65.00	.700
70.00	.670
75.00	.640
80.00	.610
90.00	.570
100.00	.520
110.00	.480
120.00	.450
130.00	.420
140.00	.390
150.00	.360
160.00	.340
180.00	.300
200.00	.260
220.00	.230
243.00	.200
263.00	.190
293.00	.160
313.00	.140
343.00	.110
373.00	.100
403.00	.080
463.00	.060

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS

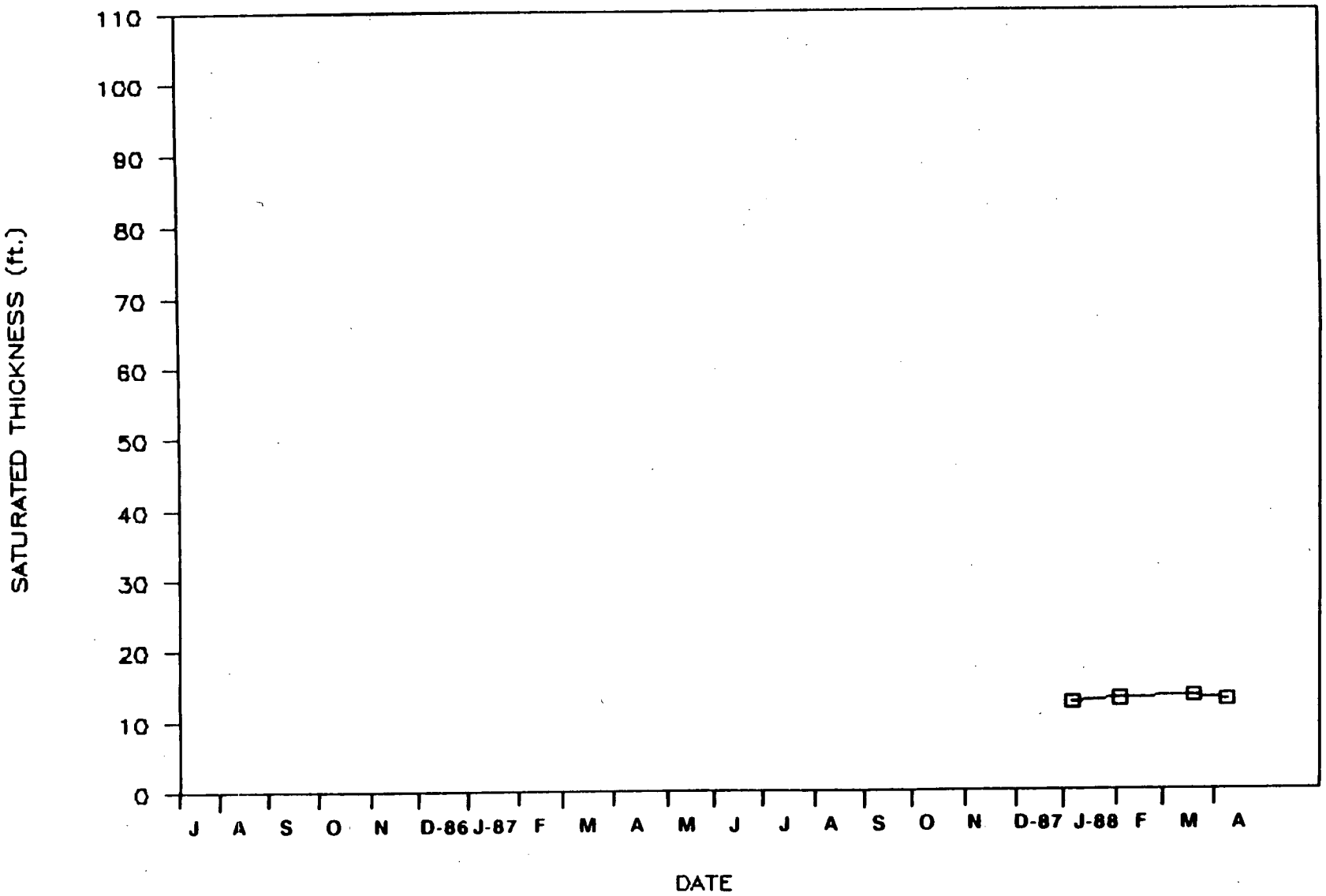
1.000E-01	1.000E-01	6.889E-05	4.956E-06	4.852E-05	1.183E-04	1.013141	98.68	.00
1.000E-02	1.000E-02	1.104E-04	7.941E-06	1.020E-04	1.430E-04	.372098	34.38	54.30
1.000E-03	1.000E-03	1.511E-04	1.087E-05	1.455E-04	1.621E-04	.109711	6.96	27.42
1.000E-04	1.000E-04	1.902E-04	1.368E-05	1.473E-04	2.177E-04	.370100	24.71	-17.76
1.000E-05	1.000E-05	2.269E-04	1.632E-05	1.571E-04	2.719E-04	.506398	40.57	-15.86
1.000E-06	1.000E-06	2.640E-04	1.900E-05	1.720E-04	3.253E-04	.580776	46.80	-6.24
1.000E-07	1.000E-07	3.019E-04	2.172E-05	2.070E-04	3.786E-04	.568362	45.43	1.37
1.000E-08	1.000E-08	3.406E-04	2.450E-05	2.375E-04	4.309E-04	.567972	41.94	3.49
1.000E-09	1.000E-09	3.795E-04	2.730E-05	2.819E-04	4.833E-04	.530516	40.85	1.09
1.000E-10	1.000E-10	4.193E-04	3.016E-05	3.234E-04	5.352E-04	.505300	39.65	1.20

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6287	01/06/88	5984.16	5986.36	2.20	26.56	14.10	5972.26
	02/04/88					13.60	5972.76
	03/21/88					13.20	5973.16
	04/11/88					13.70	5972.66

SATURATED THICKNESS IN WELL # 62-87



INDEX OF DATA

Boring No.: 63-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39738.07 E 20040.50
Total Depth: 30.0'

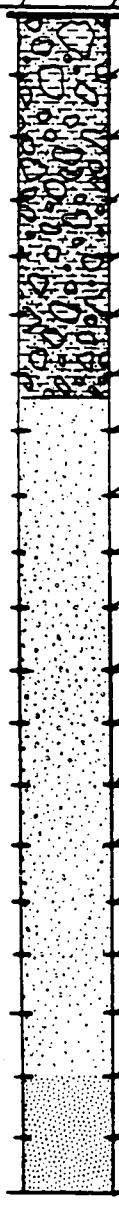
Borehole Well No.: 63-87
Ground Surface Elevation: 5985.42'
Water Level Encountered: 14.0'
Static: 13.56' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 30-December 1, 1987
Drilling Method: Hollow Stem Auger
Logged By: R.T. Treat
Geologist

Driller: S. Bradfield
Helper: P. Mesa
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 0.4/2.0' = 30%. GRAVELLY CLAY: dusky yellowish brown (10 YR 2/2) to light brown (5 YR 5/6); asphalt and cobbles on or near surface; slightly sandy gravel; gravel subrounded to rounded; 0.50 mm to cobble size, poorly sorted sand; weakly cemented; moist. 2.0-4.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY AND GRAVELS with small amount of claystone and small asphalt fragments noted; moderate brown (5 YR 3/4 and 5 YR 4/4) to light brown (5 YR 5/6 and 5 YR 6/4); gravel (3.75 mm) with scattered cobbles; poorly sorted sand and gravel; small amount of claystone; small amount asphalt fragments; moderately cemented; low to medium plastic; moist. 4.0-6.0' SAMPLE. Recovered 0.0/20.'=0%. 6.0-8.0' SAMPLE. Recovered 1.3/2.0' = 65%. 6.0-6.5': CLAY AND GRAVEL: same as above.	HNu Background=0.4 OVA Background=0.0 Ludlum background = 0.0 0.0-0.4': Reading on core; Hnu = 0; OVA = 1.4; Ludlum = 0. 2.0-4.0': Readings on core; HNu = 0; OVA = 0.8; Ludlum = 0. 6.0-7.3': Readings on core: Hnu = 0; OVA = 12.0; Ludlum = 0. 8.0': Reading in augers: HNu = 0; OVA = 1000+. 8.0-9.6': Readings on core: HNu = 7.5; OVA = 52; Ludlum = 0. 10.0-10.5': Readings on core: HNu = 0; OVA = 5.5; Ludlum = 0. 12.0-13.0': Readings on core: HNu = 86; OVA = 28; Ludlum = 0.
5				
10				
15				
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole/Well No.: 63-87 (cont'd.)

Coordinates: _____

Ground Surface Elevation: _____

Total Depth: _____

Water Level Encountered: _____

Static: _____

Drilling Company: _____

Driller: _____

Date Drilled: _____

Helper: _____

Drilling Method: _____

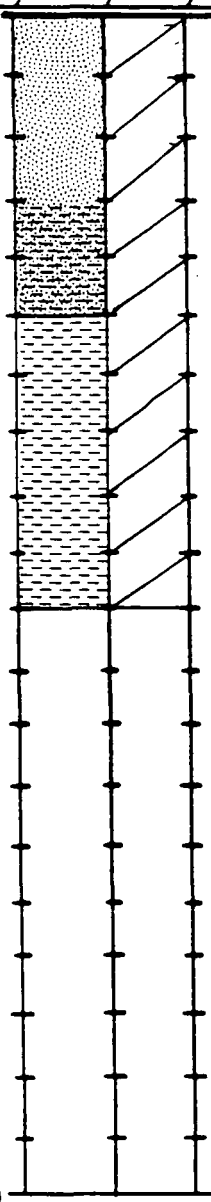
Drilling Fluid: _____

Logged By: _____ Geologist

Checked By: _____ Site Manager

_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			**ROCKY FLATS ALLUVIUM** 6.5-7.3': SAND AND GRAVEL: light brown (5 YR 5/6 and 5 YR 6/4) to some moderate brown (5 YR 4/6) sand (2.5-2.0 Ø); rounded and poorly sorted; gravel (0.35 mm to 3.00 mm); angular and subangular; weakly cemented; moist. 8.0-10.0' SAMPLE. Recovered 1.6/2.0' = 80%. SAND AND GRAVEL: moderate brown (5 YR 4/4) to multi-colored browns ranging from moderate yellowish brown (10 YR 5/4) to light brown (5 YR 5/6 and 5 YR 6/4); angular and subangular gravel (0.25 mm to scattered cobbles); sand fine-grained (3.5-3.0 Ø) to scattered (0.5-00 Ø); weakly cemented; dense; light moist. 10.0-11.0' SAMPLE. Recovered 0.5/1.0' = 50%. SAND AND GRAVEL: varying light brown (5 YR 5/6 and 5 YR 6/4); sand (3.0-2.5 Ø) with scattered larger grains and small cobbles; subangular, angular, and few rounded; poorly sorted; weakly to moderately cemented; light moist. 11.0-12.0' SAMPLE. Center bit used. 12.0-14.0' SAMPLE. Recovered 1.0/2.0' = 50%. SAND AND GRAVEL: same as above.	14.0-15.2': Readings on core: HNu = 14.5; OVA = 8.8; Ludlum = 0. 18.0-18.6': Readings on core: HNu = 10.2; OVA = 5.5; Ludlum = 0. 19.0-20.2': Readings on core: HNu = 0; OVA = 4.2; Ludlum = 0. 21.0-21.7': Readings on core: HNu = 0; OVA = 16; Ludlum = 0. 23.0-25.0': Readings on core: HNU = 0; OVA = 10; Ludlum = 0.
25				
30				
35				
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 63-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.0-16.0' SAMPLE. Recovered 1.2/2.0' = 60%. SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4) to varying light brown (5 YR 5/6) and moderate brown (5 YR 4/4); fine- to coarse-grained sand ranging from 2.5-2.0 Ø to scattered (0.5-0.0 Ø); rounded; scattered gravel (0.55 mm up to 2.25 mm); rounded and subrounded; slightly clayey; wet at 14.0' to very moist.	
			16.0-18.0' SAMPLE. Recovered 0.0/2.0' = 0%. Cuttings appear as continuing sand and gravel deposits.	
			18.0-19.0' SAMPLE. Recovered 0.6/1.0' = 60%. SAND: moderate brown (5 YR 4/4) varying light brown (5 YR 5/6); medium- and coarse-grained sand (2.0-1.5 Ø to 0.5-0.06 Ø); small size scattered gravel; poorly sorted; very moist to moist.	
			19.0-21.0' SAMPLE. Recovered 1.2/2.0' = 60%. SAND: light brown (5 YR 5/6 and 5 YR 6/4) to medium brown (5 YR 4/4); slightly clayey to very clayey; medium- and coarse-grained to fine-grained sand (2.5-2.0 Ø); moderately cemented; very clayey; very moist to moist.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates:
Total Depth:

Borehole Well No.: 63-87 (cont'd.)
Ground Surface Elevation:
Water Level Encountered:
Static:

Drilling Company:
Date Drilled:
Drilling Method:
Logged By: Geologist

Driller:
Helper:
Drilling Fluid:
Checked By: Site Manager
CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			21.0-23.0' SAMPLE. Recovered 0.7/2.0' = 35%. CLAYEY SAND: varying brown (5 YR 5/2); sand (2.5-2.0 Ø) with some scattered coarse-grained, small-size gravel (0.25 mm); low plastic; moderately cemented; moist.	
			23.0-25.0' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAY: varying with light brown (5 YR 5/6 and 5 YR 6/4) to moderate brown (5 YR 3/4); blotchy with dark yellowish orange (10 YR 6/6) to pale yellowish brown (10 YR 6/2); sand (3.0-2.5 Ø) with moist, coarse-grained (1.5-1.0 Ø); poorly sorted; moderately cemented; massive; low to medium plastic; stiff; moist.	
			ARAPAHOE FORMATION	
			25.0-27.0' SAMPLE. Recovered 2.0/2.0' = 100%.	
			CLAYSTONE: moderately oxide (Fe) stained browns of moderate yellowish browns (10 YR 5/4) with dark yellowish orange (10 YR 6/5) to predominantly light gray (N 7/0) to medium light gray (N 5/0); medium to highly plastic; moderately cemented; slightly calcareous streaked; massive; weathered; moist.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 63-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			27.0-29.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); blocky; massive; now only slightly oxide (Fe) stained in thin streaks; medium to highly plastic; weathered; moist.	
			29.0-30.0' SAMPLE. Recovered 0.0/1.0' = 0%. CLAYSTONE: based on pieces in hollow stem auger; weathered.	
			TOTAL DEPTH: 30.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Coordinates N 39738.07 E 20040.50

Total Depth: Well 25.5'

Borehole 30.0'

Well No. 63-87

Elevation: Ground Surface 5985.42'

Top of Casing 5987.06'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

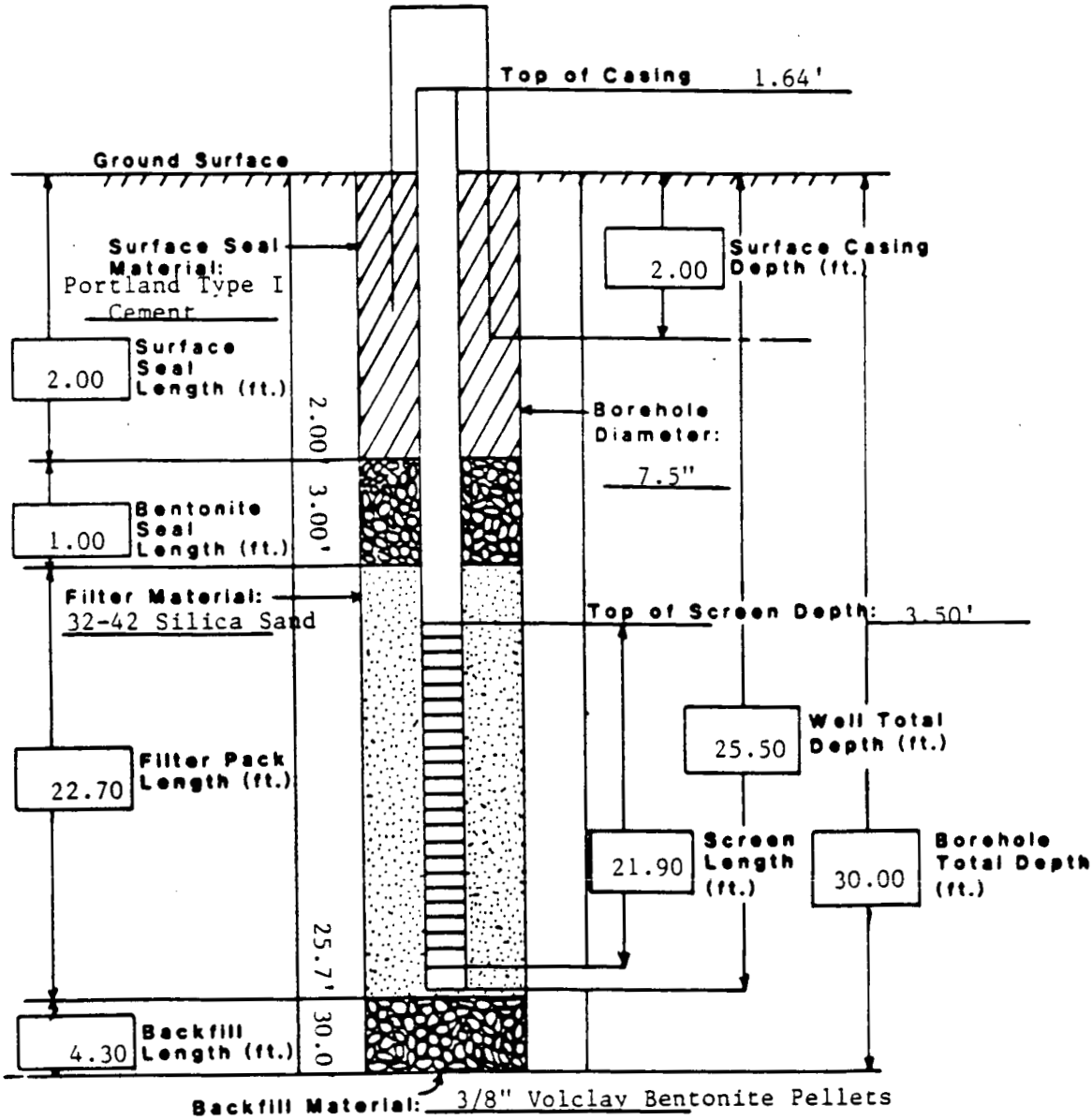
Date Installed December 1, 1987

Approved By _____ Site Manager

Installed By R. Treat Geologist

_____ CEARP Manager

Comments _____



Well No.: 63-87

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
11/7/87	1200	Pumping	---------	Very muddy	Water level 15' before pumping; Water level 20.2' after pumping
					Hole depth: 26.2'

PROGRAM SLUGT, VERSION 4,OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-27-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 63-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 21.90 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 10.84 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 10.84 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 19

TIME (sec)	HEAD (FEET)
100.00	.460
110.00	.430
120.00	.390
130.00	.360
150.00	.310
170.00	.260
190.00	.230
210.00	.210
230.00	.170
248.00	.160
268.00	.130
298.00	.120
328.00	.100
358.00	.090
388.00	.070
448.00	.050
508.00	.040
568.00	.030
608.00	.020

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED VALUES FOR HO (FEET)

.7368
.7342

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = .73 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	5.047E-05	4.656E-06	1.519E-05	1.220E-04	2.116768	253.07	.00
1.000E-02	1.000E-02	7.452E-05	6.875E-06	3.498E-05	1.302E-04	1.278183	145.07	108.00
1.000E-03	1.000E-03	9.791E-05	9.032E-06	5.623E-05	1.406E-04	.861636	86.99	58.07
1.000E-04	1.000E-04	1.202E-04	1.109E-05	7.702E-05	1.612E-04	.700535	60.82	26.17
1.000E-05	1.000E-05	1.417E-04	1.308E-05	9.738E-05	1.930E-04	.674274	59.19	1.63
1.000E-06	1.000E-06	1.649E-04	1.522E-05	1.176E-04	2.283E-04	.671364	61.30	-2.11
1.000E-07	1.000E-07	1.875E-04	1.730E-05	1.376E-04	2.256E-04	.469558	40.35	20.95
1.000E-08	1.000E-08	2.110E-04	1.946E-05	1.573E-04	2.451E-04	.416385	37.33	3.03
0E-09	1.000E-09	2.337E-04	2.156E-05	1.769E-04	2.772E-04	.429042	35.42	1.91
1.000E-10	1.000E-10	2.576E-04	2.376E-05	1.965E-04	3.122E-04	.449264	35.98	-.56

****

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 2.19E-05 FT/sec = 6.68E-04 CM/sec

TRANSMISSIVITY = 2.38E-04 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 7.28E-06 FT/sec = 2.22E-04 CM/sec

TRANSMISSIVITY = 7.90E-05 FT**2/sec

WELL NO.: 63-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25

LENGTH OF SCREEN OR INTAKE PORTION = 10.61 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 10.84 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 10.84 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 19

TIME (sec)	HEAD (FEET)
100.00	.460
110.00	.430
120.00	.390
130.00	.360
150.00	.310
170.00	.260
190.00	.230
210.00	.210
230.00	.170
248.00	.160
268.00	.130
298.00	.120
328.00	.100
358.00	.090
388.00	.070
448.00	.050
508.00	.040
568.00	.030
608.00	.020

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	1.071E-04	9.883E-06	6.963E-05	2.358E-04	1.551434	192.91	.00
1.000E-02	1.000E-02	1.432E-04	1.321E-05	1.208E-04	2.504E-04	.905632	113.45	79.46
1.000E-03	1.000E-03	1.779E-04	1.641E-05	1.624E-04	2.648E-04	.575545	72.50	40.95
1.000E-04	1.000E-04	2.118E-04	1.954E-05	1.675E-04	2.827E-04	.543689	56.60	15.90
1.000E-05	1.000E-05	2.429E-04	2.241E-05	1.736E-04	3.046E-04	.539369	53.98	2.62
1.000E-06	1.000E-06	2.739E-04	2.527E-05	1.895E-04	3.313E-04	.517712	52.89	1.09
1.000E-07	1.000E-07	3.058E-04	2.821E-05	2.297E-04	3.761E-04	[illegible]	45.49	7.70

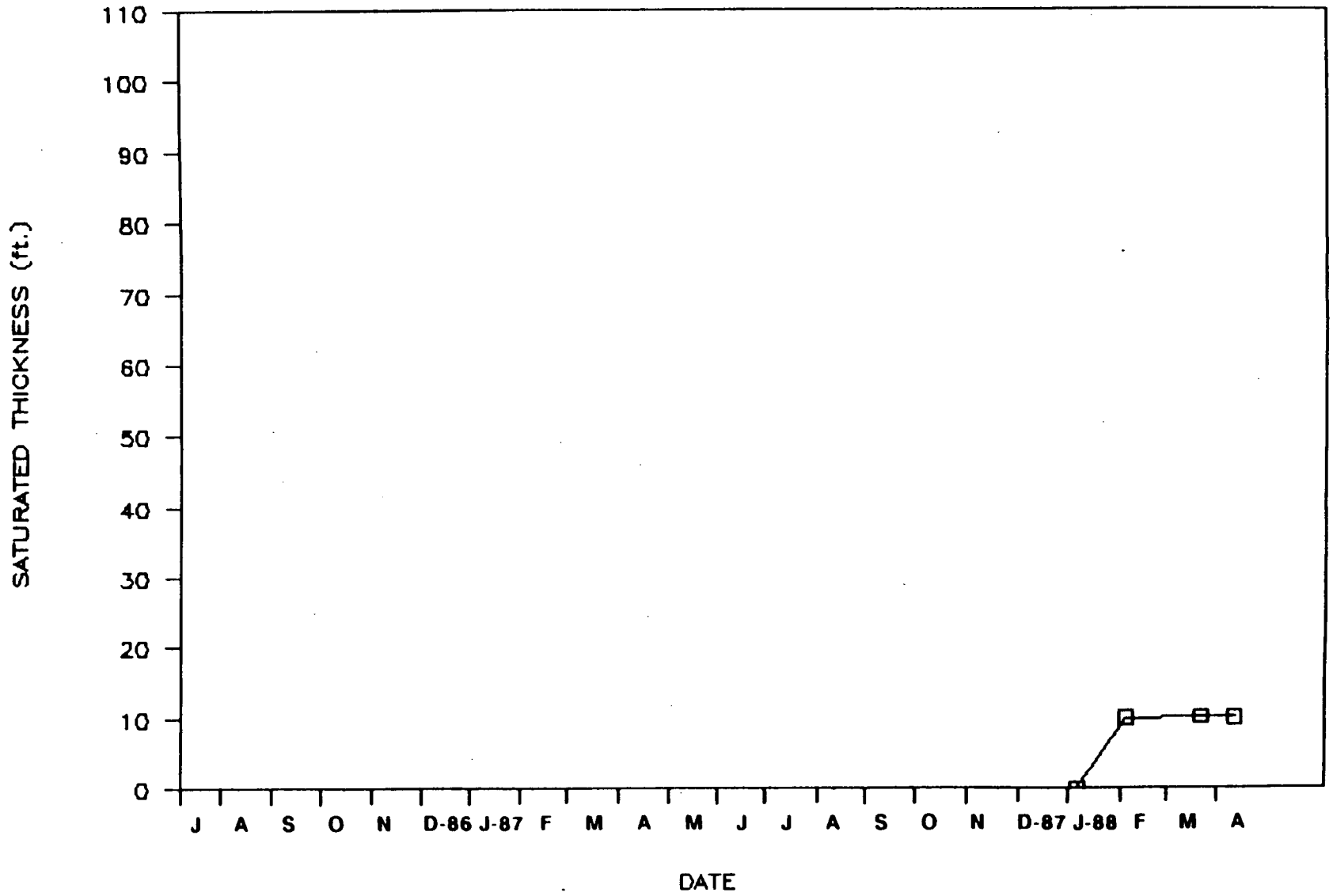
1.000E-08	1.000E-08	3.409E-04	3.145E-05	2.768E-04	4.254E-04	.435921	37.55	8.14
1.000E-09	1.000E-09	3.794E-04	3.500E-05	3.247E-04	4.744E-04	.394452	31.10	6.45
1.000E-10	1.000E-10	4.192E-04	3.867E-05	3.602E-04	5.232E-04	.388813	30.09	1.01

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6387	01/06/88	5985.42	5987.06	1.64	25.40	-1.00	DRY
	02/04/88					15.30	5971.76
	03/21/88					15.10	5971.96
	04/11/88					15.20	5971.86

SATURATED THICKNESS IN WELL # 63-87



INDEX OF DATA

Boring No.: 64-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39349.01 E 20162.23
Total Depth: 28.0'

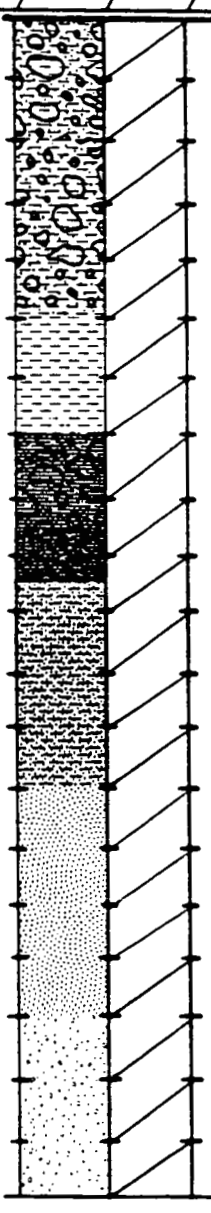
Borehole Well No.: 64-87
Ground Surface Elevation: 5985.89'
Water Level Encountered: 14.5'
Static: 16.76' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 2-4, 1987
Drilling Method: Hollow Stem Auger
Logged By: R.T. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0 5 10 15 20			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 0.0/2.0' = 0%. Cuttings appeared as clay with gravel; sandy; some asphalt fragments. 2.0-4.0' SAMPLE. Recovered 0.0/2.0' = 0%. 4.0-5.0' SAMPLE. Center bit used. 5.0-7.0' SAMPLE. Recovered 2.0/2.0' = 100%. 5.0-6.0': CLAY: moderate yellowish brown (10 YR 5/4); fine-grained sand with gravel; grayish brown (5 YR 3/2) to dusky brown (5 YR 2/2); slightly clayey, fine-, medium- and coarse-grained sand (1.0-2.5 Ø to 0.5-1.00 Ø); gravel 0.15 mm up to 1.75 mm; subrounded, angular, and angular; weakly cemented; poorly sorted gravel; well sorted sand; few scattered asphalt fragments; light moist.	HNu Background=0.2 OVA Background=0.0 Ludlum Background = 0 5.0-7.0': Readings on core: HNu = 2.5; OVA = 11; Ludlum = 0. 7.0-7.6': Readings on core: HNu = 15.5; OVA = 310; Ludlum = 0. 13.0-14.5': Readings on core: HNu = 0; OVA = 38; Ludlum = 0. 14.5-17.0': Readings on core: HNu = 0; OVA = 12.5; Ludlum = 0. 17.0-19.5': Readings on core: HNu = 0; OVA = 11.4; Ludlum = 0. 19.5-22.0': Readings on core: HNu = 0; OVA = 13.5; Ludlum = 0.

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates:
Total Depth:

Borehole/Well No.: 64-87 (cont'd.)
Ground Surface Elevation:
Water Level Encountered:
Static:

Drilling Company:
Date Drilled:
Drilling Method:
Logged By: Geologist

Driller:
Helper:
Drilling Fluid:
Checked By: Site Manager
CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			7.0-9.5' SAMPLE. Recovered 0.6/2.5' = 24%. SILTY SAND WITH GRAVEL: dusky brown (5 YR 2/2); sand ranging from 3.5-3.0 Ø to 2.0-1.5 Ø; weakly cemented; poorly sorted; gravel ranging from 0.25-0.75 mm; light moist. SPECIAL NOTE: During this run, most of the cuttings now appearing as a sanitary landfill deposit. Consisting of wood particles, insulated wire fragments, construction ribbon, surgical gloves, saranex suits, and assorted plastics.	22.0': Readings in augers: HNu = 18.4; OVA = 1,000+. 22.0-24.5': Readings on core: HNu = 0; OVA = 13.2; Ludlum = 0. 24.5-25.5': Readings on core: HNu = 0; OVA = 8.2; Ludlum = 0. 25.5-27.0': Readings on core: HNu = 0; OVA = 4.8; Ludlum = 0.
25				
			9.5-12.0' SAMPLE. Recovered 0.0/2.5' = 0%. Auger cuttings during this run now appearing as a CLAYEY SAND or a very SANDY CLAY: moderate olive brown (5 Y 4/4) to an olive gray (5 Y 3/2); fine-grained sand (3.0-2.5 Ø); scattered amounts of continued trash debris.	
30				
			12.0-13.0' SAMPLE. Center bit used.	
			13.0-14.5' SAMPLE. Recovered 1.5/1.5' = 100%. SAND: moderate yellowish brown (10 YR 5/4) to dark yellowish orange (10 YR 6/6); well sorted sand ranging from 2.5-2.0 Ø to 0.0-0.5 Ø; rounded, subrounded, and some angular; weakly cemented; slightly clayey; moist to very moist at end.	
35				
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 64-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.5-17.0' SAMPLE. Recovered 2.5/2.5' = 100%. SAND: light brown (5 YR 5/6), moderate brown (5 YR 4/4) to pale yellowish brown (10 YR 6/2), and dark yellowish orange (10 YR 6/6); sand ranging from 3.5-3.0 Ø up to 2.0-2.5 Ø; weakly cemented; poorly sorted; clayey sand with coarse deposits noted from 16.5-17.0' and some scattered gravel below 16.5'; saturated sand at 14.5' to otherwise moist deposits.	
			17.0-19.5' SAMPLE. Recovered 2.5/2.5' = 100%. SAND AND GRAVEL: colors as stated in previous run; sand grain size as above and somewhat finer; poorly sorted; clayey to very clayey; scattered gravel ranging from 0.50 mm to a few 2.25 mm; weakly to moderately cemented; moist.	
			19.5-22.0' SAMPLE. Recovered 2.5/2.5' = 100%. 19.5-20.5': SAND AND GRAVEL: as noted in previous run. 20.5-22.0': SLIGHTLY SANDY CLAY: pale yellowish brown (10 YR 6/2) to light gray (N 6/0); scattered sand (2.0-1.5 Ø); moderately cemented; low plastic; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 64-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			22.0-24.5' SAMPLE. Recovered 2.5/2.5' = 100%. 22.0-23.3': CLAY: moderate yellowish brown (10 YR 5/4) to dark yellowish orange (10 YR 6/6) with some light brown (5 YR 5/6); fine-grained sand (3.0-2.5 Ø); low to medium plastic; moderately cemented; moist.	
			ARAPAHOE FORMATION	
			23.3-24.5': CLAYSTONE: light brown (5 YR 6/4 to 5 YR 5/6) to moderate brown (5 YR 4/4); sandy to very sandy streaks; fine-grained sand (3.0-2.5 Ø); moderately cemented; severely oxide stained; low plastic; poorly sorted; highly weathered; moist.	
			24.5-25.5' SAMPLE. Recovered 1.3/1.0' = 130%. CLAYEY SANDSTONE: dark yellowish orange (10 YR 6/6) to light brown (5 YR 5/6) and pale brown (5 YR 5/2); fine-grained sand (3.5-3.0 Ø to 3.0-2.5 Ø); severely oxide stained; weakly cemented; poorly sorted; weathered; moist.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 64-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			25.5-27.0' SAMPLE. Recovered 1.5/1.5' = 100%. CLAYEY SANDSTONE: yellowish orange (10 YR 6/6) to light brown (5 YR 5/6) with blotches of light gray (N 7/0); streaky; fine-grained sand (3.0-2.5 Ø to 2.5-2.0 Ø); weakly cemented; poorly sorted; massive; highly weathered; moist to very moist at bottom of run.	
			27.0-28.0' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYEY SANDSTONE: as noted in previous run.	
			TOTAL DEPTH: 28.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 64-87

Coordinates N 39349.01 E 20162.23

Elevation: Ground Surface 5985.89'

Total Depth: Well 23.8'

Top of Casing 5987.33'

Borehole 28.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 4, 1987

Approved By

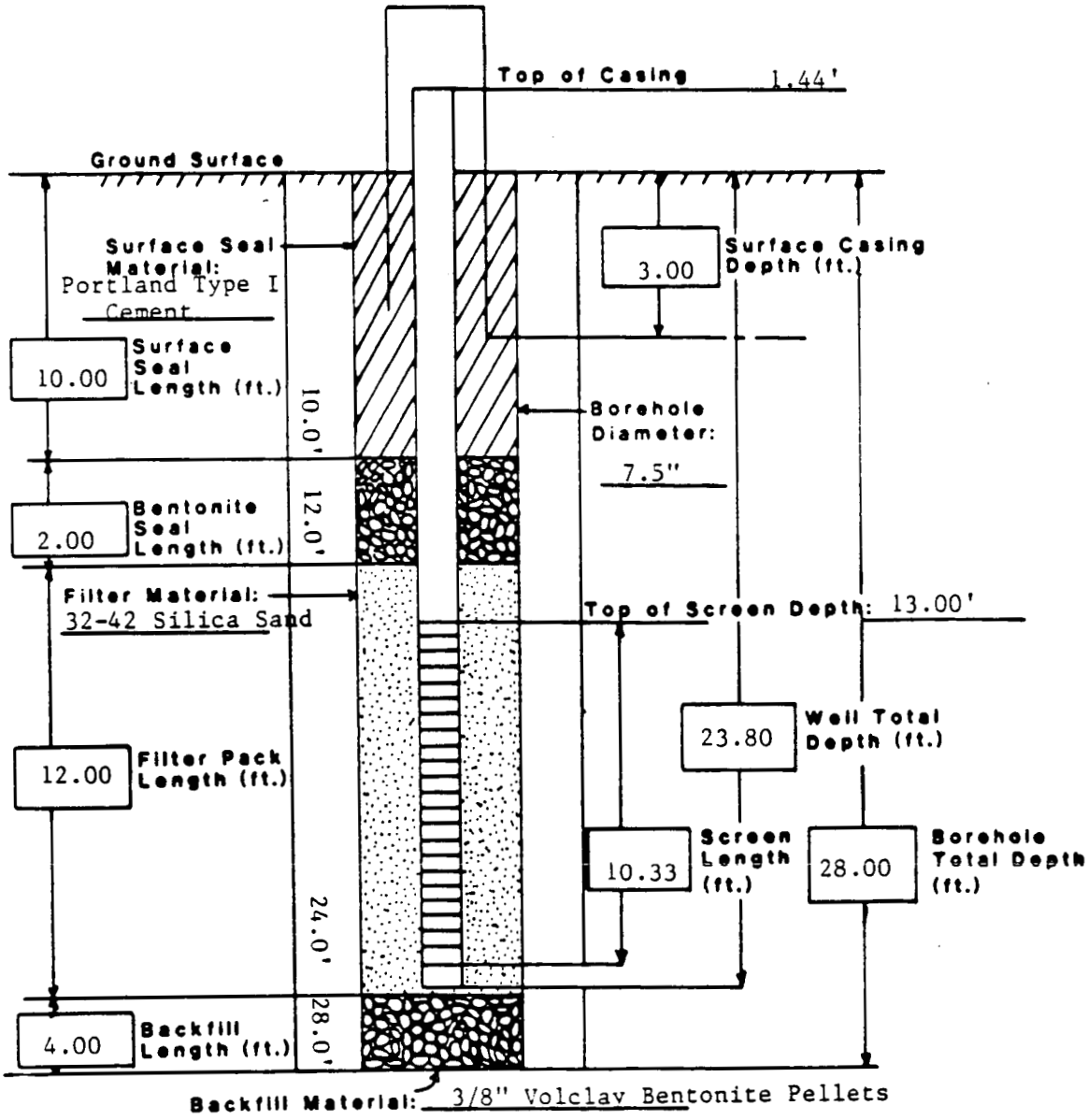
Site Manager

Installed By R. Treat

Geologist

CEARP Manager

Comments

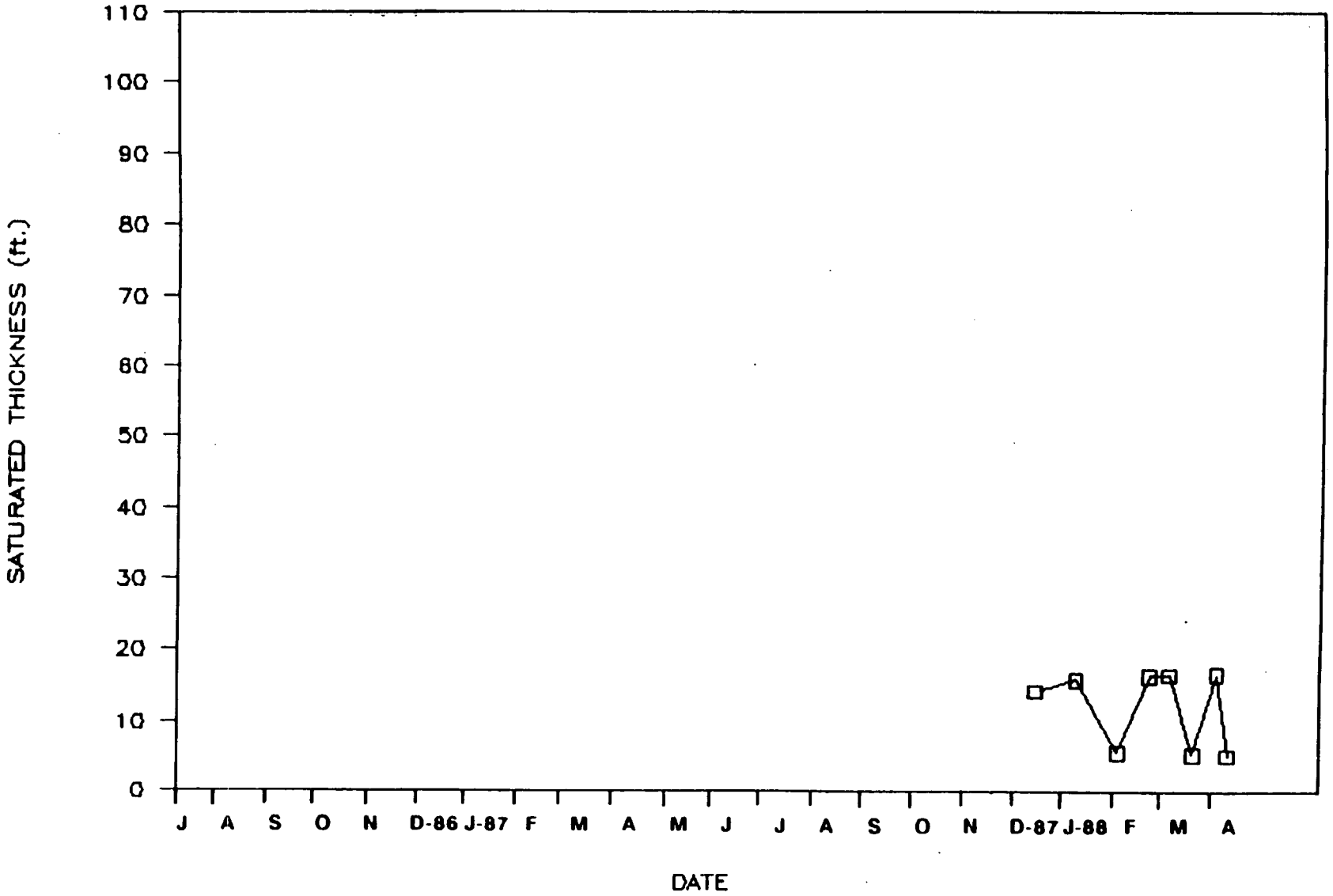


ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6487	12/16/87	5985.89	5987.33	1.44	23.30	9.00	5978.33
	01/09/88					7.50	5979.83
	02/04/88					17.60	5969.73
	02/24/88					6.90	5980.43
	03/07/88					6.80	5980.53
	03/21/88					17.90	5969.43
	04/04/88					6.70	5980.63
	04/11/88					18.20	5969.13

SATURATED THICKNESS IN WELL # 64-87



INDEX OF DATA

Boring No.: 65-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39250.14 E 20200.22
Total Depth: 27.0'

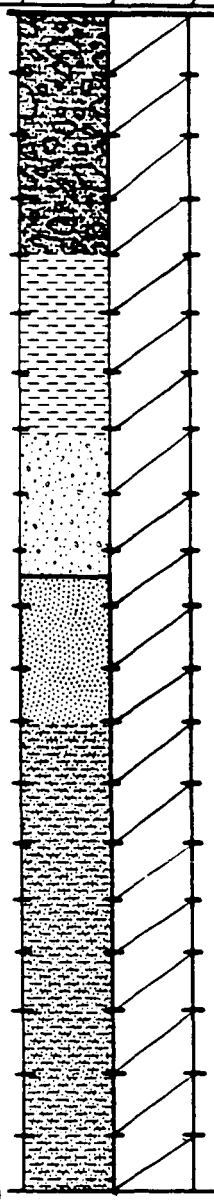
Borehole/Well No.: 65-87
Ground Surface Elevation: 5983.08'
Water Level Encountered: 14.0'
Static: 10.46' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 8-9, 1987
Drilling Method: Hollow Stem Auger
Logged By: R.T. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0 5 10 15 20			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 1.4/2.0' = 70%. CLAYEY SAND AND GRAVEL: light brown (5 YR 5/6) to moderate brown (5 YR 4/4); ranging from 2.5-2.0 Ø to 0.0-0.5 Ø; rounded and subrounded gravel (0.50 mm to scattered cobbles); lower portion of sample is black (N 1/0) to dusky brown (5 YR 2/2); moist to damp. 2.0-4.0' SAMPLE. Recovered 1.6/2.0' = 80%. 2.0-2.5': CLAYEY SAND AND GRAVEL: as noted in previous run. 2.5-3.6': CLAY: light brown (5 YR 5/6 and 5 YR 6/4) to pale yellowish brown (10 YR 6/2) and dark yellowish orange (10 YR 6/5) with blotches of dusky brown (5 YR 2/2); some claystone and sandstone fragments; scattered gravel to 3.25 mm; angular; subangular; moist. 4.0-7.0' SAMPLE. Recovered 2.2/3.0' = 73%. CLAY: colors as stated above; sandy; little scattered gravel; more claystone fragments than above; low plastic; moderately cemented; moist.	OVA Background=0.8 HNu Background=0.2 Ludlum Background = 0 0.0-1.4': Readings on core: HNu = 0; OVA = 115. 2.0-3.6': Readings on core: HNu = 1.2; OVA = 210. 4.0-6.2': Readings on core: HNu = 1.4; OVA = 10. 7.0-8.3': Readings on core: HNu = 0.0; OVA = 95. 9.5-11.6': Readings on core: HNu = 0.0; OVA = 95. 12.0': Readings in augers: HNu = 0.0; OVA = 320; Gastech = 5% LEL. 12.0-14.1': Readings on core: HNu = 0.4; OVA = 92. 14.5-16.3': Readings on core: HNu = 0.0; OVA = 55.

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 65-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			7.0-9.5' SAMPLE. Recovered 1.3/2.5' = 52%. 7.0-7.1': CLAY: colors as noted above; moderately cemented; very sand; poorly sorted sand; moist. 7.1-8.3': SAND AND GRAVEL: pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2); sand varying (2.0-1.5 Ø to scattered 0.5-1.0 Ø); poorly sorted gravel ranging from 0.25 mm to 1.75 mm; weakly to non-cemented; very clayey at base; light moist.	17.0-19.2': Readings on core: HNu = 0.0; OVA = 9.5.
25				19.5-22.0': Readings on core: HNu = 0.0; OVA = 8.8.
				22.0-24.0': Readings on core: HNu = 2.2; OVA = 38.
			ROCKY FLATS ALLUVIUM	24.0-25.0': Readings on core: HNu = 0.0; OVA = 35.
30			9.5-12.0' SAMPLE. Recovered 2.1/2.5' = 84%. SAND: moderate yellowish brown (10 YR 5/4) to varying light brown (5 YR 5/6) and (5 YR 6/4) to some mixed gray and light gray (N 6/0); severely oxide stained; weakly to moderately cemented; sand ranging (2.0-1.5 Ø with some scattered sand to 1.5-1.0 Ø); massive; slightly clayey to very clayey below 10.5'; moist.	25.0-26.0': Readings on core: HNu = 0.0; OVA = 5.5.
				26.0': Readings in augers: HNu = 0.7; OVA = 750; Gastech = 10% LEL .
35			12.0-14.5' SAMPLE. Recovered 2.1/2.5' = 84%. CLAYEY SAND: brown; continuing severely oxide stained; sand grading as above; moderately to weakly cemented; moist to very moist streak noted at 14.0'.	
40				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 65-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.5-17.0' SAMPLE. Recovered 1.8/2.5' = 72%. CLAYEY SAND: light brown (5 YR 5/6) to moderate brown; yellowish (10 YR 5/4); severely oxide stained; medium-grained sand (3.0-2.5 Ø) to scattered (2.0-1.5 Ø); some subangular and subrounded gravel; weakly cemented; moist.	
			17.0-19.5' SAMPLE. Recovered 2.2/2.5' = 88%. CLAYEY SAND: scattered gravel ranging to 2.75 mm; subrounded to subangular with few rounded gravel; poorly sorted sand; weakly cemented; moist to very moist below 18.0'.	
			19.5-22.0' SAMPLE. Recovered 2.5/2.5' = 100%. 19.5-21.0': CLAYEY SAND: small amounts of scattered gravel; numerous sandstone fragments; highly to weakly cemented; severely oxide stained; fine-grained sand; wet to saturated.	
			ARAPAHOE FORMATION	
			21.0-22.0': SANDSTONE: very light gray (N 8/0) to light gray (N 7/0); fine-grained sand (3.0-2.5 Ø) weakly cemented; poorly sorted; highly weathered; saturated.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 65-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			22.0-24.0' SAMPLE. Recovered 2.0/2.0' = 100%. SANDSTONE: medium light gray (N 6/0) to varying brown of moderate brown (5 YR 4/4) and pale yellowish brown (10 YR 6/2); slightly clayey to very clayey streaks; fine-grained sand (3.0-2.5 Ø) to (2.0-1.5 Ø); massive; moderately oxide stained; weakly cemented; highly weathered; very moist.	
			24.0-25.0' SAMPLE. Recovered 1.0/1.0' = 100%. 24.0-24.2': SANDSTONE: same as above. 24.2-25.0': SANDY CLAYSTONE: oderate yellowish brown (10 YR 5/4) to light brown (5 YR 6/4 and 5 YR 5/6) to brownish gray (5 YR 4/1) to light gray (N 7/0); medium plastic; moderately cemented; blocky; moist.	
			25.0-26.0' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY CLAYSTONE: color as stated above; medium plastic; moderately cemented; moist.	
			26.0-27.0' SAMPLE. Center bit used.	
			TOTAL DEPTH: 27.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 65-87

Coordinates N 39250.14 E 20200.22

Elevation: Ground Surface 5983.08'

Total Depth: Well 24.2'

Top of Casing 5985.02'

Borehole 27.0'

Formation of Completion Rocky Flats Alluvium/ Weathered Arapahoe Formation

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 9,10, 1987

Approved By

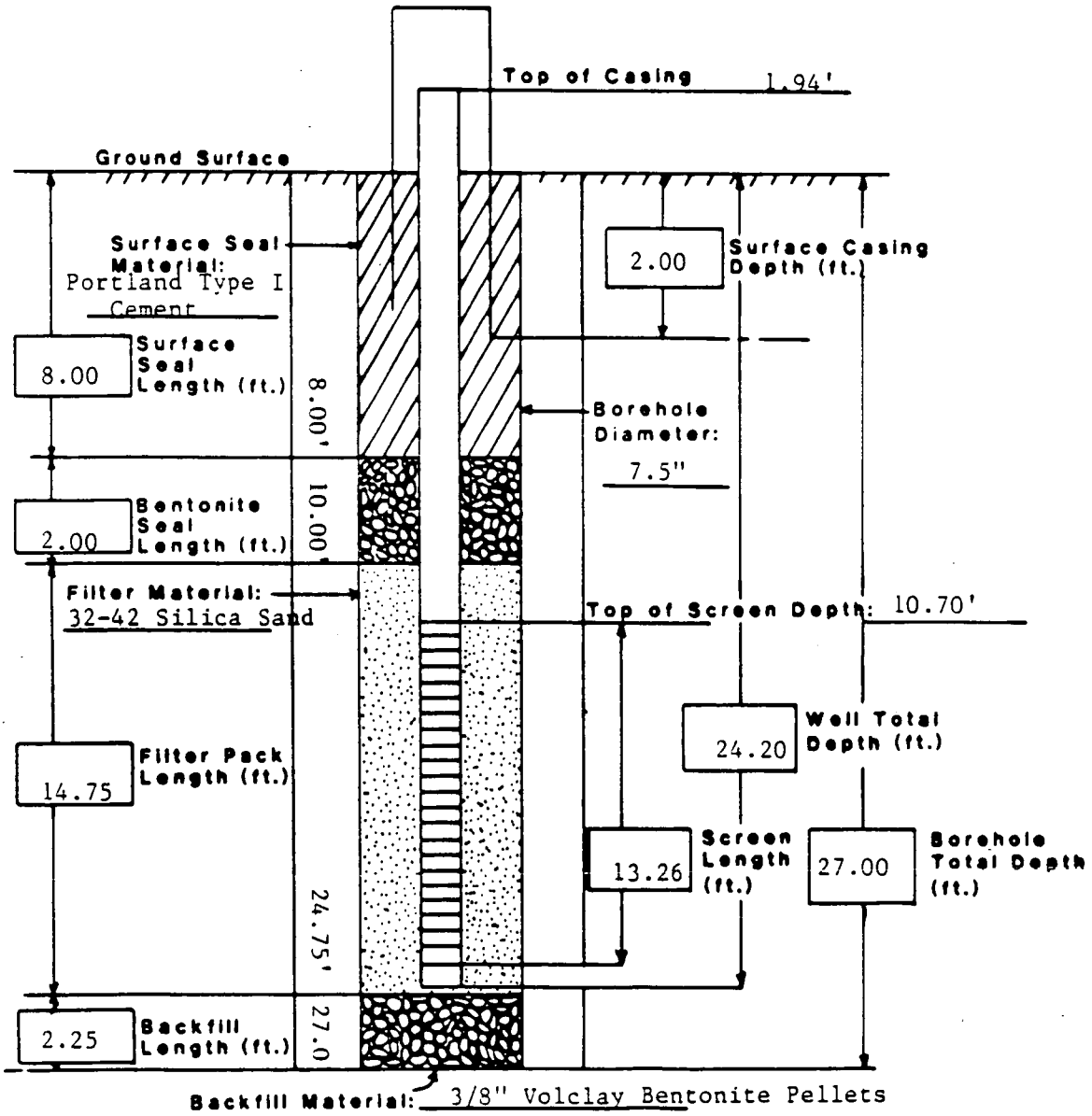
Site Manager

Installed By R. Treat

Geologist

CEARP Manager

Comments



PROGRAM SLUGT, VERSION 4,OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-28-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 65-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 13.26 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 11.14 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 11.14 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 10

TIME (sec)	HEAD (FEET)
197.00	.350
257.00	.260
317.00	.200
377.00	.160
437.00	.120
497.00	.100
557.00	.080
617.00	.070
677.00	.060
737.00	.060

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED VALUES FOR HO (FEET)
.5944
.6602
.7019
.7485
.7748

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = .77 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	3.509E-05	3.150E-06	1.850E-05	4.574E-05	.776542	112.25	.00
1.000E-02	1.000E-02	5.255E-05	4.717E-06	3.630E-05	6.121E-05	.474069	62.16	50.09
1.000E-03	1.000E-03	6.971E-05	6.257E-06	5.418E-05	7.695E-05	.326580	38.80	23.35
1.000E-04	1.000E-04	8.682E-05	7.793E-06	7.221E-05	9.383E-05	.249084	28.34	10.47
1.000E-05	1.000E-05	1.024E-04	9.189E-06	8.958E-05	1.108E-04	.207261	34.73	-6.39
1.000E-06	1.000E-06	1.127E-04	1.011E-05	8.504E-05	1.278E-04	.379575	77.43	-42.70
1.000E-07	1.000E-07	1.244E-04	1.117E-05	9.482E-05	1.456E-04	.407854	80.91	-5.48
1.000E-08	1.000E-08	1.396E-04	1.253E-05	1.154E-04	1.592E-04	.313845	60.40	20.52
1.000E-09	1.000E-09	1.573E-04	1.412E-05	1.389E-04	1.748E-04	.228009	38.65	21.74
1.000E-10	1.000E-10	1.767E-04	1.586E-05	1.617E-04	1.925E-04	.174469	25.78	12.87

****

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 1.52E-05 FT/sec = 4.63E-04 CM/sec

TRANSMISSIVITY = 1.69E-04 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 5.04E-06 FT/sec = 1.54E-04 CM/sec

TRANSMISSIVITY = 5.62E-05 FT**2/sec

WELL NO.: c5-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
NUMBER OF DESCRIPTIVE DATA POINTS = 10

LENGTH OF SCREEN OR INTAKE PORTION = 10.97 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 11.14 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 11.14 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)

TIME (sec)	HEAD (FEET)
197.00	.350
257.00	.260
317.00	.200
377.00	.160
437.00	.120
497.00	.100
557.00	.080
617.00	.070
677.00	.060
737.00	.060

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

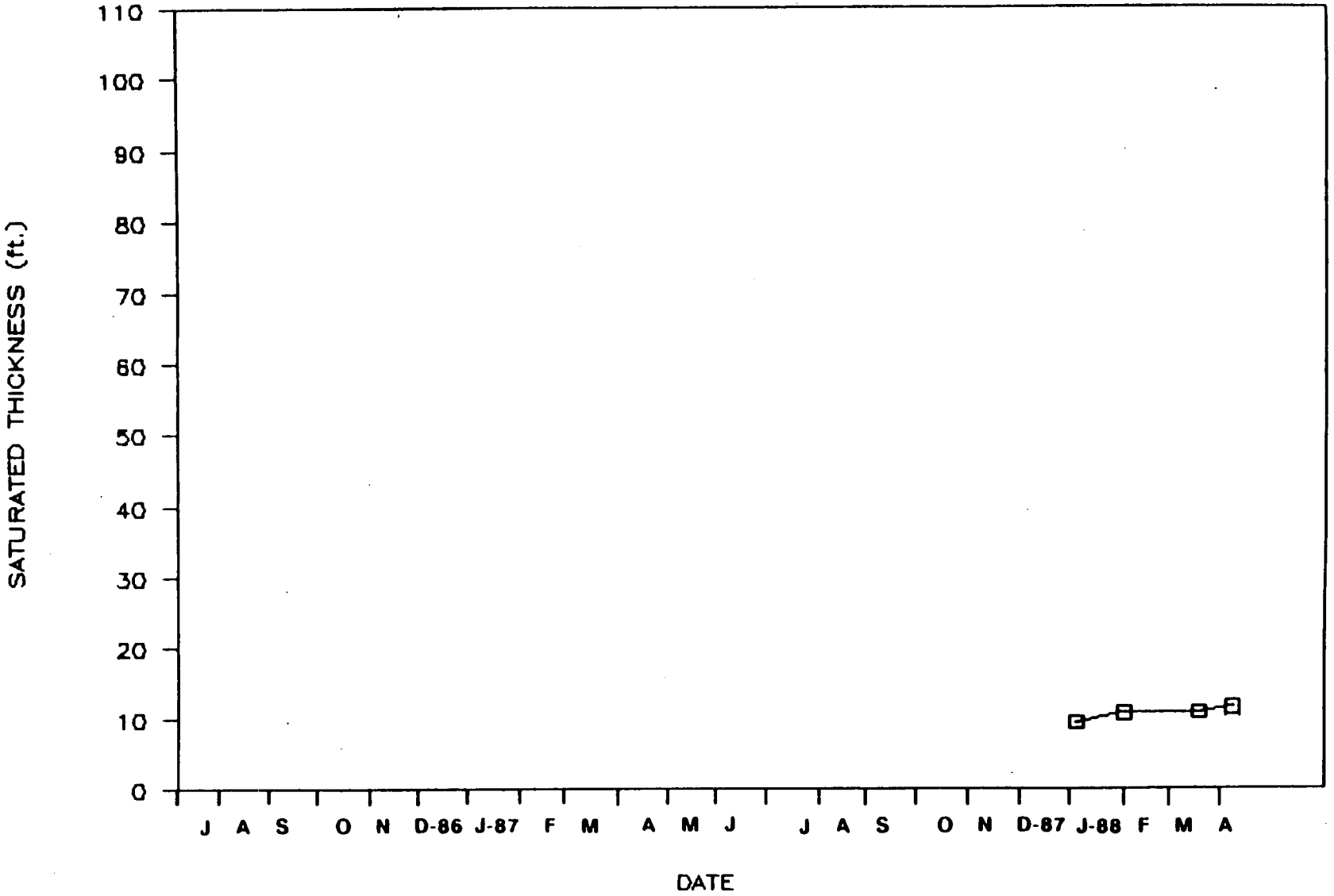
ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF 'T' RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	6.736E-05	6.046E-06	5.032E-05	8.091E-05	.454240	69.09	.00
1.000E-02	1.000E-02	9.060E-05	8.133E-06	8.353E-05	9.785E-05	.157882	26.50	42.59
1.000E-03	1.000E-03	1.108E-04	9.950E-06	9.396E-05	1.164E-04	.202477	41.06	-14.56
1.000E-04	1.000E-04	1.257E-04	1.129E-05	9.251E-05	1.480E-04	.441233	86.64	-45.57
1.000E-05	1.000E-05	1.409E-04	1.265E-05	1.062E-04	1.794E-04	.519717	96.62	-9.98
1.000E-06	1.000E-06	1.610E-04	1.445E-05	1.291E-04	2.106E-04	.506194	80.38	16.24
1.000E-07	1.000E-07	1.859E-04	1.669E-05	1.553E-04	2.415E-04	.463236	59.68	20.70
1.000E-08	1.000E-08	2.114E-04	1.898E-05	1.859E-04	2.722E-04	.408360	46.35	13.32
1.000E-09	1.000E-09	2.324E-04	2.087E-05	1.857E-04	3.029E-04	.503838	61.55	-15.20
1.000E-10	1.000E-10	2.547E-04	2.286E-05	2.032E-04	3.332E-04	.510557	63.80	-2.25

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6587	01/06/88	5983.08	5985.02	1.94	23.96	14.50	5970.52
	02/04/88					13.20	5971.82
	03/21/88					13.10	5971.92
	04/11/88					12.40	5972.62

SATURATED THICKNESS IN WELL # 65-87



INDEX OF DATA

Boring No.: 66-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

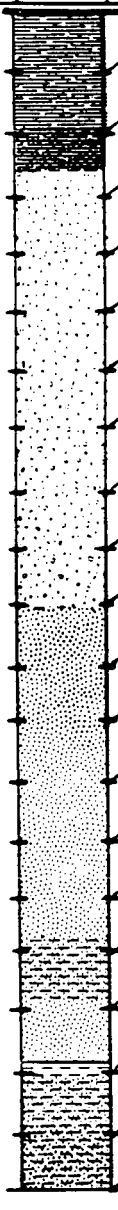
Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39170.27 E 20226.02
Total Depth: 23.0'

Borehole Well No.: 66-87
Ground Surface Elevation: 5981.90'
Water Level Encountered: 15.5'
Static: 8.90' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 23, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat, Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____ Site Manager
_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**TOPSOIL** 0.0-2.0' SAMPLE. Recovered 0.4/2.0' = 20%. TOP SOIL: silty sand with gravel; dusky brown (5 YR 2/2); 2.0-1.3 Ø to 0.5-0.0 Ø sized sand with 0.50 mm to 2.75 mm gravel and scattered cobbles; weakly cemented; poorly sorted; light moist. **ROCKY FLATS ALLUVIUM** 2.0-4.0 SAMPLE. Recovered 1.8/2.0 = 90%. 2.0-2.5': SANDY CLAY AND GRAVEL: grayish brown (5 YR 3/2) with 1.5-1.0 Ø sand; gravel of subangular and angular with some subrounded to 3.25 mm; weakly cemented; moist. 2.5-3.8': SAND AND GRAVEL: light brown (5 YR 6/4) with (1.5-1.0 Ø) size sand and medium brown (5 YR 4/4) gravel ranging 0.25 mm to 2.75 mm with some cobbles; weakly cemented; light moist. 4.0-7.0' SAMPLE. Recovered 0.7/3.0 = 23%. SAND AND GRAVEL: same as above with several small cobbles. 7.0-9.5' SAMPLE. Recovered 0.0/2.5 = 0%. Cuttings indicating a sand with gravel and slightly clayey to clayey, moist. 9.5'-10.0' Center bit drill.	HNu Background = 0.5. OVA Background = 0.2. Ludlum Background = 0 No readings above background.
5				
10				
15				
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 66-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			10.0-12.0' SAMPLE. Recovered 2.0/2.0' = 100%. SAND: moderate brown (5 YR 4/4) to light brown (5 YR 6/4) to some noticed light brownish gray (5 YR 6/1); very clayey with some scattered gravel: sand ranging (3.0-2.5 Ø) with scattered sand (1.0- 0.5 Ø); gravel consisting of 0.75 mm to scattered 2.50 mm: subrounded: subangular; weakly to moderately cemented: moist.	
25			12.0-14.5' SAMPLE. Recovered 2.5/2.5 = 100%. SAND: light brown (5 YR 5/6) and (5 YR 6/4); sand ranging (2.5-2.0 Ø) and (2.0-1.5 Ø) to (1.5-1.0 Ø) slightly clayey with some gravel; 3.00 mm gravel subangular, subrounded; moist to very moist.	
30			14.5-17.0' SAMPLE. Recovered 2.5/2.5 = 100%. 14.5-15.8': SAND: moderate brown (5 YR 4/4) with sand (2.5-2.0 Ø); gravel 1.50 mm to 2.55 mm: clayey with scattered gravel; weakly cemented; very moist to wet at 15.5-15.7'. 15.8-16.8': SANDY CLAY: pale yellowish brown (10 YR 6/2) to brownish gray (5 YR 4/1) sand (3.0-2.5 Ø); poorly sorted; moderately cemented; moist. 16.8-17.0': SAND: moderate yellowish brown (10 YR 5/4) sand ranging (1.5-1.0 Ø) with some scattered larger particles; moist to very moist.	
35				
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Coordinates

Total Depth

Drilling Company

Date Drilled

Drilling Method

Logged By

Geologist

Borehole Well No. 66-87 (cont'd.)

Ground Surface Elevation

Water Level Encountered

Static

Driller

Helper

Drilling Fluid

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			17.0-18.0' SAMPLE. Recovered 1.0/1.0 = 100%. 17.0-17.8': SAND: pale yellowish brown (10 YR 6/2); fine-grained sand (3.0-2.5 Ø) slightly clayey; non-cemented; poorly sorted; wet.	
			ARAPAHOE FORMATION	
			17.8-18': CLAYSTONE: moderate yellowish brown (10 YR 5/4) to moderate brown (5 YR 4/4); severely oxide stained; fine-grained sand (3.5-3.0 Ø); moderately cemented; low plastic; weathered; very moist to moist.	
			18.0-19.0' SAMPLE. Recovered 2.3/1.0 = 230%. SANDY CLAYSTONE: light brown (5 YR 5/6) to moderate brown (5 YR 4/4); fine-grained sand (3.5-3.0 Ø) some noted light brownish gray (5 YR 6/1); medium plastic; blocky and somewhat layered; severely oxide stained; weathered; very moist to moist at 18.5'.	
			19.0-20.0' SAMPLE. Recovered 1.0/1.0 = 100%. SANDY CLAYSTONE: colors as noted in previous runs; fine-grained sand; blocky; medium plastic; remaining severely oxide stained; weathered; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 66-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			20.0-21.0' SAMPLE. Recovered 1.0/1.0 = 100%. SANDY CLAYSTONE: as noted in previous runs; moderately cemented; highly weathered; moist.	
			21.0-22.0' SAMPLE. Recovered 1.3/1.0 = 130%. SANDY CLAYSTONE: light brown (5 YR 6/4) to pale yellowish brown (10 YR 6/2) to light gray (N 7/0) streaked; slightly sandy; fine-grained sand (3.5-3.0 Ø); moderately cemented; highly weathered; highly plastic; moist.	
			22.0-23.0' SAMPLE. Recovered 1.2/1.0' = 120%. CLAYSTONE: slightly sandy; medium if not highly plastic; moderately cemented; blocky; highly weathered; moist.	
			TOTAL DEPTH: 23.0'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 66-87

Coordinates N 39170.26 E 20226.01

Elevation: Ground Surface 5981.90'

Total Depth: Well 18.20'

Top of Casing 5983.64'

Borehole 23.00'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed November 24, 1987

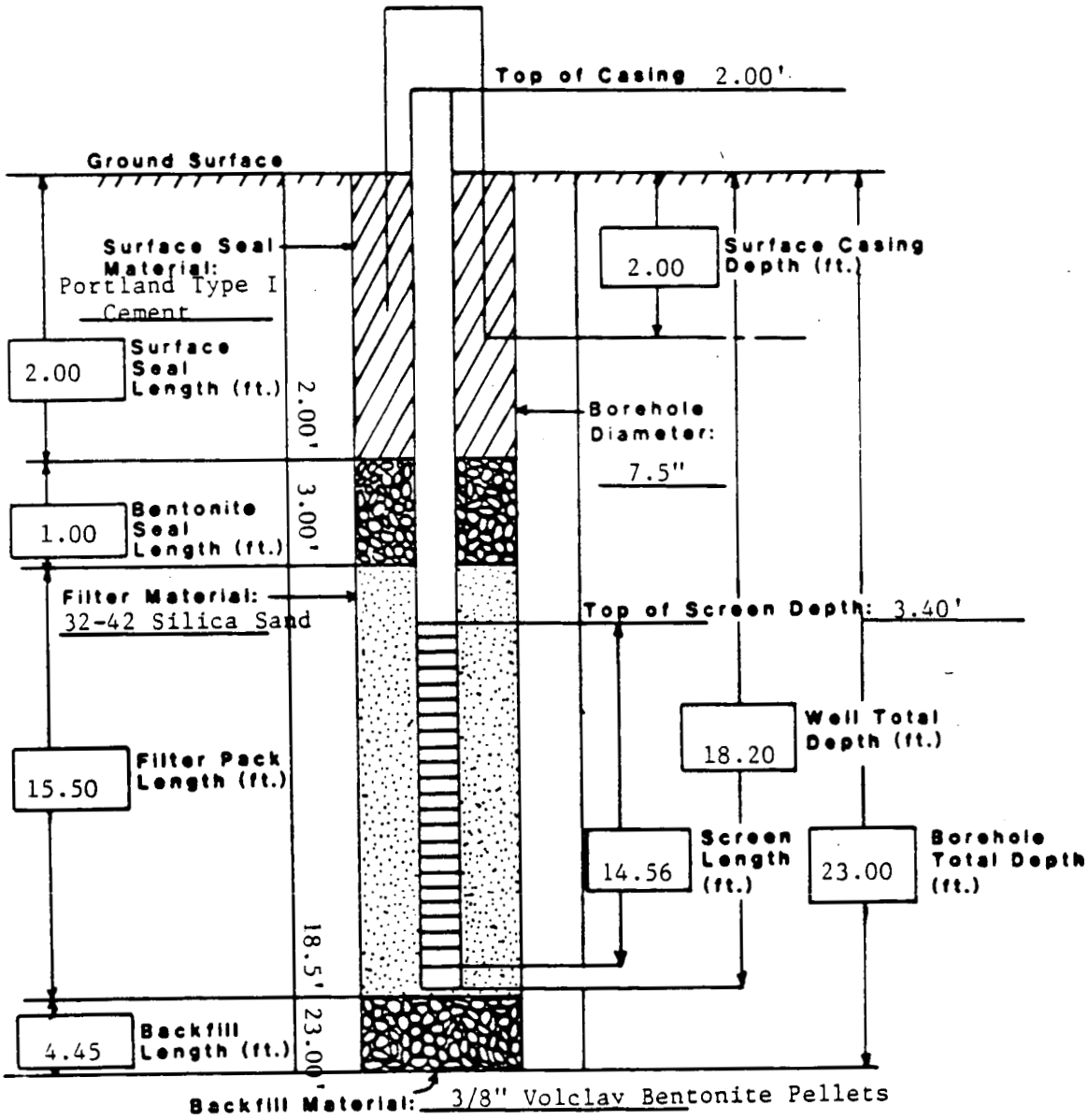
Approved By

Installed By R. Treat
Geologist

Site Manager

CEARP Manager

Comments



Well No.: 66-87

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
12/3/87	----	Pumping	----------	Muddy; yellowish brown	Water level 11.0' before pumping Water level 11.9' after pumping

PROGRAM SLUGT, VERSION 4,OCT.-1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-27-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 66-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 14.56 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 6.59 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 6.59 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 21

TIME (sec)	HEAD (FEET)
100.00	1.150
110.00	1.140
121.00	1.120
141.00	1.100
161.00	1.070
181.00	1.050
201.00	1.030
221.00	1.000
240.00	.980
260.00	.970
290.00	.930
320.00	.900
350.00	.880
380.00	.850
410.00	.820
440.00	.790
470.00	.770
500.00	.750
530.00	.730
575.00	.700
605.00	.680

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED VALUES FOR H0 (FEET)

1.2694

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = 1.27 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	2.623E-06	3.981E-07	1.074E-06	4.057E-06	1.137177	136.60	.00
1.000E-02	1.000E-02	6.724E-06	1.020E-06	4.141E-06	8.561E-06	.657301	72.97	63.63
1.000E-03	1.000E-03	1.147E-05	1.741E-06	8.554E-06	1.320E-05	.404577	43.09	29.88
1.000E-04	1.000E-04	1.620E-05	2.458E-06	1.313E-05	1.783E-05	.290477	29.37	13.72
1.000E-05	1.000E-05	2.083E-05	3.161E-06	1.756E-05	2.254E-05	.239335	22.57	6.79
1.000E-06	1.000E-06	2.538E-05	3.852E-06	2.189E-05	2.721E-05	.209739	18.42	4.15
1.000E-07	1.000E-07	2.988E-05	4.534E-06	2.616E-05	3.183E-05	.189823	15.66	2.76
1.000E-08	1.000E-08	3.434E-05	5.211E-06	3.038E-05	3.638E-05	.174741	13.74	1.92
1.000E-09	1.000E-09	3.877E-05	5.883E-06	3.457E-05	4.092E-05	.163703	12.31	1.42
1.000E-10	1.000E-10	4.318E-05	6.552E-06	3.873E-05	4.544E-05	.155363	11.24	1.07

****

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 5.87E-06 FT/sec = 1.79E-04 CM/sec

TRANSMISSIVITY = 3.37E-05 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 2.05E-06 FT/sec = 6.24E-05 CM/sec

TRANSMISSIVITY = 1.23E-05 FT**2/sec

WELL NO.: 66-37

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25

LENGTH OF SCREEN OR INTAKE PORTION = 6.02 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 6.59 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 6.59 FEET
FALLING-HEAD INDEX = 0 ('1' IF FALLING,'0' IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 21

TIME (sec)	HEAD (FEET)
100.00	1.150
110.00	1.140
121.00	1.120
141.00	1.100
161.00	1.070
181.00	1.050
201.00	1.030
221.00	1.000
240.00	.980
260.00	.970
290.00	.930
320.00	.900
350.00	.880
380.00	.850
410.00	.820
440.00	.790
470.00	.770
500.00	.750
530.00	.730
575.00	.700
605.00	.680

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF 'T' RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	5.439E-06	8.254E-07	5.055E-06	5.891E-06	.153641	19.20	.00
1.000E-02	1.000E-02	1.264E-05	1.917E-06	1.162E-05	1.362E-05	.316866	24.99	-5.79
1.000E-03	1.000E-03	2.045E-05	3.103E-06	1.772E-05	2.734E-05	.488257	42.39	-17.99
1.000E-04	1.000E-04	2.817E-05	4.273E-06	2.316E-05	3.693E-05	.561564	50.27	-7.33
1.000E-05	1.000E-05	3.574E-05	5.423E-06	2.873E-05	5.037E-05	.605394	54.61	-4.34

1.000E-07	1.000E-07	5.055E-05	7.671E-06	3.979E-05	7.259E-05	.648734	59.02	-1.84
1.000E-08	1.000E-08	5.786E-05	8.780E-06	4.526E-05	8.331E-05	.661090	60.36	-1.33
1.000E-09	1.000E-09	6.513E-05	9.882E-06	5.067E-05	9.438E-05	.671073	61.38	-1.03
1.000E-10	1.000E-10	7.235E-05	1.098E-05	5.608E-05	1.052E-04	.678677	62.20	-.82

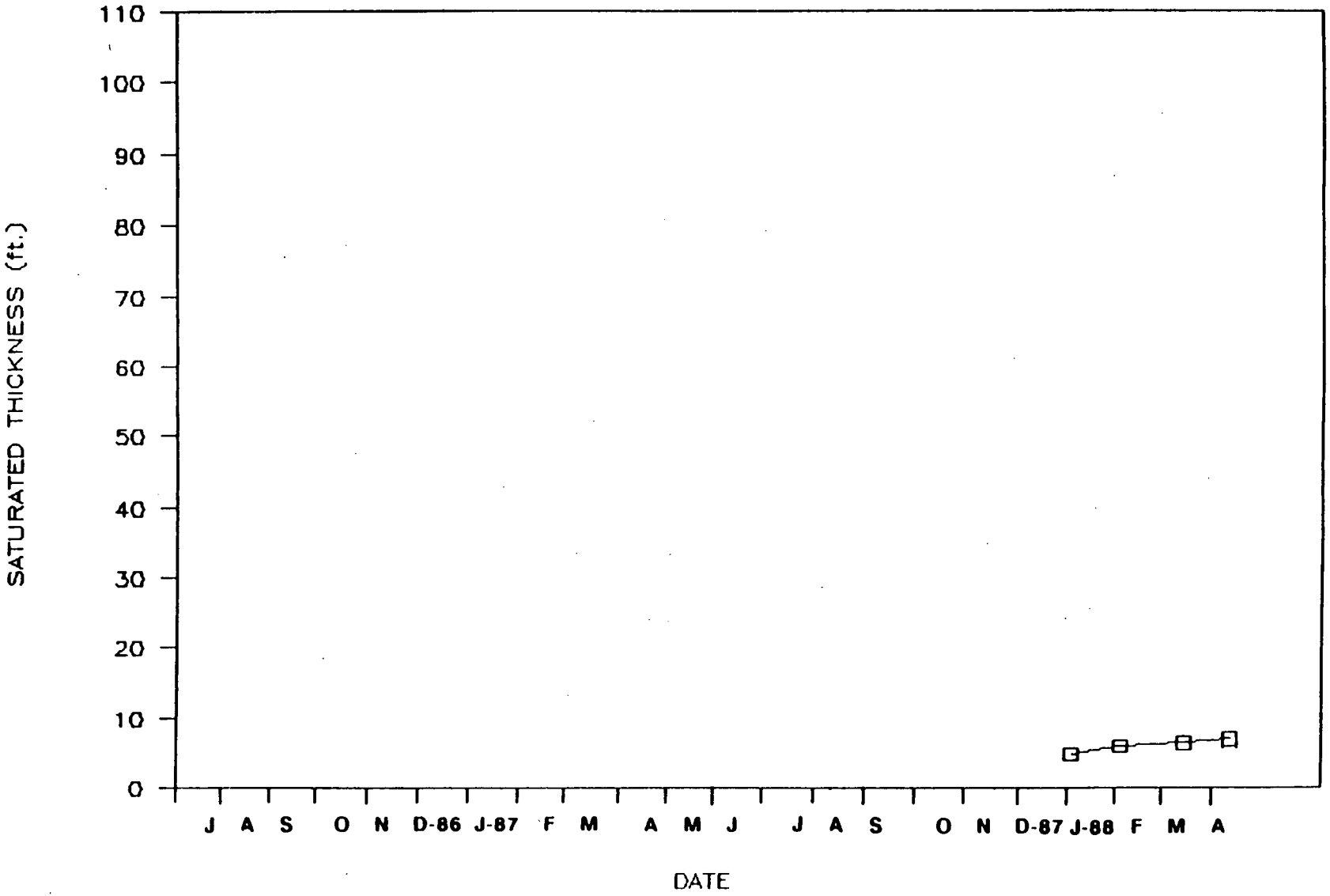
1

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6687	01/05/88	5981.90	5983.64	1.74	17.96	13.00	5970.64
	02/04/88					11.90	5971.74
	03/14/88					11.50	5972.14
	04/11/88					10.90	5972.74

SATURATED THICKNESS IN WELL # 66-87



INDEX OF DATA

Boring No.: 67-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

X Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40182.78 E 20678.79
Total Depth: 21.40'

Borehole/Well No.: 67-87
Ground Surface Elevation: 5969.50'
Water Level Encountered: 12.1'
Static: 7.68' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 3, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus
Geologist

Driller: S. Bradfield
Helper: P. Mesa
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM**	HNu background = 0.4. OVA background = 0.0. Ludlum background = 0.
			0.0-2.0' SAMPLE. Recovered 0.5/2.0' = 25%. CLAY: dark yellowish brown (10 YR 4/2); slight HCl reaction; sandy; large subrounded pebbles; moist.	0.0-2.0': HNu: 2.0; OVA: 0.4.
5			2.0-4.0' SAMPLE. Recovered 1.1/2.0' = 55%. 2.0-2.7: CLAY: dark reddish brown (10 R 3/4); contains coarse-grained sand and large pebbles; no HCl reaction; moist. 2.7-3.1': SAND: moderate orange pink (10 R 7/4); fine to coarse-grained; large angular pebbles; no HCl reaction.	2.0-3.1': HNu: 0.3; OVA: 0.4.
				4.0-5.6': HNu: 0.8; OVA: 2.0.
10			4.0-6.0' SAMPLE. Recovered 1.6/2.0' = 80%. 4.0-4.8': CLAYEY SAND: reddish brown (10 R 6/4); angular pebbles; no HCl reaction; slightly moist. 4.8-5.6': SAND: moderate orange pink (10 R 7/4); no HCl reaction; angular cobbles and pebbles; dry.	6.0-8.0': HNu: 0.6; Ludlum: 0.
				8.0-9.6': HNu: 0.4.
				OVA background: 1.2.
				14.1-16.1': HNu: 0; OVA: 1.2.
15			6.0-8.0' SAMPLE. Recovered 0.9/2.0' = 45%. SILTY SAND: grayish pink (5 R 8/2); small angular pebbles; no HCl reaction; dry.	16.1-17.0': HNu: 0; OVA: 1.0.
				17.8-18.8': HNu: 0; OVA: 1.0.
20				18.8-19.8': HNu: 0.2; OVA: 0.8.

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 67-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			8.0-10.0' SAMPLE. Recovered 1.6/2.0' = 80%. 8.0-9.1': SAND: moderate yellowish brown (10 YR 5/4); coarse-grained to fine-grained; angular pebbles; no HCl reaction; moist. 9.1-9.6': CLAY: pale olive (10 Y 6/2); dense; slightly sandy; no HCl reaction; slightly moist.	
25			10.0-12.0 SAMPLE. Recovered 2.0/2.0' = 100%. 10.0-11.5': CLAY: same as above except pockets of caliche and slight oxidation; moist. 11.5-12.0': CLAY: moderate reddish orange (10 R 6/6); slightly more sandy then upper clay; moist.	
30			Total depth measured at 12.1'. Adjust depth.	
			12.1-14.1' SAMPLE. Recovered 2.2/2.0' = 110%. SAND: pale olive (10 Y 6/2) stained moderate yellowish brown (10 YR 5/4); some clay; wet.	
35			14.1-16.1' SAMPLE. Recovered 1.3/2.0' = 65%. SAND: light bluish gray (5 B 7/1); stained with dark yellowish orange (10 YR 6/6); coarse-grained sand; high amount of clay; slightly moist.	
			16.1-17.1' SAMPLE. Recovered 0.9/1.0' = 90%. 16.1-16.4': SAND: same as above.	
40				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 67-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CERP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			ARAPAHOE FORMATION	
			16.4-17.0': CLAYSTONE: light gray (N 7/0); coal; dense; moist.	
			Total depth measured 17.8'. Adjust depth.	
			17.8-18.8' SAMPLE. Recovered 1.8/1.0' = 180%. CLAYSTONE: same as above except stained with light brown (5 YR 5/6); blocky structure; moist to dry.	
			18.8-19.8' SAMPLE. Recovered 0.4/1.0' = 40%. CLAYSTONE: same as above.	
			19.8-21.3' SAMPLE. Recovered 2.2/1.5' = 147%. CLAYSTONE: same as above.	
			TOTAL DEPTH: 21.4'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 67-87

Coordinates N 40182.78 E 20678.79

Elevation: Ground Surface 5969.50'

Total Depth: Well 16.8'

Top of Casing 5971.72'

Borehole 21.4'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 4, 1987

Approved By

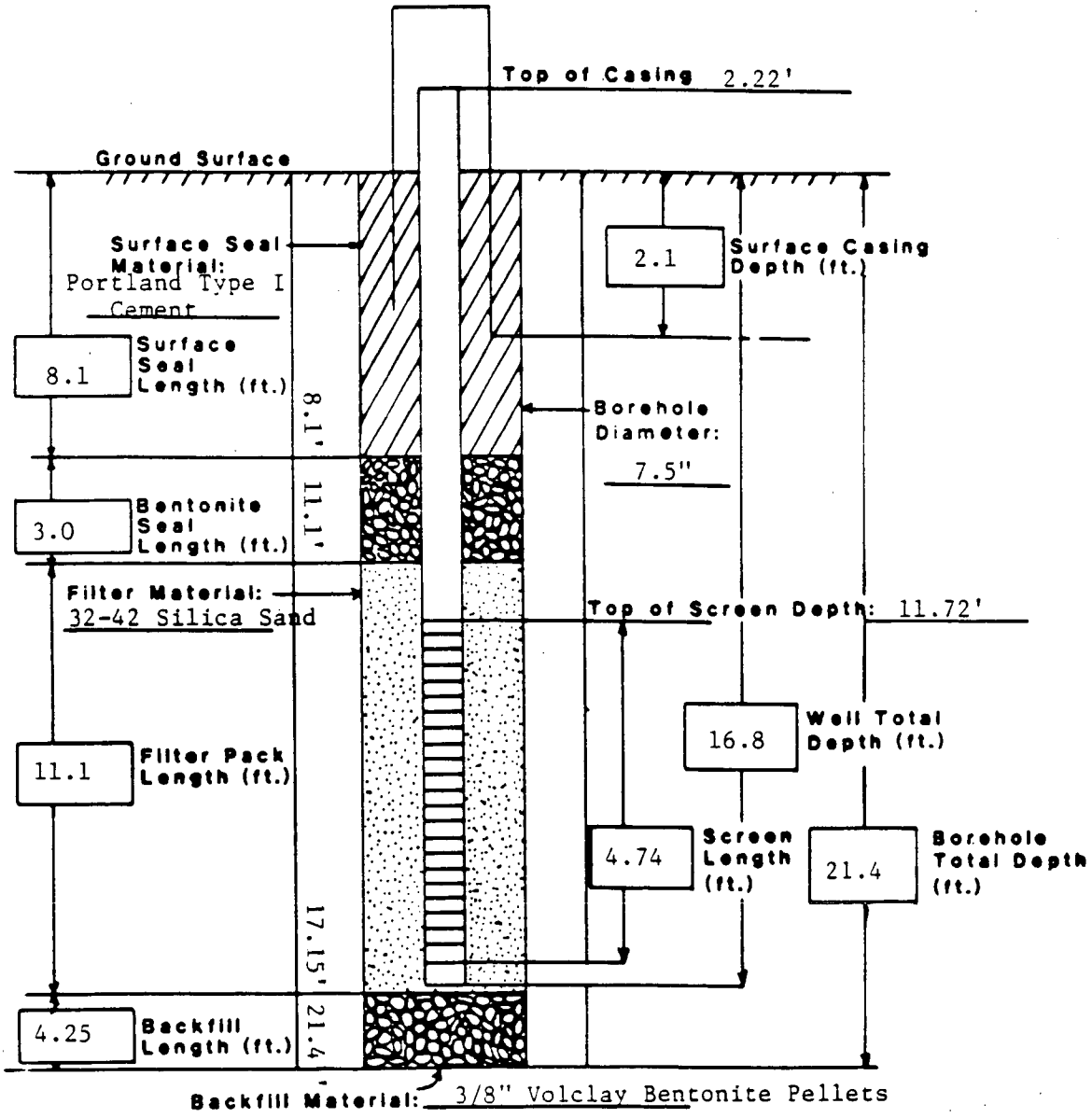
Site Manager

Installed By J. Bacchus

Geologist

CEARP Manager

Comments



Well No.: 67-37

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
11/7/87	1400	Pumping	--------	Muddy and sandy	Water level 9.3' before pumping; Water level 10' after pumping
					Hole depth: 17.2'

PROGRAM SLUGT, VERSION 4,OCT.1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-27-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 67-97

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 5.08 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 7.72 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 5.08 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 11

TIME (sec)	HEAD (FEET)
242.00	.830
302.00	.770
362.00	.710
422.00	.640
482.00	.590
547.00	.540
667.00	.460
787.00	.370
907.00	.340
1027.00	.290
1167.00	.240

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED VALUES FOR H0 (FEET)

1.1379
1.1416

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = 1.14 FEET

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF 'T' RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	6.293E-06	1.239E-06	3.307E-06	9.769E-06	1.026785	257.53	.00
1.000E-02	1.000E-02	1.212E-05	2.386E-06	8.583E-06	1.577E-05	.592796	142.95	114.59
1.000E-03	1.000E-03	1.814E-05	3.571E-06	1.456E-05	2.163E-05	.389450	92.58	50.37
1.000E-04	1.000E-04	2.407E-05	4.738E-06	2.048E-05	2.739E-05	.287057	67.18	25.40
1.000E-05	1.000E-05	2.989E-05	5.884E-06	2.626E-05	3.308E-05	.228286	52.55	14.63
1.000E-06	1.000E-06	3.563E-05	7.014E-06	3.193E-05	3.873E-05	.190840	43.25	9.30
1.000E-07	1.000E-07	4.133E-05	8.135E-06	3.754E-05	4.434E-05	.164690	36.75	6.50
1.000E-08	1.000E-08	4.698E-05	9.247E-06	4.311E-05	4.993E-05	.145216	32.05	4.70
1.000E-09	1.000E-09	5.260E-05	1.035E-05	4.865E-05	5.546E-05	.129625	28.37	3.67
1.000E-10	1.000E-10	5.812E-05	1.144E-05	5.416E-05	6.036E-05	.106599	23.32	5.05

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METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 2.11E-06 FT/sec = 6.42E-05 CM/sec

TRANSMISSIVITY = 1.07E-05 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 3.15E-06 FT/sec = 9.59E-05 CM/sec

TRANSMISSIVITY = 1.60E-05 FT**2/sec

WELL NO.: 67-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 5.09 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 7.72 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 5.08 FEET
FALLING-HEAD INDEX = 0 ('1' IF FALLING,'0' IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 11

(sec	FEET)
242.00	.830
302.00	.770
362.00	.710
422.00	.640
482.00	.590
547.00	.540
667.00	.460
787.00	.390
907.00	.340
1027.00	.290
1167.00	.240

HO WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = 1.49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

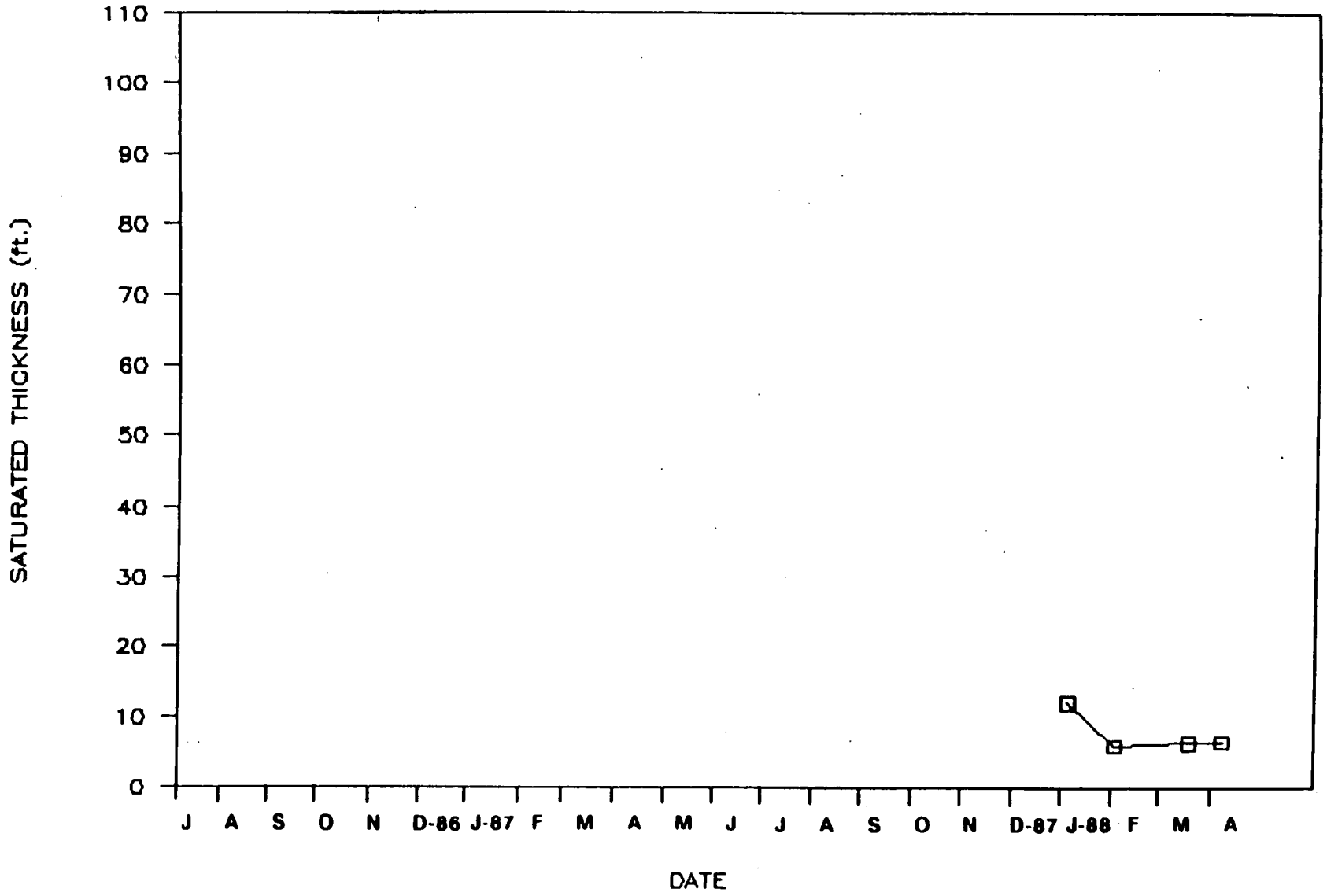
ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	1.040E-05	2.048E-06	8.874E-06	1.314E-05	.409563	113.55	.00
1.000E-02	1.000E-02	1.869E-05	3.679E-06	1.798E-05	2.006E-05	.111369	29.50	84.05
1.000E-03	1.000E-03	2.707E-05	5.328E-06	2.589E-05	3.042E-05	.167361	20.99	8.51
1.000E-04	1.000E-04	3.529E-05	6.947E-06	3.294E-05	4.105E-05	.229987	37.98	-16.99
1.000E-05	1.000E-05	4.341E-05	8.545E-06	3.984E-05	5.165E-05	.271989	49.34	-11.36
1.000E-06	1.000E-06	5.141E-05	1.012E-05	4.656E-05	6.201E-05	.300552	56.68	-7.35
1.000E-07	1.000E-07	5.936E-05	1.168E-05	5.319E-05	7.227E-05	.321375	61.92	-5.24
1.000E-08	1.000E-08	6.724E-05	1.324E-05	5.954E-05	8.249E-05	.341308	66.25	-4.33
1.000E-09	1.000E-09	7.453E-05	1.468E-05	6.053E-05	9.261E-05	.430071	84.61	-18.35
1.000E-10	1.000E-10	8.182E-05	1.611E-05	6.410E-05	1.027E-04	.471565	97.88	-13.27

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6787	01/06/88	5969.50	5971.72	2.22	16.46	4.30	5967.42
	02/04/88					10.40	5961.32
	03/21/88					10.00	5961.72
	04/11/88					9.90	5961.82

SATURATED THICKNESS IN WELL # 67-87



INDEX OF DATA

Boring No.: 68-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40163.59 E 20680.82
Total Depth: 20.0'

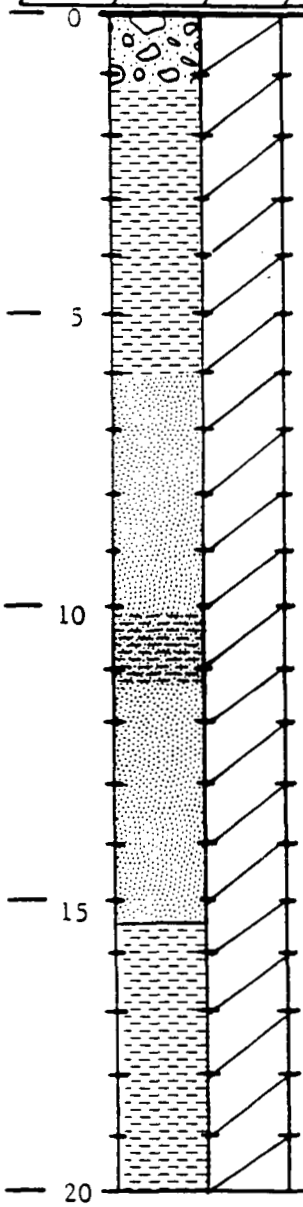
Borehole/Well No.: 68-87
Ground Surface Elevation: 5968.48'
Water Level Encountered: 11.15'
Static: 6.37' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 4, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus
Geologist

Driller: S. Bradfield
Helper: P. Mesa
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____



Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0–20			**ROCKY FLATS ALLUVIUM** 0.0-2.0' SAMPLE. Recovered 1.8/2.0' = 90%. 0.0-1.1': GRAVEL: dark yellowish brown (10 YR 4/2) and dusky brown (10 YR 2/2); clay, silt, and sand; gravel is angular to subrounded; caliche; moist. 1.1-1.8': CLAY: moderate reddish brown (10 YR 4/6) with dark yellowish brown (10 YR 4/2); contains roots; angular pebbles; slight HCl reaction; dense; moist. 2.0-4.0' SAMPLE. Recovered 0.8/2.0' = 40%. CLAY: same as above except no HCl reaction and more sandy. 4.0-6.0 SAMPLE. Recovered 0.7/2.0' = 35%. CLAY: same as above except dry. 6.0-8.0' SAMPLE. Recovered 0.8/2.0' = 40%. SAND: light brown (5 YR 5/6); coarse; angular; pebbles and silt; no HCl reaction; dry, moist in shoe. Total depth measured 7.8'. Adjust depth. 7.8-9.8' SAMPLE. Recovered 1.3/2.0' = 65%. SAND: same as above except chunks of bedrock; moist to very moist at the bottom of the run.	HNu background = 0.2. OVA background = 1.4-1.8. Ludlum background = 0. 0.0-1.8': HNu: 0; OVA: 1.7. 2.0-2.8': HNu: 2.1; OVA: 1.5. 4.0-4.7': HNu: 0; OVA: 1.4. 6.0-6.8': HNu: 0.4; OVA: 0.1. 7.8-9.1': HNu: 0.2; OVA: 1.8. 9.8-11.8': HNu: 0; OVA: 7.0. 12.0-13.0': HNu: 0; OVA: 1.0. 14.0-15.8': HNu: 0; OVA: 1.2. 15.9-16.9': HNu: 0; OVA: 0.8. 16.9-18.5': HNu: 0; OVA: 0.8.

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 68-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			9.8-11.8' SAMPLE. Recovered 2.2/2.0' = 110%. 9.8-10.05': SAND: same as above. 10.05-11.15': SANDY CLAY: pale olive (10 Y 6/2) stained with light brown (5 YR 5/6); mica; coal; quartzite; no HCl reaction; moist. 11.5-11.8': SAND: dark yellowish orange (10 YR 6/6); coarse angular quartzite cobbles; sand grains are very angular; feldspar; wet. Total depth measured 12.0'. Adjust depth. 12.0-14.0' SAMPLE. Recovered 1.0/2.0' = 50%. SAND: same as above. 14.0-16.0' SAMPLE. Recovered 1.8/2.0' = 90%. 14.0-15.3': SAND: same as above. ARAPAHOE FORMATION 15.3-15.5': SANDSTONE : light gray (N 7/0); some clay; subangular; clean sand; moist to wet. 15.5-15.8': CLAYSTONE: light gray (N 7/0) stained with dark yellowish orange (10 YR 6/6); blocky structure, slightly moist to dry. Total depth measured 15.9'. Adjust depth.	19.0-20.0': HNu: 0; OVA: 0.4.

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 68-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			15.9-16.9' SAMPLE. Recovered 1.2/1.0' = 120%. CLAYSTONE: light olive gray (5 Y 5/2); stained with dark yellowish orange (10 YR 6/6) and light brown (5 YR 5/6); blocky structure; coal; moist.	
			16.9-18.9' SAMPLE. Recovered 1.6/2.0' = 80%. CLAYSTONE: same as above.	
			Total depth measured 19.0'. Adjust depth.	
			19.0-20.0' SAMPLE. Recovered 1.5/1.0' = 150%. CLAYSTONE: same as above but slightly sandy; moist.	
			TOTAL DEPTH: 20.0'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 68-87

Coordinates N 40163.59 E 20680.82

Elevation: Ground Surface 5968.48'

Total Depth: Well 16.0'

Top of Casing 5970.31'

Borehole 20.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 4 & 7, 1987

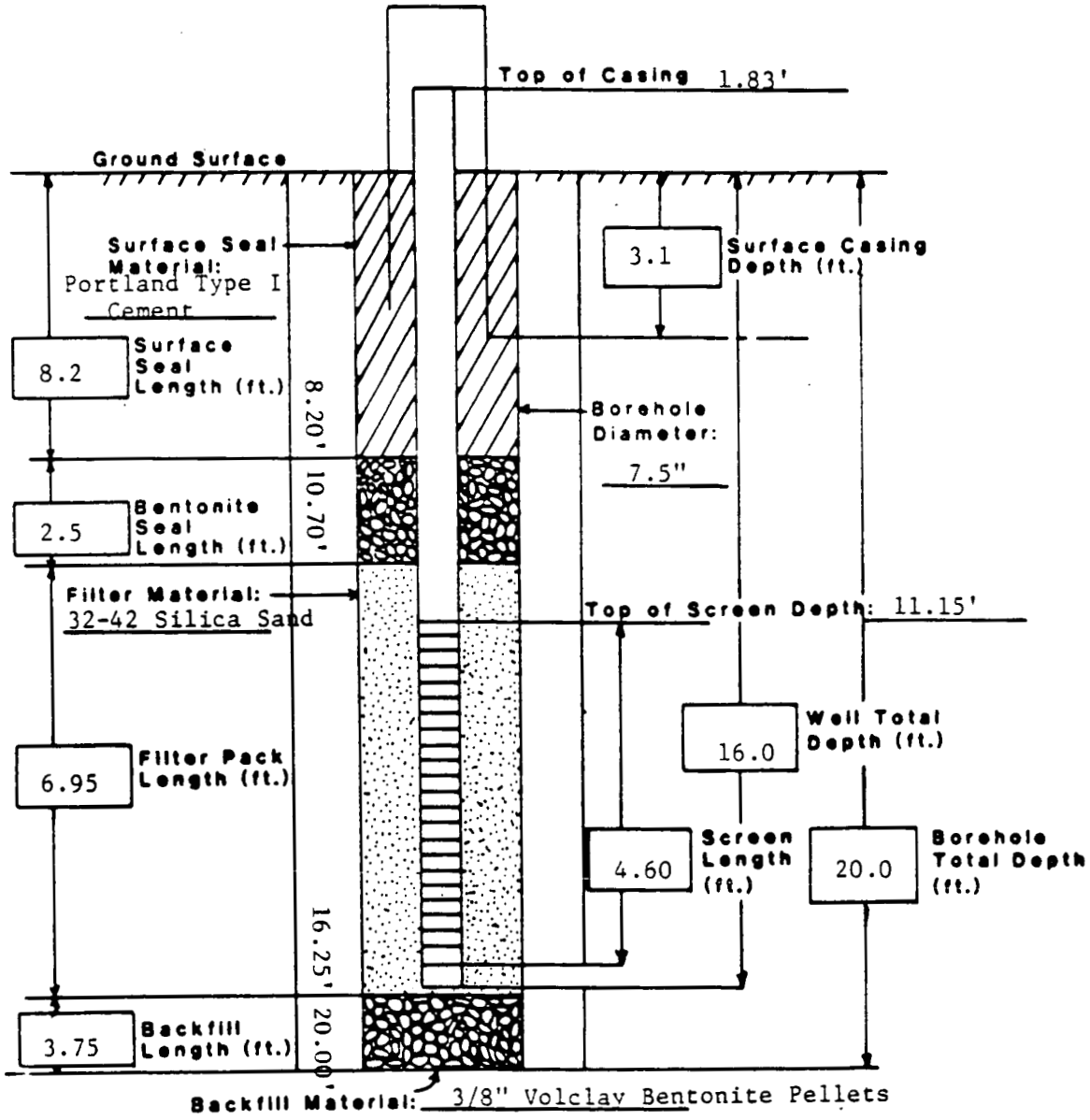
Approved By

Site Manager

Installed By J. Bacchus
Geologist

CEARP Manager

Comments

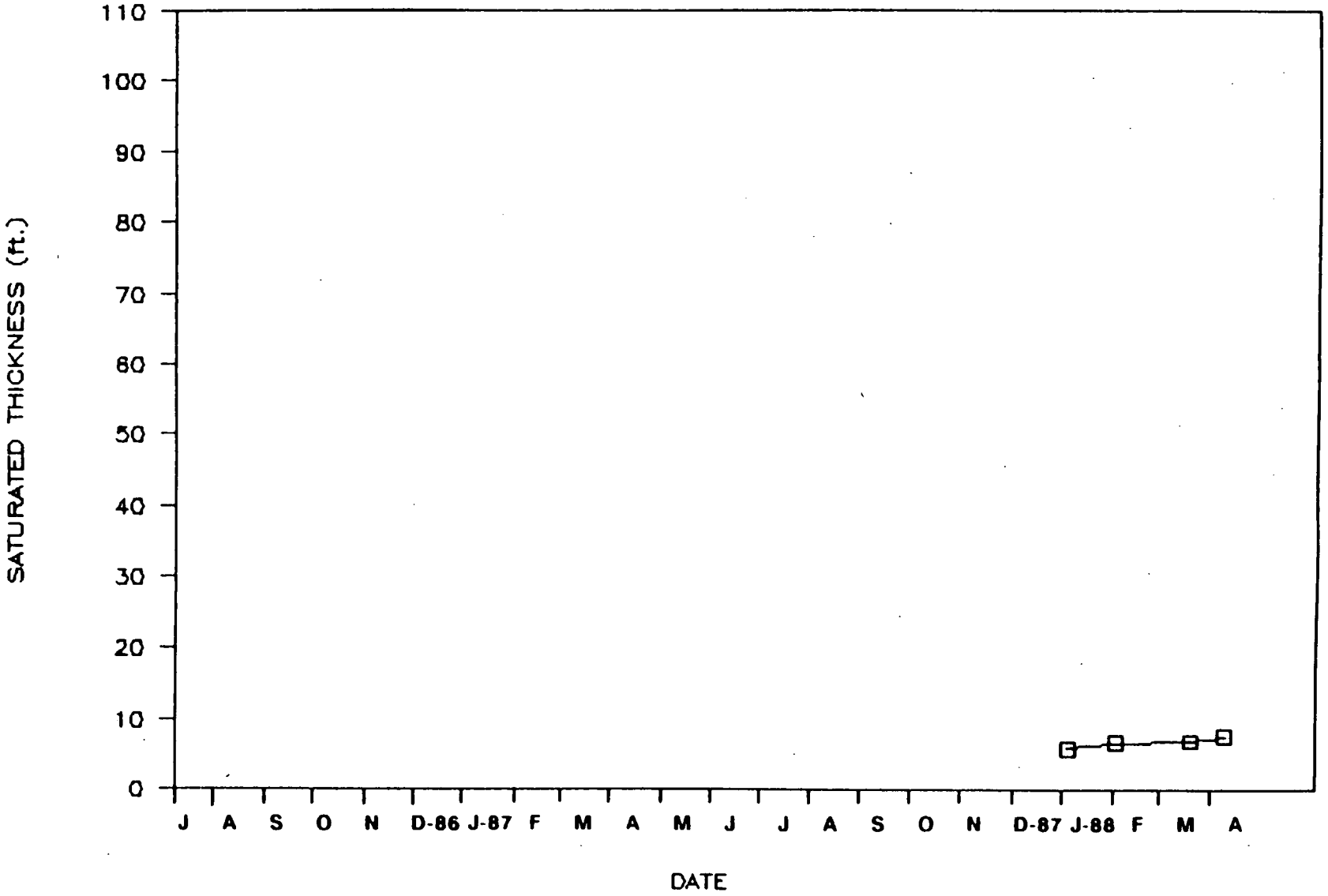


ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
6887	01/06/88	5968.48	5970.31	1.83	15.75	9.80	5960.51
	02/04/88					9.10	5961.21
	03/21/88					8.80	5961.51
	04/11/88					8.20	5962.11

SATURATED THICKNESS IN WELL # 68-87



INDEX OF DATA

Boring No.: 70-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39588.09 E 21098.79
Total Depth: 17.0'

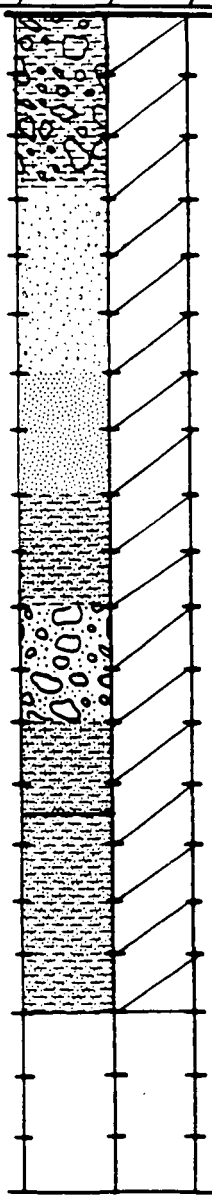
Borehole. Well No.: 70-87
Ground Surface Elevation: 5966.30'
Water Level Encountered: None
Static: 7.40' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 14, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat
Geologist

Driller: S. Bradfield
Helper: K. Parker
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM** 0.0-2.0' SAMPLE. Recovered 0.9/2.0' = 45%. CLAYEY GRAVEL: dusky brown (5 YR 2/2) to moderate brown (5 YR 4/4); slightly sandy; cobbles; gravel 0.25 mm to 2.25 mm; angular and subangular; moderately cemented; dense; moist. 2.0-4.0' SAMPLE. Recovered 1.8/2.0' = 90%. 2.0-2.8': SANDY CLAYEY GRAVEL : moderate brown (5 YR 4/4); fine and medium-grained sand ranging (2.5-2.0 Ø) up to (0.0-0.5 Ø) with 1.25 mm gravel, angular and subangular; scattered gravel; moderately cemented; poorly sorted; moist. 2.8-3.8': SAND AND GRAVEL: light brown (5 YR 6/4) to varying pale yellowish brown (10 YR 6/2); sand ranging (3.0-2.5 Ø) to (0.5-0.0 Ø); scattered gravel ranging 0.25 mm to 1.75 mm; gravel angular and subangular and few subrounded; poorly sorted; weakly cemented; light moist. 4.0-6.0' SAMPLE. Recorded 0.8/2.0' = 40%. GRAVELLY SAND: light brown (5 YR 6/4) to varying moderate brown (5 YR 4/4); sand (3.0-2.5 Ø) to (0.0-0.5 Ø); 1.25 mm scattered gravel subangular, subrounded, and angular; poorly sorted; weakly cemented; light moist.	HNU Background=1.0 OVA Background=0.2 Ludlum Background=0. No readings above background.
5				
10				
15				
20				

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Borehole/Well No. 70-87 (cont'd)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			6.0-8.0' SAMPLE. Recovered 0.7/2.0' = 35%. SAND: light brown (5 YR 6/4) sand ranging (2.5-2.0 Ø) to (0.5-1.0 Ø); scattered gravel 0.25 mm to 3.50 mm; angular and subangular; poorly sorted; weakly cemented; light, moist.	
			8.0-10.0' SAMPLE. Recovered 0.0/2.0' = 0%. Cuttings indicate clayey sand with some gravels.	
			10.0-12.0' SAMPLE. Recovered 0.014/2.0 = 0.12%. Sample retained as a large size gravel measuring 4.25 mm; subrounded.	
			12.0-14.0' SAMPLE. Recovered 2.0/2.0 = 100%. 12.0-13.5': CLAYEY SAND: moderate brown (5 YR 4/4) to varying light brown of (5 YR 5/6) to (5 YR 6/4) sand; fine-grained (3.0-2.5 Ø) and (2.5-2.0 Ø); poorly sorted, weakly cemented; moist.	
			ARAPAHOE FORMATION	
			13.5-14.0': CLAYEY SANDSTONE: pale yellowish brown (10 YR 6/2) to dark yellowish orange (10 YR 6/6) to light gray (N 7/0) streaked; grain size (2.5-2.0 Ø); subrounded and rounded; severely oxide stained; massive; poorly sorted; highly weathered; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Coordinates

Total Depth

Drilling Company

Date Drilled

Drilling Method

Logged By

Geologist

Borehole/Well No. 70-87 (cont'd.)

Ground Surface Elevation

Water Level Encountered

Static

Driller

Helper

Drilling Fluid

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.0-16.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYEY SANDSTONE: varying brown and gray as noted in previous run; continued severely oxide stained; fine-grained sand (2.5-2.0 Ø); massive; moderately cemented; moist.	
			16.0-17.0' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY CLAYSTONE: medium dark gray (N 4/0); slightly weathered; fine-grained sands; massive; low plastic; blocky; moderately cemented; with thin oxide (Fe) streaks noted; moist.	
			TOTAL DEPTH: 17.0'	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 70-87

Coordinates N 39588.09 E 21098.79

Elevation: Ground Surface 5966.30'

Total Depth: Well 16.5'

Top of Casing 5968.35'

Borehole 17.0'

Formation of Completion Rocky Flats Alluvium/ Weathered Arapahoe Formation

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 14, 1987

Approved By

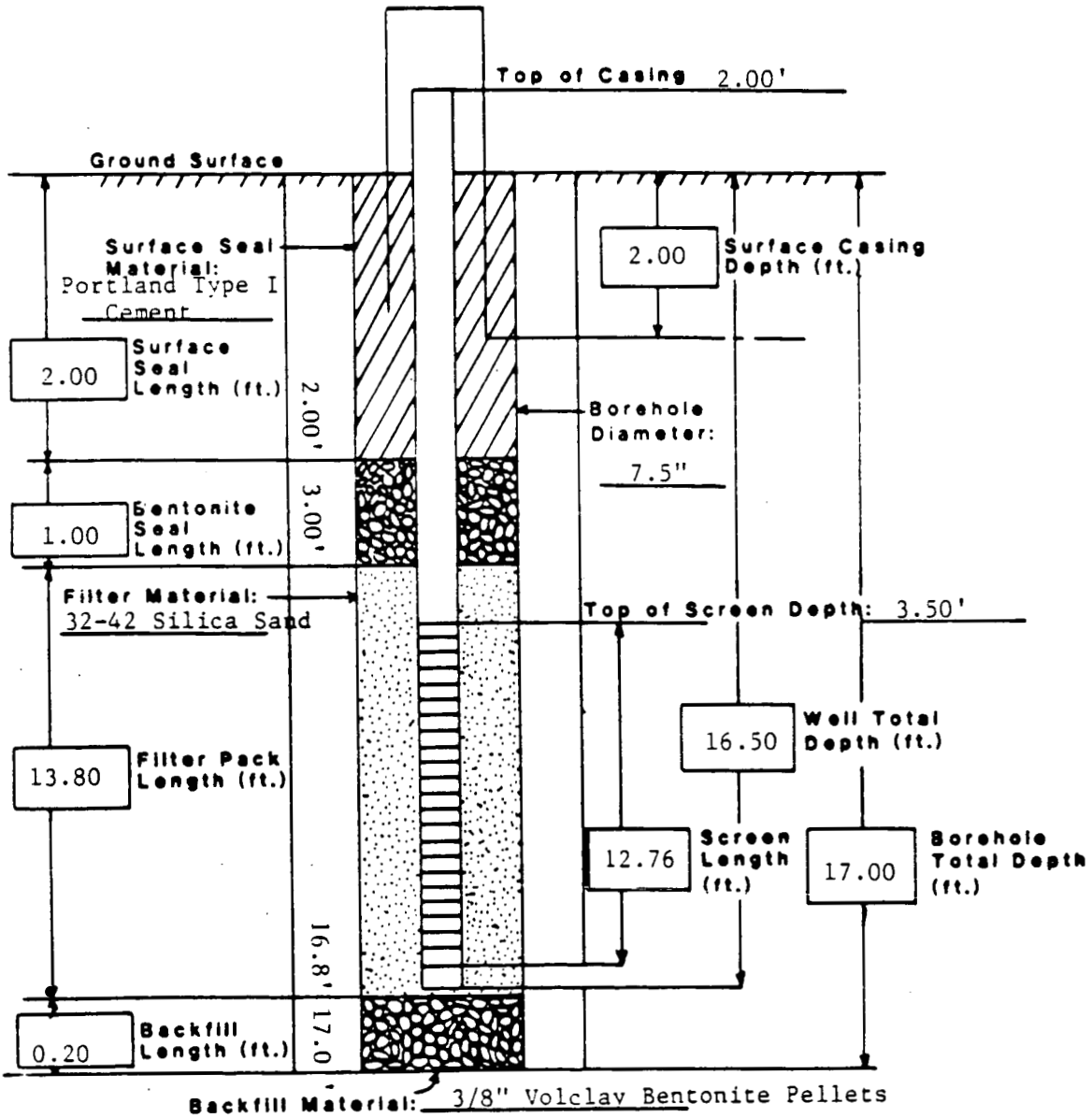
Site Manager

Installed By R. Treat

Geologist

CEARP Manager

Comments

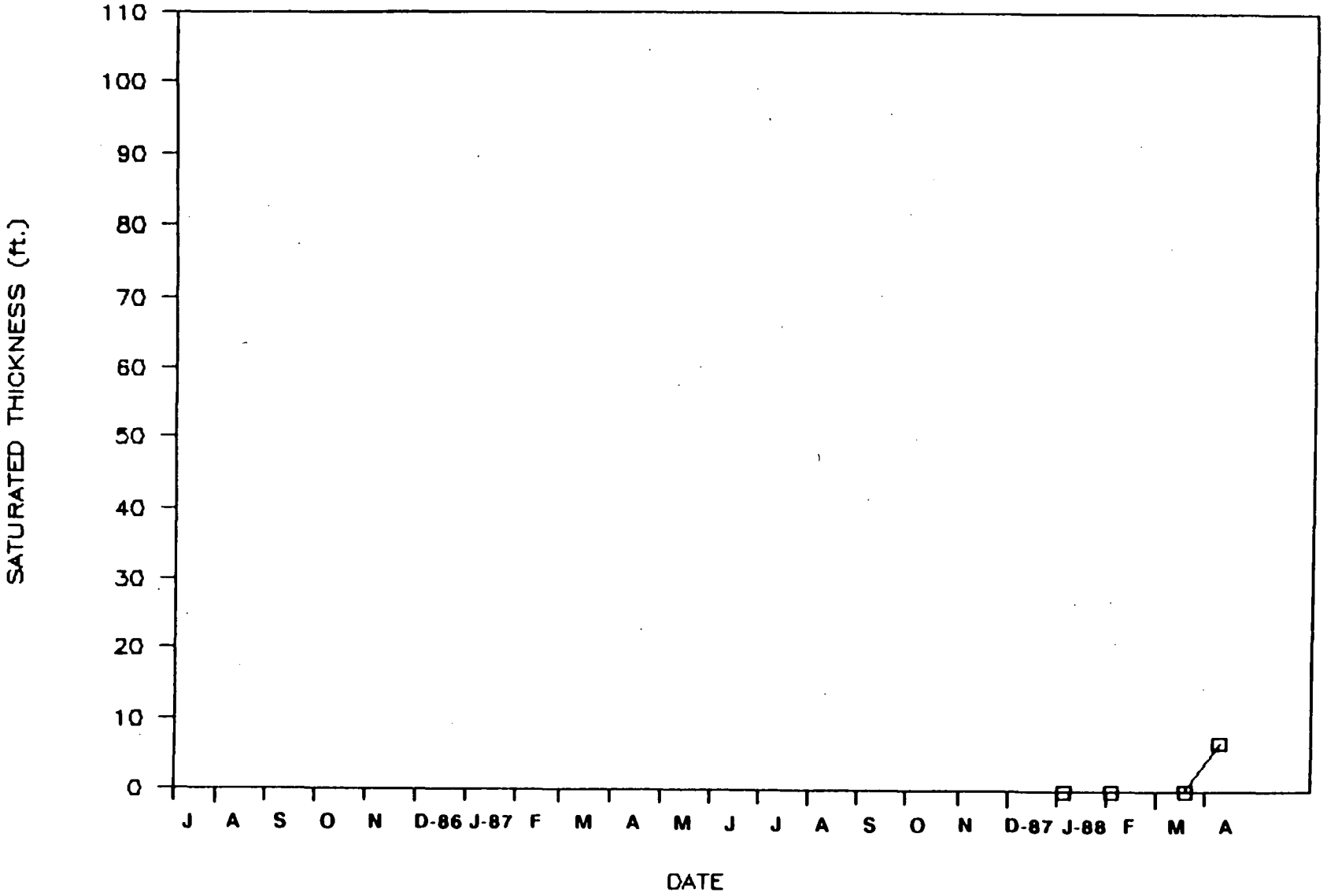


ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
7087	01/06/88	5966.30	5968.35	2.05	16.26	-1.00	DRY
	02/04/88					-1.00	DRY
	03/21/88					-1.00	DRY
	04/11/88					9.40	5958.95

SATURATED THICKNESS IN WELL # 70-87



INDEX OF DATA

Boring No.: 71-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

X Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40339.90 E 20991.74
Total Depth: 18.5'

Borehole Well No.: 71-87
Ground Surface Elevation: 5963.39'
Water Level Encountered: 5.0'
Static: 4.62' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 10, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus
Geologist

Driller: S. Bradfield
Helper: K. Parker
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM** 0.0-2.0' SAMPLE. Recovered 0.6/2.0' = 30%. SOIL: grayish brown (5 YR 3/2); roots; angular pebbles; sand; caliche; moist. 2.0-4.0' SAMPLE. Recovered 1.1/2.0' = 55%. CLAYEY SAND: yellowish gray (5 Y 7/2); high amount of caliche; angular pebbles of quartzite and igneous rock; contains chunks of clay bedrock; slightly moist to dry. 4.0-5.0' SAMPLE. Recovered 0.6/1.0' = 60%. CLAYEY SAND: same as above except less clay and much more caliche. 5.0-7.0' SAMPLE. No recovery; drilled with center bit. Total depth measured 6.5'. Adjust depth. 6.5-8.5' SAMPLE. Recovered 1.5/2.0' = 75%. CLAYEY SILTY SAND: dark yellowish orange (10 YR 6/6); clasts of quartzite; no HCl reaction; wet on top of the run; very moist. Total depth measured 9.0'. Adjust depth.	OVA background=0.7 HNu background=0.4 No readings above background.
5				
10				
15				
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 71-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			9.0-11.0' SAMPLE. Recovered 1.6/2.0' = 80%. 9.0-10.2': SANDY CLAY: dark yellowish orange (10 YR 6/6); large angular pebbles; small angular cobbles; no HCl reaction; moist to wet. 10.2-10.6': SANDY CLAY: light gray (N 7/0) stained with dark yellowish orange (10 YR 6/6); fine-grained sand; moderate HCl reaction; moist.	
			11.0-13.0' SAMPLE. Recovered 1.6/2.0' = 80%. 11.0-11.4': SANDY CLAY: same as above. 11.4-13.0': SANDY CLAY: light gray (N 7/0); stained with dark yellowish orange (10 YR 6/6); angular pebbles of feldspar and quartzite; moist to wet.	
			13.0-15.0' SAMPLE. Recovered 1.1/2.0' = 55%. 13.0-13.5': SANDY CLAY: same as above.	
			ARAPAHOE FORMATION	
			13.5-14.1': CLAYSTONE: light gray (N 7/0); stained with dark yellowish orange (10 YR 6/6); dense; moist.	
			15.0-17.0' SAMPLE. Recovered 1.1/2.0' = 55%. CLAYSTONE: same as above except contains coal; slightly moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 71-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			17.0-19.0' SAMPLE. Recovered 0.6/2.0' = 30%. CLAYSTONE: same as above.	
			TOTAL DEPTH: 18.5'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 71-87

Coordinates N 40339.90 E 20991.74

Elevation: Ground Surface 5963.39'

Total Depth: Well 13.85'

Top of Casing 5965.47'

Borehole 18.50'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 11, 1987

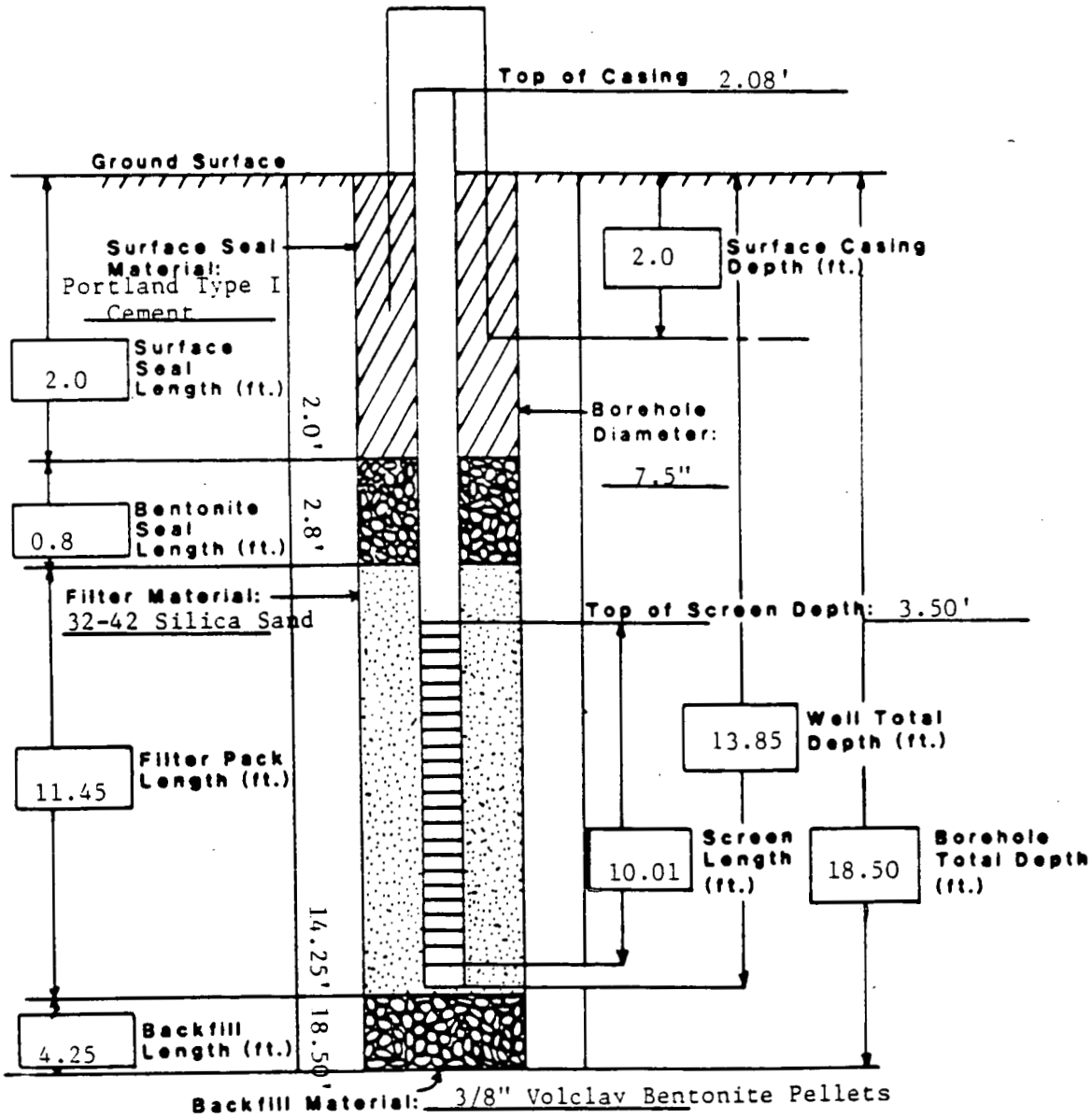
Approved By

Site Manager

Installed By J. Bacchus
Geologist

CEARP Manager

Comments



PROGRAM SLUGT, VERSION 4,OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3,NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")

(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87 CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant DATE OF SLUG TEST: 1-26-88

FIELD INVESTIGATOR: K. McNeill

WELL NO.: 71-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 10.01 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 7.83 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 7.83 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 29

TIME (sec)	HEAD (FEET)
30.00	1.060
35.00	1.030
40.00	1.010
45.00	.980
50.00	.960
55.00	.940
60.00	.920
65.00	.900
70.00	.880
76.00	.860
80.00	.840
90.00	.800
100.00	.770
110.00	.730
120.00	.700
130.00	.670
140.00	.640
150.00	.610
160.00	.580
170.00	.560
180.00	.530
190.00	.510
199.00	.490
219.00	.450
239.00	.410
259.00	.380
279.00	.350
309.00	.310
339.00	.270

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

1.1963
1.1985

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF HO = 1.20 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	1.639E-05	2.093E-06	5.117E-06	3.083E-05	1.569119	91.77	.00
1.000E-02	1.000E-02	3.474E-05	4.437E-06	1.838E-05	5.065E-05	.928773	49.13	42.64
1.000E-03	1.000E-03	5.466E-05	6.980E-06	3.651E-05	7.007E-05	.613999	30.74	18.39
1.000E-04	1.000E-04	7.436E-05	9.497E-06	5.508E-05	8.908E-05	.457225	21.90	8.84
1.000E-05	1.000E-05	9.369E-05	1.197E-05	7.324E-05	1.079E-04	.369540	16.98	4.92
1.000E-06	1.000E-06	1.127E-04	1.440E-05	9.106E-05	1.265E-04	.314116	13.89	3.09
1.000E-07	1.000E-07	1.316E-04	1.680E-05	1.086E-04	1.450E-04	.276261	11.78	2.11
1.000E-08	1.000E-08	1.503E-04	1.919E-05	1.260E-04	1.633E-04	.248656	10.25	1.53
1.000E-09	1.000E-09	1.688E-04	2.156E-05	1.432E-04	1.816E-04	.227472	9.08	1.17
1.000E-10	1.000E-10	1.873E-04	2.392E-05	1.604E-04	1.998E-04	.210345	8.16	.93

****

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 2.15E-05 FT/sec = 6.60E-04 CM/sec

TRANSMISSIVITY = 1.69E-04 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = 7.41E-06 FT/sec = 2.26E-04 CM/sec

TRANSMISSIVITY = 5.80E-05 FT**2/sec

WELL NO.: 71-87

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES
DIAMETER OF DRILLED HOLE = 7.50 INCHES
ESTIMATED POROSITY OF GRAVEL PACK = .25
LENGTH OF SCREEN OR INTAKE PORTION = 7.30 FEET
DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 7.83 FEET
THICKNESS OF SATURATED AQUIFER ZONE = 7.83 FEET
FALLING-HEAD INDEX = 0 ("1" IF FALLING,"0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 29

TIME (sec)	HEAD (FEET)
30.00	1.060
35.00	1.030
40.00	1.010
45.00	.980
50.00	.960
55.00	.940
60.00	.920
65.00	.900
70.00	.880
76.00	.860
80.00	.840
90.00	.800
100.00	.770
110.00	.730
120.00	.700
130.00	.670
140.00	.640
150.00	.610
160.00	.580
170.00	.560
180.00	.530
190.00	.510
199.00	.490
219.00	.450
239.00	.410
259.00	.380
279.00	.350
309.00	.310
339.00	.270

H0 WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .00250 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = .49 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

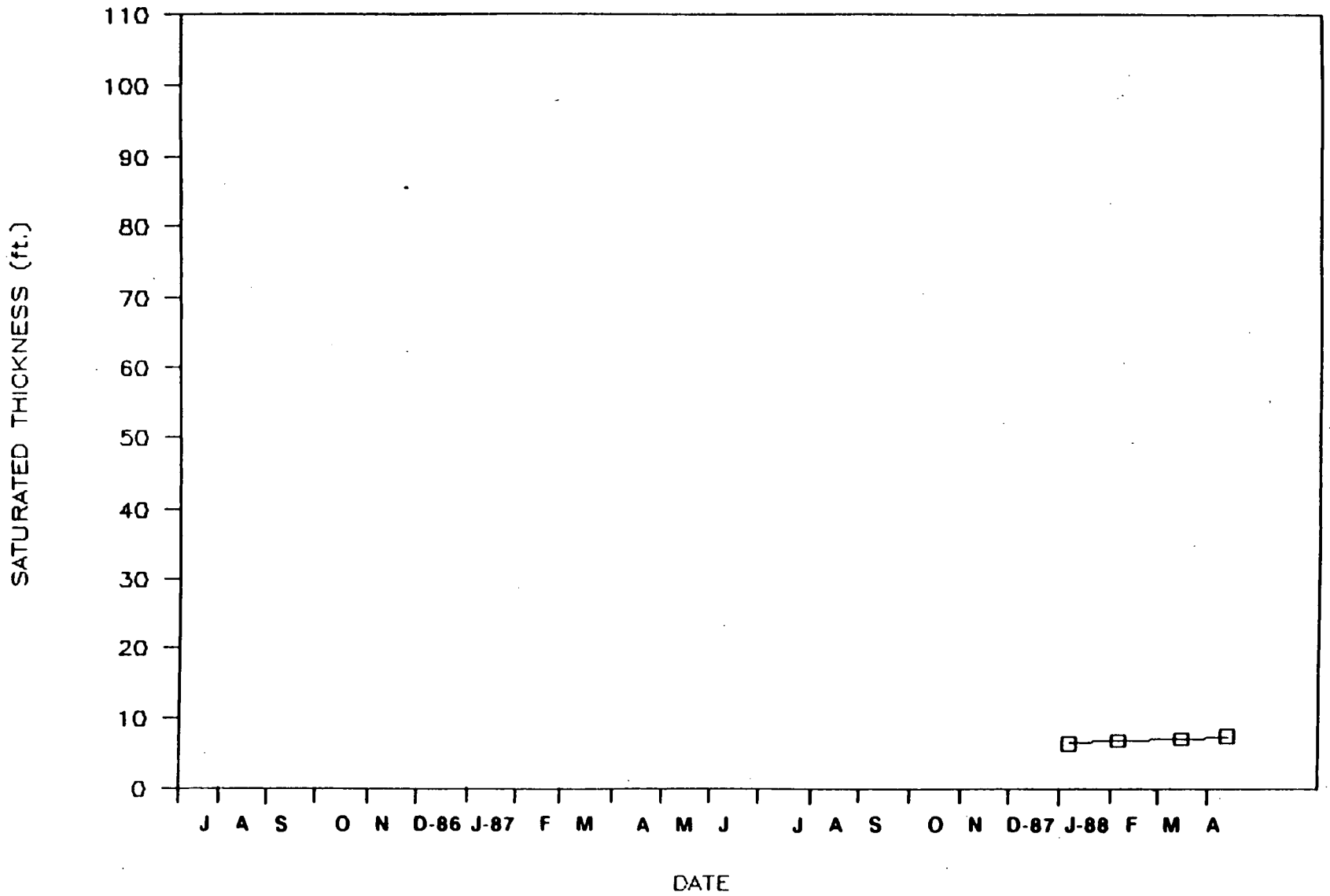
ALPHA	STORATIVITY	MEAN TRANSMIS-SIVITY	MEAN PERMEA-BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF 'T' RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	2.990E-05	3.819E-06	2.599E-05	4.026E-05	.477252	30.47	.00
1.000E-02	1.000E-02	5.964E-05	7.617E-06	5.529E-05	7.563E-05	.341149	7.51	22.96
1.000E-03	1.000E-03	9.069E-05	1.158E-05	8.151E-05	1.271E-04	.502879	14.87	-7.36
1.000E-04	1.000E-04	1.212E-04	1.548E-05	1.043E-04	1.780E-04	.608096	20.29	-5.42
1.000E-05	1.000E-05	1.511E-04	1.930E-05	1.259E-04	2.277E-04	.673361	23.51	-3.22
1.000E-06	1.000E-06	1.807E-04	2.308E-05	1.474E-04	2.764E-04	.713903	25.61	-2.10
1.000E-07	1.000E-07	2.100E-04	2.682E-05	1.687E-04	3.247E-04	.742686	27.08	-1.47
1.000E-08	1.000E-08	2.391E-04	3.053E-05	1.899E-04	3.726E-04	.764245	28.17	-1.09
1.000E-09	1.000E-09	2.678E-04	3.420E-05	2.067E-04	4.203E-04	.797832	29.45	-1.28
1.000E-10	1.000E-10	2.960E-04	3.780E-05	2.141E-04	4.678E-04	.857204	31.65	-2.20

ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
7187	01/05/88	5963.39	5965.47	2.08	13.57	7.10	5958.37
	02/04/88					6.70	5958.77
	03/14/88					6.40	5959.07
	04/11/88					6.00	5959.47

SATURATED THICKNESS IN WELL # 71-87



INDEX OF DATA

Boring No.: 72-87

Completed as well? Yes

Data in File

X Log of Borehole

X Well Construction Summaries

____ Well Development Summaries

____ Hydraulic Conductivity Test Data and Results

____ Packer Test Data and Results

X Water Level Data

X Saturated Thickness Hydrograph

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39459.12 E 20855.24
Total Depth: 15.0'

Borehole/Well No.: 72-87
Ground Surface Elevation: 5969.11'
Water Level Encountered: 6.0'
Static: 2.13' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 16, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat
Geologist

Driller: S. Bradfield
Helper: K. Parker
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM**	HNu Background=0.6 OVA Background=1.2 Ludlum Background=0
			0.0-2.0' SAMPLE. Recovered 1.8/2.0' = 90%. 0.0-0.3': CLAY AND GRAVEL: dusky brown (5 YR 2/2); scattered cobbles; subangular and subrounded gravel with numerous roots; moderately cemented; light moist. 0.3-1.8': SAND AND GRAVEL: grayish orange (10 YR 7/4) to some dark yellowish orange (10 YR 6/6); sand (2.5-2.0 Ø) to scattered (1.0-0.5 Ø); gravel ranging from 1.25 mm to 2.75 mm; subangular and subrounded; very calcareous; weakly cemented; moist.	0.0-1.8': Readings on core: HNu = 5.4; OVA = 4.2. 0.0-1.8': Direct hit sample: 72870000DH. 2.0-3.0': Readings on core: HNu = 0.0; OVA = 1.4. 2.0-3.0': Direct hit sample: 72870002DH. 4.0-5.0': Readings on core: HNu = 1.5; OVA = 0.0. 4.0-5.0': Direct hit/upper contact sample: 72870004UC. 6.0-8.0': Water table/contact sample: 72870006WT. 8.0-10.0': Bedrock sample: 72870008BR.
5				
			2.0-3.5' SAMPLE. Recovered 1.0/1.5' = 67%. SAND AND GRAVEL: very pale orange (10 YR 8/2) to some dark yellowish orange (10 YR 6/6) to light brown (5 YR 5/6); sand ranging (2.5-2.0 Ø) to scattered (0.5-0.0 Ø); gravel ranging 0.25 mm to 2.25 mm; subangular, subrounded, and few rounded; weakly cemented; poorly sorted; very calcareous; moist.	
10				
15			3.5-4.0' Center bit drill.	
			4.0-6.0' SAMPLE. Recovered 1.0/2.0' = 50%. SAND WITH SCATTERED GRAVEL: color as stated above; sand ranging (3.0-2.5 Ø) to scattered (1.0-0.5 Ø); gravel 1.00 mm and smaller; weakly cemented; poorly sorted; light moist.	
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 72-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			6.0-8.0' SAMPLE. Recovered 2.0/2.0' = 100%. 6.0-6.5': SAND AND SCATTERED GRAVELS: light brown (5 YR 5/6) to moderate brown (5 YR 4/4); sand (2.5-2.0 Ø) and (1.5-1.0 Ø); rounded; non-cemented; poorly sorted; wet at 6.0'.	13.0-13.6': Field screen readings: HNU = 0.4 (1.5); OVA = 0.0 (0.0).
			ARAPAHOE FORMATION	
			6.5-8.0': CLAYEY SANDSTONE: varying light brown (5 YR 5/6) and (5 YR 6/4) to moderate brown (5 YR 4/4) with pale yellowish brown (10 YR 6/2); sand (3.0-2.5 Ø); weakly to non-cemented; poorly sorted; moderately oxide (Fe) stained; highly weathered very moist to moist.	
			8.0-10.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYEY SANDSTONE: varying light brown (5 YR 6/4) and (5 YR 5/6), light brownish gray (5 YR 6/1), and brownish gray (5 YR 4/1); fine-grained sand of (3.5-3.0 Ø) low to possible medium plastic; hardened small calcite fragments; moderately cemented; poorly sorted; moderately oxide (Fe) stained; highly weathered, moist.	
			10.0-12.0' SAMPLE. Recovered 0.0/2.0' = 0%.	
			12.0-13.0' SAMPLE. Recovered 0.0/1.0' = 0%.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 72-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			13.0-15.0' SAMPLE. Recovered 0.6/2.0' = 30%. SANDY CLAYSTONE: medium gray (N 5/0); medium if not highly plastic; moderately cemented; fine-grained sand (3.5-3.0 Ø); weathered, moist.	
			TOTAL DEPTH: 15.0'.	

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 72-87

Coordinates N 39459.12 E 20855.24

Elevation: Ground Surface 5969.11'

Total Depth: Well 7.0'

Top of Casing 5971.18'

Borehole 15.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 17, 1987

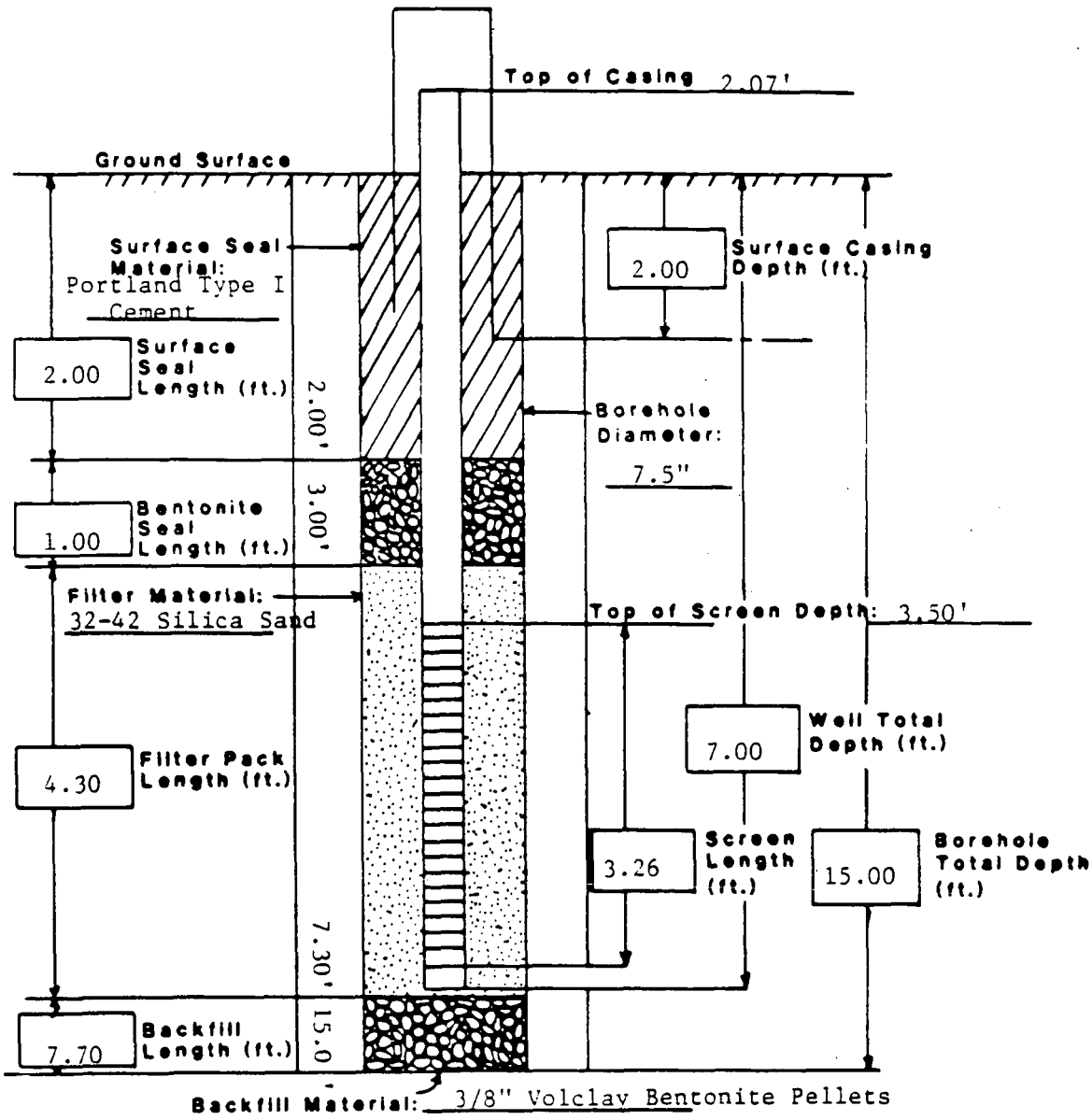
Approved By

Site Manager

Installed By R. Treat
Geologist

CEARP Manager

Comments

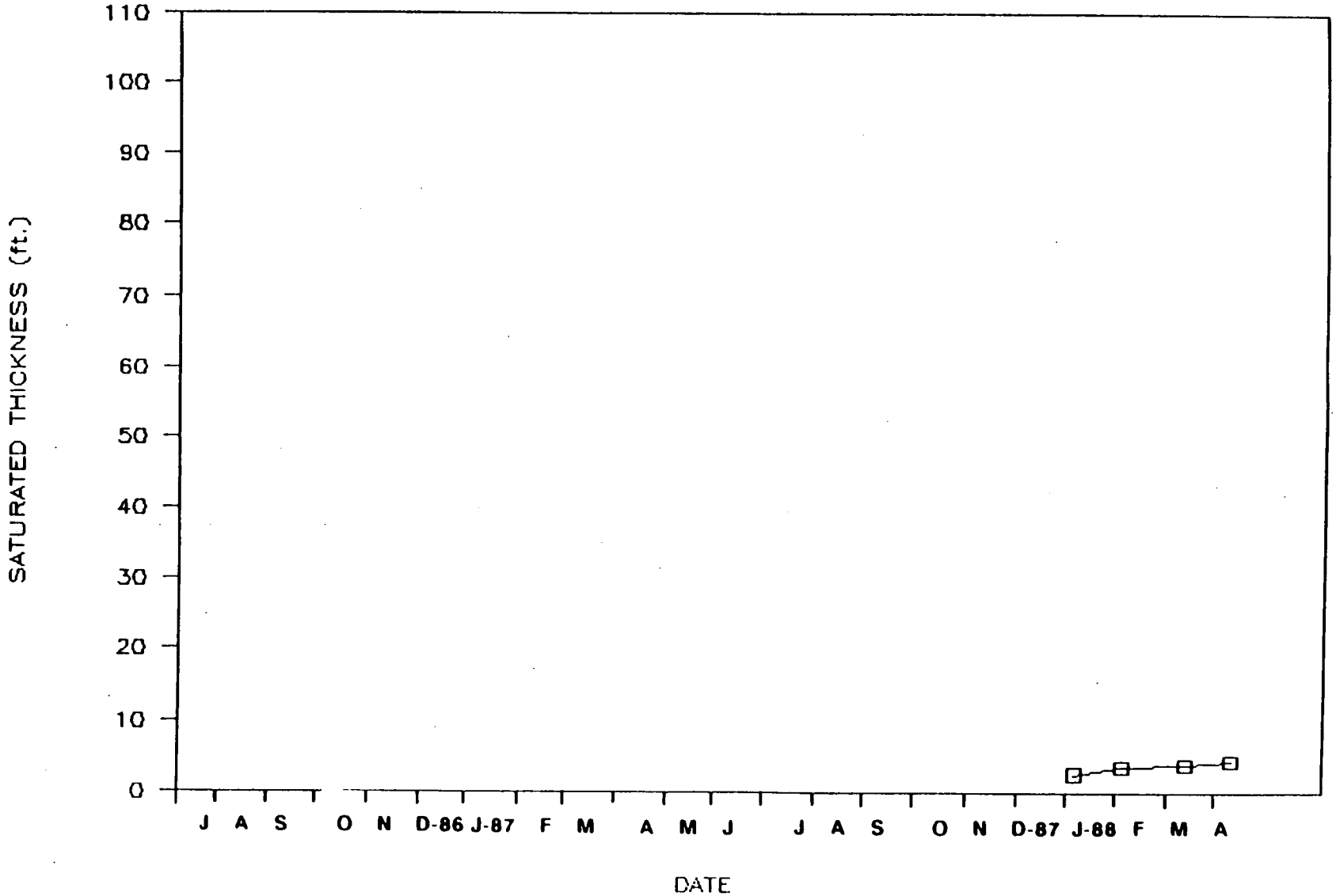


ROCKY FLATS PRESENT LANDFILL

WATER LEVEL SUMMARY

WELL NUMBER	DATE	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	STICK UP	DEPTH OF SI BASE	WATER DEPTH BELOW TOC	WATER SURFACE ELEVATION
7287	01/06/88	5969.11	5971.18	2.07	8.76	6.00	5965.18
	02/04/88					5.00	5966.18
	03/14/88					4.70	5966.48
	04/11/88					4.20	5966.98

SATURATED THICKNESS IN WELL # 72-87



APPENDIX C-5

PRESENT LANDFILL 1987 SURFACE WATER AND SEDIMENT SAMPLING RESULTS

ROCKWELL INTERNATIONAL
NORTH AMERICAN SPACE OPERATIONS
P.O. BOX 464
GOLDEN, COLORADO 80401

DISTRIBUTION:
F. J. Blaha, E.M., T452 F
Garvin Hewitt, Liqu. Waste, 374

LAB NUMBER: E87-4207
DATE:12-03-87
ACCOUNT NO: 986070-00

FILE

APPROVED: G. Compton
G.G.Compton

SAMPLE DESCRIPTION

One sediment and three surface water samples were sampled on 09-30-87.
SED 1 and SWLF 1 are samples from the west side of the pond at the landfill. SWLF 2 and 3 are water samples from the landfill.

ANALYSIS RESULTS

	SEDLF 1 mg/kg	SWLF 1 mg/l	SWLF 2 mg/l	SWLF 3 mg/l
Cyanide	2.08	--	--	--
Chloride	--	97.0	121.5	123.7
Sulfate	--	37.6	8.1	8.5
TDS	--	655	1,081	1,082
Alkalinity	--	402	190	195
Nitrate	--	<0.20	<0.20	<0.20

Analysis by ICP

HSL Metals (total)	SEDLF 1 (mg/kg)	SWLF 1 (mg/l)	SWLF 2 (mg/l)	SWLF 3 (mg/l)
Silver	7.6U	.0076U	.0076U	.0076U
Aluminum	35,000	.2324	.7041	.5842
Barium	185	.2568	.1884	.1885
Calcium	10,700	64.7146	94.7446	100.4984
Cobalt	<22	.0220U	.0220U	.0220U
Chromium	39.3	.0122	.0192	.0168
Copper	19.2	.0063U	.0072	.0063U
Iron	20,200	.3705	2.2593	2.3245
Magnesium	4,710	33.4648	73.6777	74.5405
Manganese	197	.1424	.3363	.4216
Molybdenum	22U	.0220U	.0220U	.0220U
Sodium	2,100U	113.2378	225.8143	216.0188
Nickel	<37	.0370U	.0370U	.0370U
Strontium	80.5	.5847	1.0469	1.0474
Vanadium	64.5	.0240U	.0240U	.0240U
Zinc	128	.0200U	.0337	.0320

U = analyzed, not detected

Results for water are reported with blank.

Analysis by atomic absorption:

Antimony	<6	<0.05	<0.05	<0.05
Arsenic	28	<0.010	<0.010	<0.010
Cadmium	<0.6*	<0.005	<0.005	<0.005
Lead	36	<0.005	<0.005	<0.005
Mercury	<0.3	<0.0002	<0.0002	<0.0002
Potassium	5,400	13	9	10
Selenium	<0.6	<0.005	<0.005	<0.005
Thallium	1.3	<0.010	<0.010	<0.010
Cesium	<25*	<0.2	<0.2	<0.2
Beryllium	0.9	<0.005	<0.005	<0.005

* Some present below detection limit.

Radiochemistry:

	SEDLF 1 pCi/g	SFLF 1 pCi/g	SFLF 2 pCi/l	SFLF 3 pCi/l
U-234	4.6±1.0	0.9±1.7	0.0±2.0	(0.0±7.9)10-1
U-235	(2.3±2.1)10-1	(2.2±5.8)10-1	(1.4±6.1)10-1	1.1±1.8
U-238	1.1±0.5	2.0±1.3	2.0±1.9	(0.0±5.5)10-1
Pu-239	(1.3±2.8)10-1	0.0±0.9	(0.0±5.6)10-1	(0.0±9.7)10-1
Am-241	(0.0±1.3)10-1	0.0±1.3	0.0±1.8	(0.0±5.1)10-1
Tritium	0.43	1.4x10+2	4.4x10+2	2.3x10+3
Sr-90	0.4	1.8	1.1	<1.0
Cs-137	0.3	<1.0	<1.0	<1.0
gross alpha	57±3	4±9	15±3	23±11
gross beta	54±6	27±22	16±13	24±3

Organics analyses, see attachements.

VOLATILE ORGANIC REPORT SHEET

Requestor F. Blaha Charge# 986070-00 Lab# E87-4207

Sample Date 9-30-87 Report Date 12-1-87 Page 1 of 3

Analysis	Sample #			
	#1	#2	#3	sediment
Methylene Chloride	5 U	5 U	5 U	5 U
Acetone	10 U	10 U	10 U	10 U
Carbon Disulfide	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)	5 U	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U
2-Butanone	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U
Vinyl Acetate	10 U	10 U	10 U	10 U
Bromodichloromethane	5 U	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U
Dibromochloromethane	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U
Benzene	5 U	5 U	5 U	5 U
trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U
Bromoform	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U
Tetrachloroethene	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U
Toluene	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	5 U
Styrene	5 U	5 U	5 U	5 U
Xylenes (total)	5 U	5 U	5 U	5 U

U= analyzed, not detected J= present below detection limit

All results in ug/L (Liquid) or ug/Kg (Solid)

11/11/87 HNN

SEMI-VOLATILE ORGANIC REPORT SHEET

Requestor F. Blaha Charge# 986070-00 Lab# E87-4207

Sample Date 9-30-87 Report Date 12-1-87 Page 2 of 3

Analysis (1st half)	Sample #			
	Sediment			
Phenol	1,550 U			
bis(2-Chloroethyl)ether	1,550 U			
2-Chlorophenol	1,550 U			
1,3-Dichlorobenzene	1,550 U			
1,4-Dichlorobenzene	1,550 U			
Benzyl Alcohol	1,550 U			
1,2-Dichlorobenzene	1,550 U			
2-Methylphenol	1,550 U			
bis(2-Chloroisopropyl)Ether	1,550 U			
4-Methylphenol	1,550 U			
N-Nitroso-di-n-propylamine	1,550 U			
Hexachloroethane	1,550 U			
Nitrobenzene	1,550 U			
Isophorone	1,550 U			
2-Nitrophenol	1,550 U			
2,4-Dimethylphenol	1,550 U			
Benzoic Acid	1,550 U			
bis(2-Chloroethoxy)Methane	1,550 U			
2,4-Dichlorophenol	1,550 U			
1,2,4-Trichlorobenzene	1,550 U			
Naphthalene	1,550 U			
4-Chloroaniline	1,550 U			
Hexachlorobutadiene	1,550 U			
4-Chloro-3-Methylphenol	1,550 U			
2-Methylnaphthalene	1,550 U			
Hexachlorocyclopentadiene	1,550 U			
2,4,6-Trichlorophenol	1,550 U			
2,4,5-Trichlorophenol	1,550 U			
2-Chloronaphthalene	1,550 U			
2-Nitroaniline	1,550 U			
Dimethylpthalate	1,550 U			
Acenaphthylene	1,550 U			
3-Nitroaniline	1,550 U			

All results in ug/L (Liquid) or ug/Kg (Solid)

11/11/87 HNN U= analyzed. not detected J= present below detection limit

SEMI-VOLATILE ORGANIC REPORT SHEET

Requestor E.Blaha Charge# 986070-00 Lab# E87-4207

Sample Date 9-30-87 Report Date 12-1-87 Page 3 of 3

Analysis (2nd half)	Sample #			
	Sediment			
Acenaphthene	1,550 U			
2,4-Dinitrophenol	1,550 U			
4-Nitrophenol	1,550 U			
Dibenzofuran	1,550 U			
2,4-Dinitrotoluene	1,550 U			
2,6-Dinitrotoluene	1,550 U			
Diethylphthalate	1,550 U			
4-Chlorophenyl-phenylether	1,550 U			
Fluorene	1,550 U			
4-Nitroaniline	1,550 U			
4,6-Dinitro-2-Methylphenol	1,550 U			
N-Nitrosodiphenylamine (1)	1,550 U			
4-Bromophenyl-phenylether	1,550 U			
Hexachlorobenzene	1,550 U			
Pentachlorophenol	1,550 U			
Phenanthrene	1,550 U			
Anthracene	1,550 U			
Di-n-butylphthalate	1,550 U			
Fluoranthene	1,550 U			
Pyrene	1,550 U			
Butylbenzylphthalate	1,550 U			
3,3'-Dichlorobenzidine	1,550 U			
Benzo(a)anthracene	1,550 U			
bis(2-Ethylhexyl)phthalate	1,550 U			
Chrysene	1,550 U			
Di-n-octylphthalate	1,550 U			
Benzo(b)fluoranthene	1,550 U			
Benzo(k)fluoranthene	1,550 U			
Benzo(a)pyrene	1,550 U			
Indeno(1,2,3-cd)pyrene	1,550 U			
Dibenz(a,h)anthracene	1,550 U			
Benzo(g,h,i)perylene	1,550 U			

All results in ug/L (Liquid) or ug/Kg (Solid)

11/11/87 HNN U= analyzed. not detected J= present below detection limit

APPENDIX C-4

SEDIMENT ANALYTICAL DATA

VOLATILE ORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-041-051	SED0308860	51
8608-024-019	SED0608860	19
8608-024-022	SED0708860	22

LANDFILL SEDIMENT SAMPLES
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-041-051	8608-024-019	8608-024-022
Customer ID:	SED0308860	SED0608860	SED0708860
Matrix:	Soil	Soil	Soil
Units:	UG/KG	UG/KG	UG/KG
Dilution Factor:	1.2	1.2	1.1

Surrogate Recovery

Toluene-d8:	98 %	102 %	110 %
Bromofluorobenzene:	95 %	98 %	105 %
1,2-Dichloroethane-d4:	89 %	103 %	100 %

Analytes

Chloromethane	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U
Methylene Chloride	90	1 J	2 J
Acetone	240	106	173
Carbon Disulfide	5 U	1 J	2 J
1,1-Dichloroethene	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U
Trans-1,2-Dichloroethene	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U
2-Butanone	10 U	19	10 U
1,1,1-Trichloroethane	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U
Vinyl Acetate	10 U	10 U	10 U
Bromodichloromethane	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U
Trans-1,3-Dichloropropene	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U
Dibromochloromethane	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U
Benzene	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U
2-Chloroethylvinylether	10 U	10 U	10 U
Bromoform	5 U	5 U	5 U
4-Methyl-2-pentanone	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U
Tetrachloroethene	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U
Toluene	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U
Styrene	5 U	5 U	5 U
Total Xylenes	5 U	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SEMI-VOLATILES

LANDFILL SEDIMENT SAMPLES
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-074-001	8608-046-001	8608-046-002
Customer ID:	SED0308860	SED0608860	SED0708860
Matrix:	Soil	Soil	Soil
Units:	UG/KG	UG/KG	UG/KG
Dilution Factor:	38	40	40

Surrogate Recovery

2-Fluorophenol:	24 %	48 %	59 %
Phenol-d5:	21 %	41 %	51 %
2,4,6-Br3-Phenol:	32 %	51 %	63 %
Nitrobenzene-d5:	26 %	52 %	48 %
2-Fluorobiphenyl:	36 %	64 %	72 %
p-Terphenyl-d14:	24 %	46 %	48 %

Analytes

Phenol	390 U	400 U	400 U
bis(2-Chloroethyl)Ether	390 U	400 U	400 U
2-Chlorophenol	390 U	400 U	400 U
1,3-Dichlorobenzene	390 U	400 U	400 U
1,4-Dichlorobenzene	390 U	400 U	400 U
Benzyl Alcohol	390 U	400 U	400 U
1,2-Dichlorobenzene	390 U	400 U	400 U
2-Methylphenol	390 U	400 U	400 U
bis(2-Chloroisopropyl)Ether	390 U	400 U	400 U
4-Methylphenol	390 U	400 U	400 U
N-Nitroso-di-n-propylamine	390 U	400 U	400 U
Hexachloroethane	390 U	400 U	400 U
Nitrobenzene	390 U	400 U	400 U
Isophorone	390 U	400 U	400 U
2-Nitrophenol	390 U	400 U	400 U
2,4-Dimethylphenol	390 U	400 U	400 U
Benzoic Acid	2000 U	2000 U	2000 U
bis(2-Chloroethoxy)Methane	390 U	400 U	400 U
2,4-Dichlorophenol	390 U	400 U	400 U
1,2,4-Trichlorobenzene	390 U	400 U	400 U
Naphthalene	390 U	400 U	400 U
4-Chloroaniline	390 U	400 U	400 U
Hexachlorobutadiene	390 U	400 U	400 U
4-Chloro-3-methylphenol	390 U	400 U	400 U
2-Methylnaphthalene	390 U	20 J	400 U
Hexachlorocyclopentadiene	390 U	400 U	400 U
2,4,6-Trichlorophenol	390 U	400 U	400 U
2,4,5-Trichlorophenol	2000 U	2000 U	2000 U
2-Chloronaphthalene	390 U	400 U	400 U
2-Nitroaniline	2000 U	2000 U	2000 U
Dimethyl Phthalate	390 U	400 U	400 U
Acenaphthylene	390 U	400 U	400 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL SEDIMENT SAMPLES
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-074-001	8608-046-001	8608-046-002
Customer ID:	SED0308860	SED0608860	SED0708860
Matrix:	Soil	Soil	Soil
Units:	UG/KG	UG/KG	UG/KG
Dilution Factor:	38	40	40

Analytes

3-Nitroaniline	2000	U	2000	U	2000	U
Acenaphthene	390	U	240	J	400	U
2,4-Dinitrophenol	2000	U	2000	U	2000	U
4-Nitrophenol	2000	U	2000	U	2000	U
Dibenzofuran	390	U	160	J	400	U
2,4-Dinitrotoluene	390	U	400	U	400	U
2,6-Dinitrotoluene	390	U	400	U	400	U
Diethylphthalate	390	U	400	U	400	U
4-Chlorophenyl-phenylether	390	U	400	U	400	U
Fluorene	390	U	160	J	400	U
4-Nitroaniline	2000	U	2000	U	2000	U
4,6-Dinitro-2-methylphenol	2000	U	2000	U	2000	U
N-Nitrosodiphenylamine	1100	B	360	JB	240	JB
4-Bromophenyl-phenylether	390	U	400	U	400	U
Hexachlorobenzene	390	U	400	U	400	U
Pentachlorophenol	2000	U	2000	U	320	J
Phenanthrene	390	U	1400		400	U
Anthracene	390	U	400		400	U
di-n-Butyl Phthalate	390	B	80	J	400	U
Fluoranthene	390	U	1600		400	U
Pyrene	390	U	1300		400	U
Butyl Benzyl Phthalate	390	U	400	U	400	U
3,3'-Dichlorobenzidine	780	U	800	U	800	U
Benzo(a)Anthracene	390	U	520		400	U
bis(2-Ethylhexyl)Phthalate	190	JB	120	J	200	J
Chrysene	390	U	530		400	U
di-n-Octyl Phthalate	390	U	400	U	400	U
Benzo(b)Fluoranthene	390	U	880		400	U
Benzo(k)Fluoranthene	390	U	880		400	U
Benzo(a)Pyrene	390	U	560		400	U
Indeno(1,2,3-cd)Pyrene	390	U	560		400	U
Dibenz(a,h)Anthracene	390	U	400	U	400	U
Benzo(g,h,i)Perylene	390	U	680		400	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

PESTICIDE/PCBs

LANDFILL SEDIMENT SAMPLES
PESTICIDES/PCB
CLP LIST

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-074-001	8608-046-001	8608-046-002
Customer ID:	SED0308860	SED0608860	SED0708860
Matrix:	Soil	Soil	Soil
Units:	UG/KG	UG/KG	UG/KG
Dilution Factor:	.250	.1869	.1869

Surrogate Recovery

Di-n-butylchlorendate:	30 %	74 %	69 %

Analytes

Alpha-BHC	2 U	1.5 U	1.5 U
Beta-BHC	2 U	1.5 U	1.7 U
Delta-BHC	2 U	1.5 U	1.5 U
Gamma-BHC (Lindane)	2 U	1.5 U	1.5 U
Heptachlor	2 U	1.5 U	1.5 U
Aldrin	2 U	1.5 U	1.5 U
Heptachlor Epoxide	2 U	1.5 U	1.5 U
Endosulfan I	2 U	1.5 U	1.5 U
Dieldrin	4 U	3 U	3 U
4,4'-DDE	4 U	3 U	3 U
Endrin	4 U	3 U	3 U
Endosulfan II	4 U	3 U	3 U
4,4'-DDD	4 U	3 U	3 U
Endosulfan Sulfate	4 U	3 U	3 U
4,4'-DDT	4 U	3 U	3 U
Methoxychlor	20 U	15 U	15 U
Endrin Ketone	4 U	3 U	3 U
Chlordane	20 U	15 U	15 U
Toxaphene	40 U	30 U	30 U
Aroclor-1016	20 U	15 U	15 U
Aroclor-1221	20 U	15 U	15 U
Aroclor-1232	20 U	15 U	15 U
Aroclor-1242	20 U	15 U	15 U
Aroclor-1248	20 U	15 U	15 U
Aroclor-1254	40 U	30 U	30 U
Aroclor-1260	40 U	30 U	30 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

RADIONUCLIDES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
1000-000-353	SED0308860	22542-7-7
1000-000-357	SED0608860	22509-14-4
1000-000-358	SED0708860	22509-14-5

LANDFILL SEDIMENT SAMPLES
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	1000-000-353	1000-000-357	1000-000-358
Customer ID:	SED0308860	SED0608860	SED0708860
Matrix:	Soil	Soil	Soil

Radio Chemistry

Gross Alpha.....	24 +/- 10	pci/g	16 +/- 9	pci/g	26 +/- 10	pci/g
Gross Beta.....	32 +/- 6	pci/g	17 +/- 6	pci/g	22 +/- 6	pci/g
Uranium 233, 234.....	0.95 +/- 0.19	pci/g	0.57 +/- 0.22	pci/g	0.76 +/- 0.28	pci/g
Uranium 235.....	NR		NR		NR	
Uranium 238.....	1.0 +/- 0.2	pci/g	0.33 +/- 0.17	pci/g	0.63 +/- 0.25	pci/g
Strontium 89, 90.....	NR		NR		NR	
Plutonium 239, 240.....	1.9 +/- 0.1	pci/g	0.01 +/- 0.02	pci/g	0.00 +/- 0.09	pci/g
Americium 241.....	0.42 +/- 0.06	pci/g	0.49 +/- 0.23	pci/g	0.01 +/- 0.06	pci/g
Cesium 137.....	NR		NR		NR	
Tritium.....	-0.03 +/- 0.24	pci/ml	0.17 +/- 0.26	pci/ml	0.12 +/- 0.25	pci/ml

INORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-041-053	SED0308860	
8608-024-021	SED0608860	
8608-024-024	SED0708860	

LANDFILL SEDIMENT SAMPLES
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-041-053			8608-024-021			8608-024-024	
Customer ID:	SED0308860			SED0608860			SED0708860	
Matrix:	Water			Soil			Soil	
Inorganics								
CO3= as CaCO3	NR			NR			NR	
HCO3- as CaCO3	NR			NR			NR	
Chloride	12	mg/kg		16	mg/kg		37	mg/kg
Sulfate	91	mg/kg		386	mg/kg		744	mg/kg
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	113.7	mg/kg		46.9	mg/kg		54.5	mg/kg
Sulfide								
Phosphate								
Cyanide, Total	0.005	mg/kg		0.099	mg/kg	U	0.13	mg/kg U
Hexavalent Chromium (Cr+6)	NA			NA			NA	
Total Dissolved Solids	NA			NA			NA	
Total Suspended Solids	NA			NA			NA	
% Solids	88	%		79	%		86	%

METALS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-041-052	SED0308860	
8608-024-020	SED0608860	
8608-024-023	SED0708860	

LANDFILL SEDIMENT SAMPLES
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-041-052	8608-024-020	8608-024-023
Customer ID:	SED0308860	SED0608860	SED0708860
Matrix:	Soil	Soil	Soil
Units:	MG/KG	MG/KG	MG/KG

Metals

Silver (Ag), total.....	2.2	1.2 U	0.88 U
Aluminum (Al), total.....	9.7	10500	10500
Arsenic (As), total.....	0.10	1.1	1.3
Barium (Ba), total.....	57	152	124
Beryllium (Be), total.....	2.3	1.2	0.88
Calcium (Ca), total.....	710	3990	5890
Cadmium (Cd), total.....	0.6 U	0.58 U	0.44 U
Cobalt (Co), total.....	8.0	6.9	7.0
Chromium (Cr), total.....	16	8.0	7.0
Cesium (Cs), total.....	11 U	10 U	10 U
Copper (Cu), total.....	19	15	13
Iron (Fe), total.....	12500	27700	30300
Mercury (Hg), total.....	0.26	0.50	0.18
Potassium (K), total.....	2610	3640	4450
Lithium (Li), total.....			
Magnesium (Mg), total.....	250	2030	2570
Manganese (Mn), total.....	200	360	533
Molybdenum(Mo), total.....	11	12 U	8.8 U
Sodium (Na), total.....	230 U	170	256
Nickel (Ni), total.....	14	15	12
Lead (Pb), total.....	14	7.9	12
Antimony (Sb), total.....	5.7 U	2.3 U	1.8 U
Selenium (Se), total.....	0.13	0.1 U	0.10 U
Strontium (Sr), total.....	14	49	57
Thallium (Tl), total.....	1.1 U	44	90
Vanadium (V), total.....	32	40	42
Zinc (Zn), total.....	71	71	61

APPENDIX C

ANALYTICAL CHEMISTRY

This appendix contains analytical results for surface water, sediment, and ground-water samples collected in 1986, 1987, and first quarter 1988 when available for the Present Landfill Area. The enclosed data are presented in the following order:

Appendix C-1: Ground-Water Analytical Data Alluvial Wells
- Volatile Organics
- Semi-Volatiles
- Pesticide/PCBs
- Radionuclides
- Inorganics
- Metals

Appendix C-2: Ground-Water Analytical Data Bedrock Wells
- Volatile Organics
- Radionuclides
- Inorganics
- Metals

Appendix C-3: Surface Water Analytical Data
- Volatile Organics
- Semi-Volatiles
- Pesticide/PCBs
- Radionuclides
- Inorganics
- Metals

Appendix C-4: Sediment Analytical Data
- Volatile Organics
- Semi-Volatiles
- Pesticide/PCBs
- Radionuclides
- Inorganics
- Metals

Appendix C-5: Present Landfill 1987 Surface Water and Sediment Sampling Results

APPENDIX C-1

GROUND-WATER ANALYTICAL DATA
ALLUVIAL WELLS

VOLATILE ORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0188-881-020	06-86-02-01-88	
0387-881-074	06-86-08-10-87	
0188-881-021	07-86-02-01-88	
0188-881-015	10-86-02-01-88	
0187-881-100	10-86-05-14-87	
0287-881-047	10-86-06-15-87	
0387-881-076	10-86-08-10-87	
0487-881-067	10-86-12-15-87	
0188-881-017	42-87-02-02-88	
0487-881-072	42-87-12-16-87	
8710-006-0050	45-86	05
0187-881-098	45-86-05-15-87	
0287-881-043	45-86-06-12-87	
0387-881-084	45-86-08-14-87	
0487-881-001	45-86-09-30-87	
0187-881-073	5-86-05-04-87	
0287-881-038	5-86-06-09-87	
0188-881-001	58-87-01-22-88	
0188-881-002	59-87-01-22-88	
0187-881-097	6-86-05-13-87	
0287-881-082	6-86-06-09-87	
0188-881-003	60-87-01-22-88	
0188-881-006	61-87-01-26-88	
0188-881-004	62-87-01-25-88	
0188-881-005	63-87-01-26-88	
0188-881-010	65-87-01-27-88	
0188-881-008	67-87-01-27-88	
0188-881-009	68-87-01-27-88	
0188-881-011	72-87-01-27-88	
8610-044-031	G108610860	31
8610-044-006	G458610860	06
8610-044-016	G458610862	16
8706-079-0010	GW4287	01

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	0188-881-020	0387-881-074	0188-881-021	0188-881-015
Customer ID:	06-86-02-01-88	06-86-08-10-87	07-86-02-01-88	10-86-02-01-88
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0		1.0	1.0

Surrogate Recovery

Toluene-d8:	102 %	%	100 %	102 %
Bromofluorobenzene:	94 %	%	92 %	94 %
1,2-Dichloroethane-d4:	86 %	%	82 %	82 %

Analytes

Chloromethane.....	10 U	NR	10 U	10 U
Bromomethane.....	10 U	NR	10 U	10 U
Vinyl Chloride.....	10 U	NR	10 U	10 U
Chloroethane.....	10 U	NR	10 U	10 U
Methylene Chloride.....	5 U	NR	5 U	5 U
Acetone.....	10 U	NR	10 U	10 U
Carbon Disulfide.....	5 U	NR	5 U	5 U
1,1-Dichloroethene.....	5 U	5 U	5 U	5 U
1,1-Dichloroethane.....	5 U	NR	5 U	5 U
Trans-1,2-Dichloroethene.....	5 U	5 U	5 U	5 U
Chloroform.....	5 U	5 U	5 U	5 U
1,2-Dichloroethane.....	5 U	5 U	5 U	5 U
2-Butanone.....	10 U	NR	10 U	10 U
1,1,1-Trichloroethane.....	5 U	5 U	5 U	5 U
Carbon Tetrachloride.....	5 U	5 U	5 U	5 U
Vinyl Acetate.....	10 U	NR	10 U	10 U
Bromodichloromethane.....	5 U	NR	5 U	5 U
1,2-Dichloropropane.....	5 U	NR	5 U	5 U
Trans-1,3-Dichloropropene.....	5 U	NR	5 U	5 U
Trichloroethene.....	5 U	5 U	5 U	5 U
Dibromochloromethane.....	5 U	NR	5 U	5 U
1,1,2-Trichloroethane.....	5 U	5 U	5 U	5 U
Benzene.....	5 U	NR	5 U	5 U
cis-1,3-Dichloropropene.....	5 U	NR	5 U	5 U
2-Chloroethylvinylether.....		NR		
Bromoform.....	5 U	NR	5 U	5 U
4-Methyl-2-pentanone.....	10 U	NR	10 U	10 U
2-Hexanone.....	10 U	NR	10 U	10 U
Tetrachloroethene.....	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane.....	5 U	NR	5 U	5 U
Toluene.....	5 U	NR	5 U	5 U
Chlorobenzene.....	5 U	NR	5 U	5 U
Ethylbenzene.....	5 U	NR	5 U	5 U
Styrene.....	5 U	NR	5 U	5 U
Total Xylenes.....	5 U	NR	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0187-881-100	0287-881-047	0387-881-076	0487-881-067
Customer ID:	10-86-05-14-87	10-86-06-15-87	10-86-08-10-87	10-86-12-15-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1		1.0

Surrogate Recovery

Toluene-d8:	%	%	%	72 %
Bromofluorobenzene:	%	%	%	70 %
1,2-Dichloroethane-d4:	%	%	%	94 %

Analytes

Chloromethane.....	NR	NR	NR	10 U
Bromomethane.....	NR	NR	NR	10 U
Vinyl Chloride.....	NR	NR	NR	10 U
Chloroethane.....	NR	NR	NR	10 U
Methylene Chloride.....	NR	NR	NR	9.00
Acetone.....	NR	NR	NR	10 U
Carbon Disulfide.....	NR	NR	NR	5 U
1,1-Dichloroethene.....	4 U	4 U	5 U	5 U
1,1-Dichloroethane.....	NR	NR	NR	5 U
Trans-1,2-Dichloroethene.....	4 U	4 U	5 U	5 U
Chloroform.....	4 U	4 U	5 U	5 U
1,2-Dichloroethane.....	4 U	4 U	5 U	5 U
2-Butanone.....	NR	NR	NR	10 U
1,1,1-Trichloroethane.....	4 U	4 U	5 U	5 U
Carbon Tetrachloride.....	4 U	4 U	5 U	5 U
Vinyl Acetate.....	NR	NR	NR	10 U
Bromodichloromethane.....	NR	NR	NR	5 U
1,2-Dichloropropane.....	NR	NR	NR	5 U
Trans-1,3-Dichloropropene.....	NR	NR	NR	5 U
Trichloroethene.....	4 U	4 U	5 U	5 U
Dibromochloromethane.....	NR	NR	NR	5 U
1,1,2-Trichloroethane.....	4 U	4 U	5 U	5 U
Benzene.....	NR	NR	NR	5 U
cis-1,3-Dichloropropene.....	NR	NR	NR	5 U
2-Chloroethylvinylether.....	NR	NR	NR	NR
Bromoform.....	NR	NR	NR	5 U
4-Methyl-2-pentanone.....	NR	NR	NR	10 U
2-Hexanone.....	NR	NR	NR	10 U
Tetrachloroethene.....	4 U	4 U	5 U	5 U
1,1,2,2-Tetrachloroethane.....	NR	NR	NR	5 U
Toluene.....	NR	NR	NR	5 U
Chlorobenzene.....	NR	NR	NR	5 U
Ethylbenzene.....	NR	NR	NR	5 U
Styrene.....	NR	NR	NR	5 U
Total Xylenes.....	NR	NR	NR	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-017	0487-881-072	8710-006-0050	0187-881-098
Customer ID:	42-87-02-02-88	42-87-12-16-87	45-86	45-86-05-15-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1.0	1.0	1

Surrogate Recovery

Toluene-d8:	108 %	104 %	102 %	%
Bromofluorobenzene:	92 %	74 %	102 %	%
1,2-Dichloroethane-d4:	116 %	92 %	102 %	%

Analytes

Chloromethane.....	10 U	10 U	10.00 U	NR
Bromomethane.....	10 U	10 U	10.00 U	NR
Vinyl Chloride.....	10 U	10 U	10.00 U	NR
Chloroethane.....	10 U	10 U	10.00 U	NR
Methylene Chloride.....	5 U	12.00	5.00 U	NR
Acetone.....	10 U	10 U	1.00 JB	NR
Carbon Disulfide.....	5 U	5 U	5.00 U	NR
1,1-Dichloroethene.....	5 U	5 U	5.00 U	4 U
1,1-Dichloroethane.....	5 U	5 U	5.00 U	NR
Trans-1,2-Dichloroethene.....	5 U	5 U	5.00 U	4 U
Chloroform.....	5 U	5 U	5.00 U	4 U
1,2-Dichloroethane.....	5 U	5 U	5.00 U	4 U
2-Butanone.....	10 U	10 U	10.00 U	NR
1,1,1-Trichloroethane.....	5 U	5 U	5.00 U	4 U
Carbon Tetrachloride.....	5 U	5 U	5.00 U	4 U
Vinyl Acetate.....	10 U	10 U	10.00 U	NR
Bromodichloromethane.....	5 U	5 U	5.00 U	NR
1,2-Dichloropropane.....	5 U	5 U	5.00 U	NR
Trans-1,3-Dichloropropene.....	5 U	5 U	5.00 U	NR
Trichloroethene.....	5 U	5 U	5.00 U	4 U
Dibromochloromethane.....	5 U	5 U	5.00 U	NR
1,1,2-Trichloroethane.....	5 U	5 U	5.00 U	4 U
Benzene.....	5 U	5 U	5.00 U	NR
cis-1,3-Dichloropropene.....	5 U	5 U	5.00 U	NR
2-Chloroethylvinylether.....		NR	10.00 U	NR
Bromoform.....	5 U	5 U	5.00 U	NR
4-Methyl-2-pentanone.....	10 U	10 U	10.00 U	NR
2-Hexanone.....	10 U	10 U	10.00 U	NR
Tetrachloroethene.....	5 U	5 U	5.00 U	4 U
1,1,2,2-Tetrachloroethane.....	5 U	5 U	5.00 U	NR
Toluene.....	5 U	5 U	5.00 U	NR
Chlorobenzene.....	5 U	5 U	5.00 U	NR
Ethylbenzene.....	5 U	5 U	5.00 U	NR
Styrene.....	5 U	5 U	5.00 U	NR
Total Xylenes.....	5 U	5 U	5.00 U	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0287-881-043	0387-881-084	0487-881-001	0187-881-073
Customer ID:	45-86-06-12-87	45-86-08-14-87	45-86-09-30-87	5-86-05-04-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1			1

Surrogate Recovery

Toluene-d8:	%	%	%	%
Bromofluorobenzene:	%	%	%	%
1,2-Dichloroethane-d4:	%	%	%	%

Analytes

Chloromethane	NR	NR		NR
Bromomethane	NR	NR		NR
Vinyl Chloride	NR	NR		NR
Chloroethane	NR	NR		NR
Methylene Chloride	NR	NR		NR
Acetone	NR	NR		NR
Carbon Disulfide	NR	NR		NR
1,1-Dichloroethene	4 U	5 U	5 U	4 U
1,1-Dichloroethane	NR	NR		NR
Trans-1,2-Dichloroethene	4 U	5 U	5 U	4 U
Chloroform	4 U	5 U	5 U	4 U
1,2-Dichloroethane	4 U	5 U	5 U	4 U
2-Butanone	NR	NR		NR
1,1,1-Trichloroethane	4 U	5 U	5 U	4 U
Carbon Tetrachloride	4 U	5 U	5 U	4 U
Vinyl Acetate	NR	NR		NR
Bromodichloromethane	NR	NR		NR
1,2-Dichloropropane	NR	NR		NR
Trans-1,3-Dichloropropene	NR	NR		NR
Trichloroethene	4 U	5 U	5 U	4 U
Dibromochloromethane	NR	NR		NR
1,1,2-Trichloroethane	4 U	5 U	5 U	4 U
Benzene	NR	NR		NR
cis-1,3-Dichloropropene	NR	NR		NR
2-Chloroethylvinylether	NR	NR		NR
Bromoform	NR	NR		NR
4-Methyl-2-pentanone	NR	NR		NR
2-Hexanone	NR	NR		NR
Tetrachloroethene	4 U	5 U	5 U	4 U
1,1,2,2-Tetrachloroethane	NR	NR		NR
Toluene	NR	NR		NR
Chlorobenzene	NR	NR		NR
Ethylbenzene	NR	NR		NR
Styrene	NR	NR		NR
Total Xylenes	NR	NR		NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0287-881-038	0188-881-001	0188-881-002	0187-881-097
Customer ID:	5-86-06-09-87	58-87-01-22-88	59-87-01-22-88	6-86-05-13-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1.0	1.0	1

Surrogate Recovery

Toluene-d8:	%	113 %	124 %	%
Bromofluorobenzene:	%	124 %	127 %	%
1,2-Dichloroethane-d4:	%	148 %	148 %	%

Analytes

Chloromethane.....	NR	10 U	10 U	NR
Bromomethane.....	NR	10 U	10 U	NR
Vinyl Chloride.....	NR	10 U	10 U	NR
Chloroethane.....	NR	10 U	10 U	NR
Methylene Chloride.....	NR	5 U	5 U	NR
Acetone.....	NR	13	10 U	NR
Carbon Disulfide.....	NR	5 U	5 U	NR
1,1-Dichloroethene.....	4 U	5 U	5 U	4 U
1,1-Dichloroethane.....	NR	5 U	5 U	NR
Trans-1,2-Dichloroethene.....	4 U	5 U	5 U	4 U
Chloroform.....	4 U	5 U	5 U	4 U
1,2-Dichloroethane.....	4 U	5 U	5 U	4 U
2-Butanone.....	NR	10 U	10 U	NR
1,1,1-Trichloroethane.....	4 U	5 U	5 U	4 U
Carbon Tetrachloride.....	4 U	8	5 U	4 U
Vinyl Acetate.....	NR	10 U	10 U	NR
Bromodichloromethane.....	NR	5 U	5 U	NR
1,2-Dichloropropane.....	NR	5 U	5 U	NR
Trans-1,3-Dichloropropene.....	NR	5 U	5 U	NR
Trichloroethene.....	4 U	5 U	5 U	4 U
Dibromochloromethane.....	NR	5 U	5 U	NR
1,1,2-Trichloroethane.....	4 U	5 U	5 U	4 U
Benzene.....	NR	5 U	5 U	NR
cis-1,3-Dichloropropene.....	NR	5 U	5 U	NR
2-Chloroethylvinylether.....	NR			NR
Bromoform.....	NR	5 U	5 U	NR
4-Methyl-2-pentanone.....	NR	10 U	10 U	NR
2-Hexanone.....	NR	10 U	10 U	NR
Tetrachloroethene.....	4 U	5 U	5 U	4 U
1,1,2,2-Tetrachloroethane.....	NR	5 U	5 U	NR
Toluene.....	NR	5 U	5 U	NR
Chlorobenzene.....	NR	5 U	5 U	NR
Ethylbenzene.....	NR	5 U	5 U	NR
Styrene.....	NR	5 U	5 U	NR
Total Xylenes.....	NR	5 U	5 U	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0287-881-082	0188-881-003	0188-881-006	0188-881-004
Customer ID:	6-86-06-09-87	60-87-01-22-88	61-87-01-26-88	62-87-01-25-88
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1.0	1.0	1.0

Surrogate Recovery

Toluene-d8:	%	197 %	111 %	86 %
Bromofluorobenzene:	%	116 %	122 %	114 %
1,2-Dichloroethane-d4:	%	151 %	157 %	131 %

Analytes

Chloromethane.....	NR	10 U	10 U	10 U
Bromomethane.....	NR	10 U	10 U	10 U
Vinyl Chloride.....	NR	10 U	10 U	10 U
Chloroethane.....	NR	10 U	10 U	10 U
Methylene Chloride.....	NR	5 U	5 U	6
Acetone.....	NR	10 U	10 U	10 U
Carbon Disulfide.....	NR	5 U	5 U	5 U
1,1-Dichloroethene.....	4 U	5 U	5 U	5 U
1,1-Dichloroethane.....	NR	5 U	5 U	5 U
Trans-1,2-Dichloroethene.....	4 U	5 U	5 U	5 U
Chloroform.....	4 U	5 U	5 U	5 U
1,2-Dichloroethane.....	4 U	5 U	5 U	5 U
2-Butanone.....	NR	10 U	10 U	10 U
1,1,1-Trichloroethane.....	4 U	5 U	5 U	5 U
Carbon Tetrachloride.....	4 U	6	7	8
Vinyl Acetate.....	NR	10 U	10 U	10 U
Bromodichloromethane.....	NR	5 U	5 U	5 U
1,2-Dichloropropane.....	NR	5 U	5 U	5 U
Trans-1,3-Dichloropropene.....	NR	5 U	5 U	5 U
Trichloroethene.....	4 U	5 U	5 U	5 U
Dibromochloromethane.....	NR	5 U	5 U	5 U
1,1,2-Trichloroethane.....	4 U	5 U	5 U	5 U
Benzene.....	NR	5 U	5 U	5 U
cis-1,3-Dichloropropene.....	NR	5 U	5 U	5 U
2-Chloroethylvinylether.....	NR			
Bromoform.....	NR	5 U	5 U	5 U
4-Methyl-2-pentanone.....	NR	10 U	10 U	10 U
2-Hexanone.....	NR	10 U	10 U	10 U
Tetrachloroethene.....	4 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane.....	NR	5 U	5 U	5 U
Toluene.....	NR	5 U	5 U	5 U
Chlorobenzene.....	NR	5 U	5 U	5 U
Ethylbenzene.....	NR	5 U	5 U	5 U
Styrene.....	NR	5 U	5 U	5 U
Total Xylenes.....	NR	5 U	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-005	0188-881-010	0188-881-008	0188-881-009
Customer ID:	63-87-01-26-88	65-87-01-27-88	67-87-01-27-88	68-87-01-27-88
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1.0	1.0	1.0

Surrogate Recovery

Toluene-d8:	105 %	21 %	19 %	20 %
Bromofluorobenzene:	132 %	32 %	33 %	32 %
1,2-Dichloroethane-d4:	164 %	73 %	88 %	74 %

Analytes

Chloromethane	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U
Methylene Chloride	5 U	5 U	5 U	5 U
Acetone	10 U	10 U	10 U	10 U
Carbon Disulfide	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U
Trans-1,2-Dichloroethene	5 U	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U
2-Butanone	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U
Vinyl Acetate	10 U	10 U	10 U	10 U
Bromodichloromethane	5 U	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U
Trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U
Dibromochloromethane	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U
Benzene	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U
2-Chloroethylvinylether				
Bromoform	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U
Tetrachloroethene	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U
Toluene	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	5 U
Styrene	5 U	5 U	5 U	5 U
Total Xylenes	5 U	5 U	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-011	8610-044-031	8610-044-006	8610-044-016
Customer ID:	72-87-01-27-88	G108610860	G458610860	G458610862
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1	1	1

Surrogate Recovery

Toluene-d8:	21 %	96 %	96 %	96 %
Bromofluorobenzene:	32 %	100 %	106 %	102 %
1,2-Dichloroethane-d4:	75 %	80 %	76 %	90 %

Analytes

Chloromethane	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U
Methylene Chloride	5 U	5 U	5 U	5 U
Acetone	10 U	10 U	15 B	3 BJ
Carbon Disulfide	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U
Trans-1,2-Dichloroethene	5 U	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U
2-Butanone	10 U	10 U	10 U	6 J
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U
Vinyl Acetate	10 U	10 U	10 U	10 U
Bromodichloromethane	5 U	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U
Trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U
Trichloroethene	17	5 U	5 U	5 U
Dibromochloromethane	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U
Benzene	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U
2-Chloroethylvinylether		10 U	10 U	10 U
Bromoform	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U
Tetrachloroethene	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U
Toluene	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	5 U
Styrene	5 U	5 U	1 J	2 J
Total Xylenes	5 U	5 U	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8706-079-0010
Customer ID:	GW4287
Matrix:	Water
Units:	UG/L
Dilution Factor:	1.0

Surrogate Recovery

Toluene-d8:	102 %
Bromofluorobenzene:	100 %
1,2-Dichloroethane-d4:	104 %

Analytes

Chloromethane	10.00	U
Bromomethane	10.00	U
Vinyl Chloride	10.00	U
Chloroethane	10.00	U
Methylene Chloride	5.00	U
Acetone	26	B
Carbon Disulfide	5.00	U
1,1-Dichloroethene	5.00	U
1,1-Dichloroethane	5.00	U
Trans-1,2-Dichloroethene	5.00	U
Chloroform	5.00	U
1,2-Dichloroethane	5.00	U
2-Butanone	2.0	J
1,1,1-Trichloroethane	5.00	U
Carbon Tetrachloride	5.00	U
Vinyl Acetate	10.00	U
Bromodichloromethane	5.00	U
1,2-Dichloropropane	5.00	U
Trans-1,3-Dichloropropene	5.00	U
Trichloroethene	5.00	U
Dibromochloromethane	5.00	U
1,1,2-Trichloroethane	5.00	U
Benzene	5.00	U
cis-1,3-Dichloropropene	5.00	U
2-Chloroethylvinylether	10.00	U
Bromoform	5.00	U
4-Methyl-2-pentanone	10.00	U
2-Hexanone	10.00	U
Tetrachloroethene	5.00	U
1,1,2,2-Tetrachloroethane	5.00	U
Toluene	5.00	U
Chlorobenzene	5.00	U
Ethylbenzene	5.00	U
Styrene	5.00	U
Total Xylenes	5.00	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SEMIVOLATILES

List: RFW Batch ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8610-055-002	G458610860	
8610-055-004	G458610862	

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8610-055-002	8610-055-004
Customer ID:	G458610860	G458610862
Matrix:	Water	Water
Units:	UG/L	UG/L
Dilution Factor:	1	1

Surrogate Recovery

2-Fluorophenol:	38 %	43 %
Phenol-d5:	24 %	30 %
2,4,6-Br3-Phenol:	80 %	82 %
Nitrobenzene-d5:	66 %	64 %
2-Fluorobiphenyl:	62 %	60 %
p-Terphenyl-d14:	88 %	84 %

Analytes

Phenol	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	10 U
2-Chlorophenol	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U
Benzyl Alcohol	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U
2-Methylphenol	10 U	10 U
bis(2-Chloroisopropyl)Ether	10 U	10 U
4-Methylphenol	10 U	10 U
N-Nitroso-di-n-propylamine	10 U	10 U
Hexachloroethane	10 U	10 U
Nitrobenzene	10 U	10 U
Isophorone	10 U	10 U
2-Nitrophenol	10 U	10 U
2,4-Dimethylphenol	10 U	10 U
Benzoic Acid	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	10 U
2,4-Dichlorophenol	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U
Naphthalene	10 U	10 U
4-Chloroaniline	10 U	10 U
Hexachlororbutadiene	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U
2-Methylnaphthalene	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U
2-Chloronaphthalene	10 U	10 U
2-Nitroaniline	50 U	50 U
Dimethyl Phthalate	10 U	10 U
Acenaphthylene	10 U	10 U

LANDFILL ALLUVIAL WELLS
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8610-055-002	8610-055-004
Customer ID:	G458610860	G458610862
Matrix:	Water	Water
Units:	UG/L	UG/L
Dilution Factor:	1	1

Analytes

3-Nitroaniline	50	U	50	U
Acenaphthene	10	U	10	U
2,4-Dinitrophenol	50	U	50	U
4-Nitrophenol	50	U	50	U
Dibenzofuran	10	U	10	U
2,4-Dinitrotoluene	10	U	10	U
2,6-Dinitrotoluene	10	U	10	U
Diethylphthalate	10	U	10	U
4-Chlorophenyl-phenylether	10	U	10	U
Fluorene	10	U	10	U
4-Nitroaniline	50	U	50	U
4,6-Dinitro-2-methylphenol	50	U	50	U
N-Nitrosodiphenylamine	10	U	10	U
4-Bromophenyl-phenylether	10	U	10	U
Hexachlorobenzene	10	U	10	U
Pentachlorophenol	50	U	50	U
Phenanthrene	10	U	10	U
Anthracene	10	U	10	U
di-n-Butyl Phthalate	4	JB	4	JB
Fluoranthene	10	U	10	U
Pyrene	10	U	10	U
Butyl Benzyl Phthalate	1	J	10	U
3,3'-Dichlorobenzidine	20	U	20	U
Benzo(a)Anthracene	10	U	10	U
bis(2-Ethylhexyl)Phthalate	7	JB	4	JB
Chrysene	10	U	10	U
di-n-Octyl Phthalate	10	U	10	U
Benzo(b)Fluoranthene	10	U	10	U
Benzo(k)Fluoranthene	10	U	10	U
Benzo(a)Pyrene	10	U	10	U
Indeno(1,2,3-cd)Pyrene	10	U	10	U
Dibenz(a,h)Anthracene	10	U	10	U
Benzo(g,h,i)Perylene	10	U	10	U

PESTICIDES/PCBs

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8610-055-002	G458610860	
8610-055-004	G458610862	

LANDFILL ALLUVIAL WELLS
PESTICIDES/PCB
CLP LIST

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8610-055-002	8610-055-004
Customer ID:	G458610860	G458610862
Matrix:	Water	Water
Units:	UG/L	UG/L
Dilution Factor:	1	1

Surrogate Recovery

Di-n-butylchlorendate:	74 %	55 %

Analytes

Alpha-BHC	0.05 U	0.05 U
Beta-BHC	0.05 U	0.05 U
Delta-BHC	0.05 U	0.05 U
Gamma-BHC (Lindane)	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U
Heptachlor Epoxide	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U
Dieldrin	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U
Endrin	0.1 U	0.1 U
Endosulfan II	0.1 U	0.1 U
4,4'-DDD	0.1 U	0.1 U
Endosulfan Sulfate	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U
Methoxychlor	0.5 U	0.5 U
Endrin Ketone	0.1 U	0.1 U
Chlordane	0.5 U	0.5 U
Toxaphene	1 U	1 U
Aroclor-1016	0.5 U	0.5 U
Aroclor-1221	0.5 U	0.5 U
Aroclor-1232	0.5 U	0.5 U
Aroclor-1242	0.5 U	0.5 U
Aroclor-1248	0.5 U	0.5 U
Aroclor-1254	1 U	1 U
Aroclor-1260	1 U	1 U

RADIONUCLIDES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0188-881-015	10-86-02-02-88	
0187-881-105	10-86-05-14-87	
0287-881-047	10-86-06-15-87	
0387-881-059	10-86-08-11-87	
0487-881-056	10-86-12-16-87	
0188-881-017	42-87-02-03-88	
0187-881-108	45-86-05-15-87	
0287-881-043	45-86-06-12-87	
0387-881-065	45-86-08-14-87	
0187-123-013	45-86-10-01-87	
0487-881-020	45-86-10-01-87	
0187-881-075	5-86-05-04-87	
0287-881-038	5-86-06-09-87	
0387-881-046	5-86-07-30-87	
0188-881-001	58-87-01-23-88	
0188-881-002	59-87-01-23-88	
0187-881-118	6-86-05-13-87	
0188-881-003	60-87-01-23-88	
0188-881-006	61-87-01-26-88	
0188-881-004	62-87-01-26-88	
0188-881-005	63-87-01-27-88	
0188-881-014	64-87-01-29-88	
0188-881-010	65-87-01-28-88	
0188-881-012	66-87-01-29-88	
0188-881-008	67-87-01-28-88	
0188-881-009	68-87-01-28-88	
0188-881-013	71-87-01-29-88	
0188-881-011	72-87-01-28-88	
1000-000-287	G458610860	22945-5-2
1000-000-289	G458610862	22945-5-4

LANDFILL ALLUVIAL WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	0188-881-015	0187-881-105	0287-881-047
Customer ID:	10-86-02-02-88	10-86-05-14-87	10-86-06-15-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	2 +/- 4	pci/l	35 +/- 31	pc/l	249 +/- 15	pci/l
Gross Beta	-9 +/- 11	pci/l	68 +/- 5	pc/l	171 +/- 35	pci/l
Uranium 233, 234	6.3 +/- 0.6	pci/l	1.1 +/- 1.5	pc/l	0.22 +/- 0.61	pci/l
Uranium 235	0.24 +/- 0.09	pci/l	.01 +/- .40	pc/l	0.0 +/- 0.29	pci/l
Uranium 238	5.1 +/- 0.5	pci/l	4.3 +/- 1.9	pc/l	0.05 +/- 0.38	pci/l
Strontium 89, 90			9.3	pc/l	1.6	pci/l
Plutonium 239, 240	0.00 +/- 0.32	pci/l	.13 +/- .74	pc/l	0.0 +/- 0.64	pci/l
Americium 241			0.0 +/- 1.5	pc/l	0.0 +/- 1.3	pci/l
Cesium 137			NR		NR	
Tritium	<210	pci/l	<110	pc/l	<110	pci/l

Sample Information

RFW Batch ID:	0387-881-059	0487-881-056	0188-881-017
Customer ID:	10-86-08-11-87	10-86-12-16-87	42-87-02-03-88
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	69 +/- 33	pci/l	29 +/- 8	pci/l	8 +/- 5	pci/l
Gross Beta	62 +/- 45	pci/l	35 +/- 13	pci/l	5 +/- 13	pci/l
Uranium 233, 234	0.4 +/- 1.3	pci/l	.11 +/- .09	pci/l	0.08 +/- 0.11	pci/l
Uranium 235	2.6 +/- 0.9	pci/l	0.00 +/- .02	pci/l	0.02 +/- 0.07	pci/l
Uranium 238	4.5 +/- 1.5	pci/l	.02 +/- .07	pci/l	0.00 +/- 0.09	pci/l
Strontium 89, 90	2.7	pci/l	<1.0	pci/l		
Plutonium 239, 240	-.32 +/- .61	pci/l	0.00 +/- .15	pci/l	0.02 +/- 0.24	pci/l
Americium 241	0.0 +/- 1.4	pci/l	0.00 +/- .10	pci/l		
Cesium 137						
Tritium	<540	pci/l	<220	pci/l	<220	pci/l

LANDFILL ALLUVIAL WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 2

Sample Information

RFW Batch ID:	0187-881-108	0287-881-043	0387-881-065
Customer ID:	45-86-05-15-87	45-86-06-12-87	45-86-08-14-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	55	+/- 21	pc/l	0	+/- 0	pci/l	25	+/- 24	pci/l
Gross Beta	23	+/- 15	pc/l	18	+/- 21	pci/l	27	+/- 41	pci/l
Uranium 233, 234	1.5	+/- 1.1	pc/l	0.0	+/- 0.59	pci/l	2.0	+/- 1.5	pci/l
Uranium 235	.28	+/- .49	pc/l	0.0	+/- 0.36	pci/l	0.2	+/- 0.6	pci/l
Uranium 238	1.0	+/- 0.9	pc/l	0.0	+/- 0.35	pci/l	9.8	+/- 2.3	pci/l
Strontium 89, 90	1.61		pc/l	1.0		pci/l	2.1		pci/l
Plutonium 239, 240	4.7	+/- 1.8	pc/l	0.0	+/- 0.68	pci/l	.10	+/- .86	pci/l
Americium 241	0.0	+/- 1.4	pc/l	0.0	+/- 1.5	pci/l	.69	+/- .91	pci/l
Cesium 137	NR			NR					
Tritium	<110		pc/l	330		pci/l	<535		pci/l

Sample Information

RFW Batch ID:	0187-123-013	0487-881-020	0187-881-075
Customer ID:	45-86-10-01-87	45-86-10-01-87	5-86-05-04-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha				21	+/- 5	pci/l	126	+/- 102	pc/l
Gross Beta				26	+/- 10	pci/l	79	+/- 22	pc/l
Uranium 233, 234	0.099	+/- 0.174	pci/l	0.00	+/- 0.06	pci/l	.79	+/- .09	pc/l
Uranium 235				0.00	+/- 0.03	pci/l	1.6	+/- 0.9	pc/l
Uranium 238	0.085	+/- 0.053	pci/l	0.02	+/- 0.96	pci/l	.49	+/- .06	pc/l
Strontium 89, 90				<1.0		pci/l	<0.6		pc/l
Plutonium 239, 240	0.106	+/- 0.062	pci/l	0.00	+/- 0.09	pci/l	0.7	+/- 1.1	pci/l
Americium 241	-0.019	+/- 0.036	pci/l	0.00	+/- 0.44	pci/l	0.0	+/- 1.3	pc/l
Cesium 137							NR		
Tritium				<460		pci/l	120		pc/l

LANDFILL ALLUVIAL WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0287-881-038	0387-881-046	0188-881-001
Customer ID:	5-86-06-09-87	5-86-07-30-87	58-87-01-23-88
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	NR		NR		9 +/- 6	pci/l
Gross Beta	NR		NR		3 +/- 12	pci/l
Uranium 233, 234	NR		NR		0.49 +/- 0.23	pci/l
Uranium 235	NR		NR		0.07 +/- 0.07	pci/l
Uranium 238	NR		NR		0.48 +/- 0.20	pci/l
Strontium 89, 90	NR		NR			
Plutonium 239, 240	0.0 +/- 0.6	pci/l	-.32 +/- .97		0.00 +/- 0.27	pci/l
Americium 241	NR		NR		0.00 +/- 0.44	pci/l
Cesium 137	NR					
Tritium	NR		<540	pci/l	<210	pci/l

Sample Information

RFW Batch ID:	0188-881-002	0187-881-118	0188-881-003
Customer ID:	59-87-01-23-88	6-86-05-13-87	60-87-01-23-88
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	14 +/- 7	pci/l			10 +/- 8	pci/l
Gross Beta	5 +/- 12	pci/l			-9 +/- 12	pci/l
Uranium 233, 234	5.3 +/- 0.6	pci/l			0.00 +/- 0.11	pci/l
Uranium 235	0.22 +/- 0.10	pci/l			0.00 +/- 0.05	pci/l
Uranium 238	4.4 +/- 0.6	pci/l			0.01 +/- 0.09	pci/l
Strontium 89, 90						
Plutonium 239, 240	0.00 +/- 0.24	pci/l	0.0 +/- 6.8	pci/l	0.00 +/- 0.27	pci/l
Americium 241	0.00 +/- 0.14	pci/l			0.00 +/- 0.10	pci/l
Cesium 137						
Tritium	<220	pci/l			<220	pci/l

LANDFILL ALLUVIAL WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-006	0188-881-004	0188-881-005
Customer ID:	61-87-01-26-88	62-87-01-26-88	63-87-01-27-88
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	0	+/- 7	pci/l	8	+/- 6	pci/l	17	+/- 7	pci/l
Gross Beta.....	-4	+/- 11	pci/l	1	+/- 12	pci/l	8	+/- 15	pci/l
Uranium 233, 234.....	0.00	+/- 0.07	pci/l	0.01	+/- 0.10	pci/l	4.6	+/- 0.4	pci/l
Uranium 235.....	0.01	+/- 0.05	pci/l	0.02	+/- 0.05	pci/l	0.18	+/- 0.07	pci/l
Uranium 238.....	0.08	+/- 0.08	pci/l	0.01	+/- 0.08	pci/l	3.6	+/- 0.3	pci/l
Strontium 89, 90.....									
Plutonium 239, 240.....	0.00	+/- 0.24	pci/l	0.01	+/- 0.19	pci/l	0.21	+/- 0.22	pci/l
Americium 241.....	0.02	+/- 0.10	pci/l	0.00	+/- 0.16	pci/l	0.00	+/- 0.24	pci/l
Cesium 137.....									
Tritium.....	<220		pci/l	<220		pci/l	1900	+/- 100	pci/l

Sample Information

RFW Batch ID:	0188-881-014	0188-881-010	0188-881-012
Customer ID:	64-87-01-29-88	65-87-01-28-88	66-87-01-29-88
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	2	+/- 4	pci/l	10	+/- 6	pci/l	2	+/- 4	pci/l
Gross Beta.....	16	+/- 11	pci/l	8	+/- 11	pci/l	15	+/- 11	pci/l
Uranium 233, 234.....	0.62	+/- 0.37	pci/l	5.4	+/- 1.9	pci/l	0.80	+/- 0.16	pci/l
Uranium 235.....	0.02	+/- 0.11	pci/l	0.27	+/- 0.39	pci/l	0.01	+/- 0.04	pci/l
Uranium 238.....	0.84	+/- 0.44	pci/l	4.3	+/- 1.6	pci/l	0.50	+/- 0.13	pci/l
Strontium 89, 90.....									
Plutonium 239, 240.....	0.00	+/- 0.40	pci/l	0.01	+/- 0.14	pci/l	0.01	+/- 0.18	pci/l
Americium 241.....	0.00	+/- 0.71	pci/l	0.00	+/- 0.50	pci/l	0.00	+/- 0.50	pci/l
Cesium 137.....									
Tritium.....	<210		pci/l	<210		pci/l	<210		pci/l

LANDFILL ALLUVIAL WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

Sample Information

RFW Batch ID:	0188-881-008	0188-881-009	0188-881-013
Customer ID:	67-87-01-28-88	68-87-01-28-88	71-87-01-29-88
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	19 +/- 7	pci/l	1 +/- 4	pci/l	5 +/- 5	pci/l
Gross Beta	3 +/- 13	pci/l	-1 +/- 12	pci/l	17 +/- 10	pci/l
Uranium 233, 234	0.57 +/- 0.18	pci/l	0.05 +/- 0.10	pci/l	0.22 +/- 0.13	pci/l
Uranium 235	0.00 +/- 0.05	pci/l	0.00 +/- 0.04	pci/l	0.07 +/- 0.08	pci/l
Uranium 238	0.48 +/- 0.13	pci/l	0.16 +/- 0.10	pci/l	0.08 +/- 0.10	pci/l
Strontium 89, 90						
Plutonium 239, 240	0.02 +/- 0.14	pci/l	0.00 +/- 0.16	pci/l	0.00 +/- 0.15	pci/l
Americium 241	0.03 +/- 0.06	pci/l	0.00 +/- 0.09	pci/l	0.00 +/- 0.69	pci/l
Cesium 137						
Tritium	<220	pci/l	<220	pci/l	<210	pci/l

Sample Information

RFW Batch ID:	0188-881-011	1000-000-287	1000-000-289
Customer ID:	72-87-01-28-88	G458610860	G458610862
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	6 +/- 5	pci/l	200 +/- 80	pci/l	190 +/- 100	pci/l
Gross Beta	-3 +/- 13	pci/l	140 +/- 30	pci/l	250 +/- 40	pci/l
Uranium 233, 234	5.8 +/- 0.9	pci/l	11 +/- 1	pci/l	15 +/- 2	pci/l
Uranium 235	0.27 +/- 0.15	pci/l	NR		NR	
Uranium 238	4.2 +/- 0.7	pci/l	10 +/- 1	pci/l	16 +/- 2	pci/l
Strontium 89, 90			NR		NR	
Plutonium 239, 240	0.00 +/- 0.19	pci/l	0.13 +/- 0.21	pci/l	-0.02 +/- 0.08	pci/l
Americium 241	0.00 +/- 0.11	pci/l	0.03 +/- 0.07	pci/l	-0.01 +/- 0.03	pci/l
Cesium 137			NR		NR	
Tritium	<210	pci/l	0.10 +/- 0.22	pci/ml	0.13 +/- 0.22	pci/ml

INORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0188-881-015	10-86-02-02-88	
0187-881-103	10-86-05-14-87	
0287-881-050	10-86-06-15-87	
0387-881-081	10-86-08-11-87	
0487-881-053	10-86-12-15-87	
0188-881-017	42-87-02-03-88	
0187-881-106	45-86-05-15-87	
0287-881-046	45-86-06-12-87	
0387-881-087	45-86-08-14-87	
0487-881-001	45-86-09-30-87	
0187-881-075	5-86-05-04-87	
0287-881-041	5-86-06-09-87	
0387-881-068	5-86-07-31-87	
0188-881-001	58-87-01-23-88	
0188-881-002	59-87-01-23-88	
0187-881-096	6-86-05-13-87	
0188-881-003	60-87-01-23-88	
0188-881-006	61-87-01-27-88	
0188-881-004	62-87-01-26-88	
0188-881-005	63-87-01-27-88	
0188-881-014	64-87-01-29-88	
0188-881-010	65-87-01-28-88	
0188-881-012	66-87-01-29-88	
0188-881-008	67-87-01-28-88	
0188-881-009	68-87-01-28-88	
0188-881-013	71-87-01-29-88	
0188-881-011	72-87-01-28-88	
8610-044-033	G108610860	
8610-044-008	G458610860	
8610-044-018	G458610862	

LANDFILL ALLUVIAL WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-015			0187-881-103			0287-881-050	
Customer ID:	10-86-02-02-88			10-86-05-14-87			10-86-06-15-87	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3							NR	
HCO3- as CaCO3	40.5		mg/l	30.0		mg/l	27.5	mg/l
Chloride	3.02		mg/l	6.30		mg/l	4.91	mg/l
Sulfate	23.8		mg/l	42.0		mg/l	40.0	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	3.37		mg/l	3.40		mg/l	4.50	mg/l
Sulfide								
Phosphate								
Cyanide, Total				1.0	U	mg/l	1.0	U mg/l
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	131		mg/l	145		mg/l	161	mg/l
Total Suspended Solids								
% Solids								

Sample Information

RFW Batch ID:	0387-881-081			0487-881-053			0188-881-017	
Customer ID:	10-86-08-11-87			10-86-12-15-87			42-87-02-03-88	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3				NR				
HCO3- as CaCO3	30.2		mg/l	47.1		mg/l	259	mg/l
Chloride	72.0		mg/l	2.91		mg/l	13.9	mg/l
Sulfate	36.0		mg/l	49.0		mg/l	74.2	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	4.95		mg/l	3.04		mg/l	0.02	U mg/l
Sulfide								
Phosphate								
Cyanide, Total	1	U	mg/l	NR				
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	125		mg/l	134		mg/l	355	mg/l
Total Suspended Solids								
% Solids								

LANDFILL ALLUVIAL WELLS
INORGANIC
DATA SUMMARY REPORT

Sample Information

RFW Batch ID:	0187-881-106			0287-881-046			0387-881-087	
Customer ID:	45-86-05-15-87			45-86-06-12-87			45-86-08-14-87	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3				NR				
HCO3- as CaCO3	22.0		mg/l	18.4		mg/l	39.1	mg/l
Chloride	4.90		mg/l	9.30		mg/l	6.39	mg/l
Sulfate	24.5		mg/l	19.0		mg/l	14.5	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	0.56		mg/l	0.51		mg/l	0.75	mg/l
Sulfide								
Phosphate								
Cyanide, Total	1.0	U	mg/l	1.0	U	mg/l	1	U mg/l
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	143		mg/l	92.0		mg/l	124	mg/l
Total Suspended Solids								
% Solids								

Sample Information

RFW Batch ID:	0487-881-001			0187-881-075			0287-881-041	
Customer ID:	45-86-09-30-87			5-86-05-04-87			5-86-06-09-87	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3							NR	
HCO3- as CaCO3	45.1		mg/l	366		mg/l	388	mg/l
Chloride	6.5		mg/l	150		mg/l	264	mg/l
Sulfate	17.5		mg/l	1780		mg/l	725	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	1.02		mg/l	2.75		mg/l	1.26	mg/l
Sulfide								
Phosphate								
Cyanide, Total	NR			1.0	U	mg/l	1.0	U mg/l
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	125		mg/l	3517		mg/l	7363	mg/l
Total Suspended Solids								
% Solids								

LANDFILL ALLUVIAL WELLS
INORGANIC
DATA SUMMARY REPORT

Sample Information

RFW Batch ID:	0387-881-068			0188-881-001			0188-881-002	
Customer ID:	5-86-07-31-87			58-87-01-23-88			59-87-01-23-88	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3								
HCO3- as CaCO3	459		mg/l	97.3		mg/l	306	mg/l
Chloride	270		mg/l	13.8		mg/l	24.3	mg/l
Sulfate	4600		mg/l	34.2		mg/l	31.8	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	1.20		mg/l	3.38		mg/l	0.02	U mg/l
Sulfide								
Phosphate								
Cyanide, Total	1	U mg/l						
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	6747		mg/l	233		mg/l	406	mg/l
Total Suspended Solids								
% Solids								

Sample Information

RFW Batch ID:	0187-881-096			0188-881-003			0188-881-006	
Customer ID:	6-86-05-13-87			60-87-01-23-88			61-87-01-27-88	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3								
HCO3- as CaCO3	227		mg/l	75.7		mg/l	88.0	mg/l
Chloride	826		mg/l	4.33		mg/l	2.87	mg/l
Sulfate	1710		mg/l	57.1		mg/l	59.2	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	0.44		mg/l	2.62		mg/l	2.58	mg/l
Sulfide								
Phosphate								
Cyanide, Total	1.0	U mg/l						
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	4542		mg/l	160		mg/l	153	mg/l
Total Suspended Solids								
% Solids								

LANDFILL ALLUVIAL WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-004			0188-881-005			0188-881-014	
Customer ID:	62-87-01-26-88			63-87-01-27-88			64-87-01-29-88	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3								
HCO3- as CaCO3	75.4	mg/l		392		mg/l	179	mg/l
Chloride	3.89	mg/l		26.3		mg/l	19.9	mg/l
Sulfate	35.0	mg/l		54.5		mg/l	8.4	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	2.55	mg/l		0.02	U	mg/l	0.02	mg/l
Sulfide								
Phosphate								
Cyanide, Total								
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	154	mg/l		519		mg/l	255	mg/l
Total Suspended Solids								
% Solids								

Sample Information

RFW Batch ID:	0188-881-010			0188-881-012			0188-881-008	
Customer ID:	65-87-01-28-88			66-87-01-29-88			67-87-01-28-88	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3								
HCO3- as CaCO3	208	mg/l		127		mg/l	101	mg/l
Chloride	6.38	mg/l		4.50		mg/l	4.32	mg/l
Sulfate	153	mg/l		29.0		mg/l	39.8	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	2.00	mg/l		3.22		mg/l	1.81	mg/l
Sulfide								
Phosphate								
Cyanide, Total								
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	491	mg/l		405		mg/l	191	mg/l
Total Suspended Solids								
% Solids								

LANDFILL ALLUVIAL WELLS
INORGANIC
DATA SUMMARY REPORT

Sample Information

RFW Batch ID:	0188-881-009	0188-881-013	0188-881-011
Customer ID:	68-87-01-28-88	71-87-01-29-88	72-87-01-28-88
Matrix:	Water	Water	Water

Inorganics

CO3= as CaCO3								
HCO3- as CaCO3	107		mg/l	219		mg/l	276	mg/l
Chloride	5.03		mg/l	2.15		mg/l	8.42	mg/l
Sulfate	139		mg/l	67.0		mg/l	90.4	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	2.12		mg/l	1.02		mg/l	0.33	mg/l
Sulfide								
Phosphate								
Cyanide, Total								
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	226		mg/l	262		mg/l	395	mg/l
Total Suspended Solids								
% Solids								

Sample Information

RFW Batch ID:	8610-044-033	8610-044-008	8610-044-018
Customer ID:	G108610860	G458610860	G458610862
Matrix:	Water	Water	Water

Inorganics

CO3= as CaCO3	66		mg/l	110		mg/l	5	U	mg/l
HCO3- as CaCO3	16		mg/l	12		mg/l	4.9		mg/l
Chloride	4.3		mg/l	6.1		mg/l	5.9		mg/l
Sulfate	17		mg/l	14		mg/l	13		mg/l
pH									
Fluoride									
Nitrate-Nitrite-Nitrogen									
Sulfide									
Phosphate									
Cyanide, Total	0.01	U	mg/l	0.01	U	mg/l	0.01	U	mg/l
Hexavalent Chromium (Cr+6)									
Total Dissolved Solids	140		mg/l	180		mg/l	160		mg/l
Total Suspended Solids									
% Solids									

METALS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0188-881-015	10-86-02-02-88	
0187-881-100	10-86-05-14-87	
0287-881-047	10-86-06-16-87	
0387-881-083	10-86-08-11-87	
0487-881-061	10-86-12-16-87	
0188-881-017	42-87-02-03-88	
0187-881-098	45-86-05-15-87	
0287-881-043	45-86-06-12-87	
0387-881-089	45-86-08-14-87	
0487-881-005	45-86-10-01-87	
0187-881-073	5-86-05-04-87	
0287-881-038	5-86-06-10-87	
0387-881-069	5-86-07-31-87	
0188-881-001	58-87-01-23-88	
0188-881-002	59-87-01-23-88	
0187-881-097	6-86-05-13-87	
0188-881-003	60-87-01-23-88	
0188-881-006	61-87-01-27-88	
0188-881-004	62-87-01-26-88	
0188-881-005	63-87-01-27-88	
0188-881-014	64-87-01-29-88	
0188-881-010	65-87-01-28-88	
0188-881-012	66-87-01-29-88	
0188-881-008	67-87-01-28-88	
0188-881-009	68-87-01-28-88	
0188-881-013	71-87-01-29-88	
0188-881-011	72-87-01-28-88	
8610-044-032	G108610860	
8610-044-007	G458610860	
8610-044-017	G458610862	

LANDFILL ALLUVIAL WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-015	0187-881-100	0287-881-047	0387-881-083
Customer ID:	10-86-02-02-88	10-86-05-14-87	10-86-06-16-87	10-86-08-11-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0076 U	0.0076 U	0.0076 U	0.0076 U
Aluminum (Al), total.....	0.0290 U	0.1323	0.0290 U	0.0320
Arsenic (As), total.....	0.005 U	0.01 U	0.01 U	0.005 U
Barium (Ba), total.....	0.0722	0.0326	0.0330	0.0805
Beryllium (Be), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca), total.....	17.0370	25.6217	20.1122	20.5573
Cadmium (Cd), total.....	0.001 U	0.005 U	0.005 U	0.001 U
Cobalt (Co), total.....	0.0220 U	0.0220 U	0.0220 U	0.0220 U
Chromium (Cr), total.....	0.0214	0.0100 U	0.0105	0.0188
Cesium (Cs), total.....	0.02 U	0.2 U	0.2 U	0.02 U
Copper (Cu), total.....	0.0070	0.0063 U	0.0080	0.0063 U
Iron (Fe), total.....	0.0868	0.0469	0.0481	0.0640
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Potassium (K), total.....	0.6	5.0 U	5.0 U	5.9
Lithium (Li), total.....	0.1 U			
Magnesium (Mg), total.....	3.2011	4.9638	3.7433	4.0182
Manganese (Mn), total.....	0.0835	0.1339	0.1113	0.0979
Molybdenum(Mo), total.....	0.0220 U	0.0220 U	0.0220 U	0.0220 U
Sodium (Na), total.....	9.9138	13.2611	9.7672	13.7014
Nickel (Ni), total.....	0.0693	0.0370 U	0.0370 U	0.0370 U
Lead (Pb), total.....	0.005 U	0.005 U	0.009	0.005 U
Antimony (Sb), total.....	0.02 U	0.0600 U	0.06 U	0.02 U
Selenium (Se), total.....	0.005 U	0.0050 U	0.005 U	0.005 U
Strontium (Sr), total.....	0.0971	0.1292	0.1014	0.1145
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V), total.....	0.0292	0.0240 U	0.0240 U	0.0240 U
Zinc (Zn), total.....	0.0884	0.02 U	0.0295	0.0581

LANDFILL ALLUVIAL WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-061		0188-881-017		0187-881-098		0287-881-043	
Customer ID:	10-86-12-16-87		42-87-02-03-88		45-86-05-15-87		45-86-06-12-87	
Matrix:	Water		Water		Water		Water	
Units:	MG/L		MG/L		MG/L		MG/L	
Metals								
Silver (Ag), total	0.0076	U	0.0076	U	0.0076	U	0.0076	U
Aluminum (Al), total	0.1504		0.0463		0.1786		0.0405	
Arsenic (As), total	0.005	U	0.005	U	0.0100	U	0.01	U
Barium (Ba), total	0.0838		0.1437		0.0308		0.0265	
Beryllium (Be), total	0.005	U	0.005	U	0.005	U	0.005	U
Calcium (Ca), total	16.1526		71.3661		11.5612		9.0966	
Cadmium (Cd), total	0.0008	J	0.001	U	0.0050	U	0.005	U
Cobalt (Co), total	0.0220	U	0.0220	U	0.0220	U	0.0220	U
Chromium (Cr), total	0.0100	U	0.0100	U	0.0100	U	0.0100	U
Cesium (Cs), total	0.02	U	0.02	U	0.2	U	0.2	U
Copper (Cu), total	0.0086		0.0065		0.0063	U	0.0063	U
Iron (Fe), total	0.1329		0.4066		0.0948		0.0311	
Mercury (Hg), total	0.0002	U	0.0002	U	0.0002	U	0.0002	U
Potassium (K), total	0.9		9.4		5.0	U	5.0	U
Lithium (Li), total	0.1	U	0.05	J				
Magnesium (Mg), total	3.4896		12.9761		2.6072		2.1295	
Manganese (Mn), total	0.0901		0.5674		0.0141		0.0051	U
Molybdenum(Mo), total	0.0220	U	0.0220	U	0.0220	U	0.0220	U
Sodium (Na), total	12.9361		52.5685		7.3332		6.5707	
Nickel (Ni), total	0.0370	U	0.0370	U	0.0370	U	0.0370	U
Lead (Pb), total	0.004	J	0.005	U	0.0050	U	0.011	
Antimony (Sb), total	0.02	U	0.02	U	0.06	U	0.06	U
Selenium (Se), total	0.005	U	0.005	U	0.005	U	0.005	U
Strontium (Sr), total	0.0975		1.2777		0.0633		0.0550	
Thallium (Tl), total	0.01	U	0.01	U	0.0100	U	0.01	U
Vanadium (V), total	0.0240	U	0.0240	U	0.0240	U	0.0240	U
Zinc (Zn), total	0.0200	U	0.0352		0.02	U	0.0200	U

LANDFILL ALLUVIAL WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-089	0487-881-005	0187-881-073	0287-881-038
Customer ID:	45-86-08-14-87	45-86-10-01-87	5-86-05-04-87	5-86-06-10-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0076 U	0.0076 U	0.0076 U	0.0076 U
Aluminum (Al), total.....	0.0727	0.0336	0.0290 U	0.4102
Arsenic (As), total.....	0.005 U	0.005 U	0.01 U	0.01 U
Barium (Ba), total.....	0.0615	0.0556	0.0416	0.0758
Beryllium (Be), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca), total.....	10.0692	12.8262	325.9938	31.6307
Cadmium (Cd), total.....	0.001 U	0.001 U	0.005 U	0.005 U
Cobalt (Co), total.....	0.0220 U	0.0220 U	0.0220 U	0.0220 U
Chromium (Cr), total.....	0.0115	0.0100 U	0.0100 U	0.0120
Cesium (Cs), total.....	0.02 U	0.02 U	0.2 U	0.2 U
Copper (Cu), total.....	0.0068 U	0.0063 U	0.0799	0.0063 U
Iron (Fe), total.....	0.0495	0.0143	0.0069 U	0.4246
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Potassium (K), total.....	0.6	0.67	5.0	5.7
Lithium (Li), total.....		0.1 U		
Magnesium (Mg), total.....	2.3749	3.2490	264.1889	6.4399
Manganese (Mn), total.....	0.0062	0.0051 U	0.0624	0.0234
Molybdenum(Mo), total.....	0.0220 U	0.0220 U	0.0220 U	0.0220 U
Sodium (Na), total.....	10.7756	10.8467	720.3239	21.7350
Nickel (Ni), total.....	0.0370 U	0.0370 U	0.1912	0.0370 U
Lead (Pb), total.....	0.005 U	0.002 J	0.005 U	0.005 U
Antimony (Sb), total.....	0.02 U	0.011 J	0.0600 U	0.06 U
Selenium (Se), total.....	0.005 U	0.005 U	0.011	0.005 U
Strontium (Sr), total.....	0.0617	0.0847	5.2430	0.1721
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V), total.....	0.0240 U	0.0334	0.0240 U	0.0240 U
Zinc (Zn), total.....	0.0498	0.0200 U	0.02 U	0.0236

LANDFILL ALLUVIAL WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-069	0188-881-001	0188-881-002	0187-881-097
Customer ID:	5-86-07-31-87	58-87-01-23-88	59-87-01-23-88	6-86-05-13-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver	(Ag),	total.....	0.0076	U	0.0085		0.0076	U	0.0076	U
Aluminum	(Al),	total.....	0.0372		0.0443		0.0737		0.0554	
Arsenic	(As),	total.....	0.005	U	0.005	U	0.005	U	0.01	U
Barium	(Ba),	total.....	0.0656		0.1067		0.2532		0.0463	
Beryllium	(Be),	total.....	0.005	U	0.005	U	0.005	U	0.005	U
Calcium	(Ca),	total.....	473.0916		27.8264		78.5587		443.5891	
Cadmium	(Cd),	total.....	0.001	U	0.001	U	0.001		0.005	U
Cobalt	(Co),	total.....	0.0220	U	0.0220	U	0.0220	U	0.0220	U
Chromium	(Cr),	total.....	0.0100	U	0.0191		0.0154		0.0100	U
Cesium	(Cs),	total.....	0.02	U	0.02	U	0.02	U	0.2	U
Copper	(Cu),	total.....	0.0154		0.0437		0.0154		0.0063	U
Iron	(Fe),	total.....	0.0069	U	0.0999		0.1716		0.0069	U
Mercury	(Hg),	total.....	0.0002	U	0.0002		0.0002	U	0.0002	U
Potassium	(K),	total.....	3.1		5.2		11		10.9	
Lithium	(Li),	total.....			0.1	U	0.1	U		
Magnesium	(Mg),	total.....	291.7351		5.4896		14.8116		179.9157	
Manganese	(Mn),	total.....	0.0479		0.5217		2.1310		1.2989	
Molybdenum	(Mo),	total.....	0.0291		0.0220	U	0.0220	U	0.0220	U
Sodium	(Na),	total.....	1179.3182		24.6325		31.5072		801.8515	
Nickel	(Ni),	total.....	0.1751		0.1425		0.2035		1.4027	
Lead	(Pb),	total.....	0.005		0.005	U	0.010		0.005	U
Antimony	(Sb),	total.....	0.007	J	0.02	U	0.02	U	0.0600	U
Selenium	(Se),	total.....	0.009		0.005	U	0.002	J	0.089	
Strontium	(Sr),	total.....	9.4688		0.2273		0.6235		5.1181	
Thallium	(Tl),	total.....	0.01	U	0.01	U	0.01	U	0.01	U
Vanadium	(V),	total.....	0.0240	U	0.0240	U	0.0240	U	0.0240	U
Zinc	(Zn),	total.....	0.0212		0.4270		0.5840		0.02	U

LANDFILL ALLUVIAL WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-003	0188-881-006	0188-881-004	0188-881-005
Customer ID:	60-87-01-23-88	61-87-01-27-88	62-87-01-26-88	63-87-01-27-88
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver	(Ag),	total.....	0.0076	U	0.0076	U	0.0076	U	0.0076	U
Aluminum	(Al),	total.....	0.0769		0.1453		0.1130		0.0506	
Arsenic	(As),	total.....	0.005	U	0.005	U	0.005	U	0.005	U
Barium	(Ba),	total.....	0.1434		0.1307		0.1538		0.2462	
Beryllium	(Be),	total.....	0.005	U	0.005	U	0.005	U	0.005	U
Calcium	(Ca),	total.....	26.9666		24.2757		26.8479		122.5689	
Cadmium	(Cd),	total.....	0.001	U	0.001	U	0.001	U	0.001	U
Cobalt	(Co),	total.....	0.0220	U	0.0220	U	0.0220	U	0.0220	U
Chromium	(Cr),	total.....	0.0100	U	0.0282		0.0193		0.0296	
Cesium	(Cs),	total.....	0.02	U	0.02	U	0.02	U	0.02	U
Copper	(Cu),	total.....	0.0365		0.0085		0.0118		0.0105	
Iron	(Fe),	total.....	0.0813		0.1863		0.1015		0.1137	
Mercury	(Hg),	total.....	0.0002	U	0.0002	U	0.0002	U	0.0002	U
Potassium	(K),	total.....	1.0		2.1		3.0		3.8	
Lithium	(Li),	total.....	0.1	U	0.1	U	0.1	U	0.1	U
Magnesium	(Mg),	total.....	4.7603		4.5329		4.8600		15.3287	
Manganese	(Mn),	total.....	0.3136		0.2702		0.4100		0.6425	
Molybdenum	(Mo),	total.....	0.0220	U	0.0220	U	0.0220	U	0.0220	U
Sodium	(Na),	total.....	14.1688		14.9011		13.4639		33.6016	
Nickel	(Ni),	total.....	0.0370	U	0.0370	U	0.0416		0.0370	U
Lead	(Pb),	total.....	0.005	U	0.005	U	0.005	U	0.005	U
Antimony	(Sb),	total.....	0.02	U	0.02	U	0.02	U	0.02	U
Selenium	(Se),	total.....	0.005	U	0.005	U	0.005	U	0.005	U
Strontium	(Sr),	total.....	0.1399		0.1619		0.1716		0.6899	
Thallium	(Tl),	total.....	0.01	U	0.01	U	0.01	U	0.01	U
Vanadium	(V),	total.....	0.0240	U	0.0264		0.0240	U	0.0240	U
Zinc	(Zn),	total.....	0.2418		0.0755		0.0714		0.0608	

LANDFILL ALLUVIAL WELLS
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INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-014	0188-881-010	0188-881-012	0188-881-008
Customer ID:	64-87-01-29-88	65-87-01-28-88	66-87-01-29-88	67-87-01-28-88
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0085	0.0076 U	0.0076 U	0.0076 U
Aluminum (Al), total.....	0.0353	0.0346	0.0769	0.0290 U
Arsenic (As), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Barium (Ba), total.....	0.1826	0.1291	0.1020	0.1034
Beryllium (Be), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca), total.....	47.2474	74.4528	34.0248	40.1314
Cadmium (Cd), total.....	0.001 U	0.001 U	0.001 U	0.001
Cobalt (Co), total.....	0.0313	0.0220 U	0.0220 U	0.0220 U
Chromium (Cr), total.....	0.0136	0.0131	0.0236	0.0114
Cesium (Cs), total.....	0.02 U	0.02 U	0.02 U	0.02 U
Copper (Cu), total.....	0.0568	0.0063 U	0.0545	0.0063 U
Iron (Fe), total.....	0.0471	0.0401	0.1182	0.0419
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0002	0.0002 U
Potassium (K), total.....	4.2	6.2	6.1	4.9
Lithium (Li), total.....	0.1 U	0.1 U	0.1 U	0.1 U
Magnesium (Mg), total.....	8.2194	13.2047	7.2507	5.5284
Manganese (Mn), total.....	1.2001	1.0484	0.1784	0.6670
Molybdenum(Mo), total.....	0.3551	0.0220 U	0.0299	0.0220 U
Sodium (Na), total.....	18.7309	71.3146	94.6908	17.3672
Nickel (Ni), total.....	0.0444	0.0370 U	0.1863	0.0748
Lead (Pb), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Antimony (Sb), total.....	0.02 U	0.02 U	0.02 U	0.02 U
Selenium (Se), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Strontium (Sr), total.....	0.3320	0.5041	0.3011	0.2425
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V), total.....	0.0572	0.0240 U	0.1004	0.0240 U
Zinc (Zn), total.....	0.0486	0.0598	0.4714	0.1893

LANDFILL ALLUVIAL WELLS
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INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0188-881-009	0188-881-013	0188-881-011	8610-044-032
Customer ID:	68-87-01-28-88	71-87-01-29-88	72-87-01-28-88	G108610860
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0076 U	0.0076 U	0.0076 U	0.019
Aluminum (Al), total.....	0.0290	0.0308	0.0516	36.6
Arsenic (As), total.....	0.005 U	0.005 U	0.005 U	0.002 U
Barium (Ba), total.....	0.1528	0.0841	0.1574	0.340
Beryllium (Be), total.....	0.005 U	0.005 U	0.005 U	0.026
Calcium (Ca), total.....	32.4063	71.2977	88.9694	22.1
Cadmium (Cd), total.....	0.001 U	0.001 U	0.001 U	0.005 U
Cobalt (Co), total.....	0.0220 U	0.0220 U	0.0220 U	0.050 U
Chromium (Cr), total.....	0.0100 U	0.0135	0.0111	0.010
Cesium (Cs), total.....	0.02 U	0.02 U	0.02 U	0.150 U
Copper (Cu), total.....	0.0063 U	0.0070	0.0069	0.024
Iron (Fe), total.....	0.9498	0.0344	0.0344	28.2
Mercury (Hg), total.....	0.0002 U	0.0002	0.0002 U	0.00056
Potassium (K), total.....	3.0	1.7	3.1	12.9
Lithium (Li), total.....	0.1 U	0.1 U	0.1 U	
Magnesium (Mg), total.....	5.3604	9.3802	16.7782	7.88
Manganese (Mn), total.....	1.6145	0.0590	0.5105	0.634
Molybdenum(Mo), total.....	0.0220 U	0.0220 U	0.0220 U	0.100 U
Sodium (Na), total.....	19.3733	9.5292	23.4236	12.2
Nickel (Ni), total.....	0.0370	0.0370 U	0.0370 U	0.040 U
Lead (Pb), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Antimony (Sb), total.....	0.02 U	0.02 U	0.02 U	0.050 U
Selenium (Se), total.....	0.005 U	0.005 U	0.005 U	0.002 U
Strontium (Sr), total.....	0.1964	0.4217	0.5986	0.238
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.010 U
Vanadium (V), total.....	0.0240 U	0.0364	0.0240 U	0.057
Zinc (Zn), total.....	0.1062	0.0572	0.0353	0.055

LANDFILL ALLUVIAL WELLS
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RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8610-044-007	8610-044-017
Customer ID:	G458610860	G458610862
Matrix:	Water	Water
Units:	MG/L	MG/L

Metals

Silver (Ag), total.....	0.010 U	0.010 U
Aluminum (Al), total.....	0.480	0.550
Arsenic (As), total.....	0.002 U	0.002 U
Barium (Ba), total.....	0.160	0.150
Beryllium (Be), total.....	0.011	0.007
Calcium (Ca), total.....	26.2	25.5
Cadmium (Cd), total.....	0.005 U	0.005 U
Cobalt (Co), total.....	0.050 U	0.050 U
Chromium (Cr), total.....	0.010 U	0.010 U
Cesium (Cs), total.....	0.150 U	0.150 U
Copper (Cu), total.....	0.020 U	0.020 U
Iron (Fe), total.....	0.252	0.242
Mercury (Hg), total.....	0.00021	0.0016
Potassium (K), total.....	0.623	0.540
Lithium (Li), total.....		
Magnesium (Mg), total.....	5.90	5.40
Manganese (Mn), total.....	0.079	0.091
Molybdenum(Mo), total.....	0.100 U	0.100 U
Sodium (Na), total.....	13.4	13.9
Nickel (Ni), total.....	0.040 U	0.040 U
Lead (Pb), total.....	0.005 U	0.005 U
Antimony (Sb), total.....	0.050 U	0.050 U
Selenium (Se), total.....	0.002 U	0.002 U
Strontium (Sr), total.....	0.190	0.193
Thallium (Tl), total.....	0.010 U	0.010 U
Vanadium (V), total.....	0.025 U	0.025 U
Zinc (Zn), total.....	0.006	0.005 U

APPENDIX C-2

GROUND-WATER ANALYTICAL DATA
BEDROCK WELLS

VOLATILE ORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0188-881-019	08-86-02-03-88	
0387-881-078	08-86-08-11-87	
0188-881-018	09-86-02-03-88	
0387-881-077	09-86-08-11-87	
8709-078-0150	41-87	15
0188-881-016	41-87-02-02-88	
0687-881-010	41-87-09-21-87	
0487-881-071	41-87-12-16-87	
0187-881-053	8-86-04-13-87	
0287-881-044	8-86-06-11-87	
0487-881-068	8-86-12-16-87	
0487-881-102	9-86-01-18-88	
0187-881-099	9-86-05-14-87	
0287-881-046	9-86-06-15-87	
8611-027-023	G088611860	
8611-004-006	G098610860	

LANDFILL BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Field Parameters

RFW Batch ID:	0188-881-019	0387-881-078	0188-881-018	0387-881-077
Customer ID:	08-86-02-03-88	08-86-08-11-87	09-86-02-03-88	09-86-08-11-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0		1.0	

Field Parameters

Toluene-d8:	100 %	%	100 %	%
Bromofluorobenzene:	92 %	%	94 %	%
1,2-Dichloroethane-d4:	76 %	%	78 %	%

Field Parameters

Chloromethane	10 U	NR	10 U	NR
Bromomethane	10 U	NR	10 U	NR
Vinyl Chloride	10 U	NR	10 U	NR
Chloroethane	10 U	NR	10 U	NR
Methylene Chloride	5 U	NR	5 U	NR
Acetone	10 U	NR	10 U	NR
Carbon Disulfide	5 U	NR	5 U	NR
1,1-Dichloroethene	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	NR	5 U	NR
Trans-1,2-Dichloroethene	5 U	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U
2-Butanone	10 U	NR	10 U	NR
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U
Vinyl Acetate	10 U	NR	10 U	NR
Bromodichloromethane	5 U	NR	5 U	NR
1,2-Dichloropropane	5 U	NR	5 U	NR
Trans-1,3-Dichloropropene	5 U	NR	5 U	NR
Trichloroethene	5 U	5 U	5 U	5 U
Dibromochloromethane	5 U	NR	5 U	NR
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U
Benzene	5 U	NR	5 U	NR
cis-1,3-Dichloropropene	5 U	NR	5 U	NR
2-Chloroethylvinylether		NR		NR
Bromoform	5 U	NR	5 U	NR
4-Methyl-2-pentanone	10 U	NR	10 U	NR
2-Hexanone	10 U	NR	10 U	NR
Tetrachloroethene	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	NR	5 U	NR
Toluene	5 U	NR	5 U	NR
Chlorobenzene	5 U	NR	5 U	NR
Ethylbenzene	5 U	NR	5 U	NR
Styrene	5 U	NR	5 U	NR
Total Xylenes	5 U	NR	5 U	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Field Parameters

RFW Batch ID:	8709-078-0150	0188-881-016	0687-881-010	0487-881-071
Customer ID:	41-87	41-87-02-02-88	41-87-09-21-87	41-87-12-16-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1.0		1.0

Field Parameters

Toluene-d8:	102 %	108 %	%	110 %
Bromofluorobenzene:	102 %	98 %	%	72 %
1,2-Dichloroethane-d4:	98 %	84 %	%	92 %

Field Parameters

Chloromethane	10.00 U	10 U	NR	10 U
Bromomethane	10.00 U	10 U	NR	10 U
Vinyl Chloride	10.00 U	10 U	NR	10 U
Chloroethane	10.00 U	10 U	NR	10 U
Methylene Chloride	5.00 U	5 U	NR	10.00
Acetone	6.00 JB	10 U	NR	10 U
Carbon Disulfide	5.00 U	5 U	NR	5 U
1,1-Dichloroethene	5.00 U	5 U	5 U	5 U
1,1-Dichloroethane	5.00 U	5 U	NR	5 U
Trans-1,2-Dichloroethene	5.00 U	5 U	5 U	5 U
Chloroform	5.00 U	5 U	5 U	5 U
1,2-Dichloroethane	5.00 U	5 U	5 U	5 U
2-Butanone	10.00 U	10 U	NR	10 U
1,1,1-Trichloroethane	5.00 U	5 U	5 U	5 U
Carbon Tetrachloride	5.00 U	5 U	5 U	5 U
Vinyl Acetate	10.00 U	10 U	NR	10 U
Bromodichloromethane	5.00 U	5 U	NR	5 U
1,2-Dichloropropane	5.00 U	5 U	NR	5 U
Trans-1,3-Dichloropropene	5.00 U	5 U	NR	5 U
Trichloroethene	5.00 U	5 U	5 U	5 U
Dibromochloromethane	5.00 U	5 U	NR	5 U
1,1,2-Trichloroethane	5.00 U	5 U	5 U	5 U
Benzene	5.00 U	5 U	NR	5 U
cis-1,3-Dichloropropene	5.00 U	5 U	NR	5 U
2-Chloroethylvinylether	10.00 U		NR	NR
Bromoform	5.00 U	5 U	NR	5 U
4-Methyl-2-pentanone	10.00 U	10 U	NR	10 U
2-Hexanone	10.00 U	10 U	NR	10 U
Tetrachloroethene	5.00 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5.00 U	5 U	NR	5 U
Toluene	5.00 U	5 U	NR	5 U
Chlorobenzene	5.00 U	5 U	NR	5 U
Ethylbenzene	5.00 U	5 U	NR	5 U
Styrene	5.00 U	5 U	NR	5 U
Total Xylenes	5.00 U	5 U	NR	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 3

Field Parameters

RFW Batch ID:	0187-881-053	0287-881-044	0487-881-068	0487-881-102
Customer ID:	8-86-04-13-87	8-86-06-11-87	8-86-12-16-87	9-86-01-18-88
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1.0	1.0

Field Parameters

Toluene-d8:	%	%	144 %	126 %
Bromofluorobenzene:	%	%	76 %	125 %
1,2-Dichloroethane-d4:	%	%	92 %	184 %

Field Parameters

Chloromethane	NR	NR	10 U	10 U
Bromomethane	NR	NR	10 U	10 U
Vinyl Chloride	NR	NR	10 U	10 U
Chloroethane	NR	NR	10 U	10 U
Methylene Chloride	NR	NR	12.00	6
Acetone	NR	NR	4.00 J	10 U
Carbon Disulfide	NR	NR	5 U	5 U
1,1-Dichloroethene	4 U	4 U	5 U	5 U
1,1-Dichloroethane	NR	NR	5 U	5 U
Trans-1,2-Dichloroethene	4 U	4 U	5 U	5 U
Chloroform	4 U	4 U	5 U	5 U
1,2-Dichloroethane	4 U	4 U	5 U	5 U
2-Butanone	NR	NR	10 U	10 U
1,1,1-Trichloroethane	4 U	4 U	5 U	5 U
Carbon Tetrachloride	4 U	4 U	5 U	5 U
Vinyl Acetate	NR	NR	10 U	10 U
Bromodichloromethane	NR	NR	5 U	5 U
1,2-Dichloropropane	NR	NR	5 U	5 U
Trans-1,3-Dichloropropene	NR	NR	5 U	5 U
Trichloroethene	4 U	4 U	5 U	5 U
Dibromochloromethane	NR	NR	5 U	5 U
1,1,2-Trichloroethane	4 U	4 U	5 U	5 U
Benzene	NR	NR	5 U	5 U
cis-1,3-Dichloropropene	NR	NR	5 U	5 U
2-Chloroethylvinylether	NR	NR	NR	NA
Bromoform	NR	NR	5 U	5 U
4-Methyl-2-pentanone	NR	NR	10 U	10 U
2-Hexanone	NR	NR	10 U	10 U
Tetrachloroethene	4 U	4 U	5 U	5 U
1,1,2,2-Tetrachloroethane	NR	NR	5 U	5 U
Toluene	NR	NR	5 U	5 U
Chlorobenzene	NR	NR	5 U	5 U
Ethylbenzene	NR	NR	5 U	5 U
Styrene	NR	NR	5 U	5 U
Total Xylenes	NR	NR	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Field Parameters

RFW Batch ID:	0187-881-099	0287-881-046	8611-027-023	8611-004-006
Customer ID:	9-86-05-14-87	9-86-06-15-87	G088611860	G098610860
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Field Parameters

Toluene-d8:	%	%	92 %	100 %
Bromofluorobenzene:	%	%	94 %	105 %
1,2-Dichloroethane-d4:	%	%	98 %	100 %

Field Parameters

Chloromethane	NR	NR	10 U	10 U
Bromomethane	NR	NR	10 U	10 U
Vinyl Chloride	NR	NR	10 U	10 U
Chloroethane	NR	NR	10 U	10 U
Methylene Chloride	NR	NR	5 U	5 U
Acetone	NR	NR	84	2 JB
Carbon Disulfide	NR	NR	5 U	5 U
1,1-Dichloroethene	4 U	4 U	5 U	5 U
1,1-Dichloroethane	NR	NR	5 U	5 U
Trans-1,2-Dichloroethene	4 U	4 U	5 U	5 U
Chloroform	4 U	4 U	5 U	5 U
1,2-Dichloroethane	4 U	4 U	5 U	5 U
2-Butanone	NR	NR	12 B	10 U
1,1,1-Trichloroethane	4 U	4 U	5 U	5 U
Carbon Tetrachloride	4 U	4 U	5 U	5 U
Vinyl Acetate	NR	NR	10 U	10 U
Bromodichloromethane	NR	NR	5 U	5 U
1,2-Dichloropropane	NR	NR	5 U	5 U
Trans-1,3-Dichloropropene	NR	NR	5 U	5 U
Trichloroethene	4 U	4 U	5 U	5 U
Dibromochloromethane	NR	NR	5 U	5 U
1,1,2-Trichloroethane	4 U	4 U	5 U	5 U
Benzene	NR	NR	5 U	5 U
cis-1,3-Dichloropropene	NR	NR	5 U	5 U
2-Chloroethylvinylether	NR	NR	10 U	10 U
Bromoform	NR	NR	5 U	5 U
4-Methyl-2-pentanone	NR	NR	10 U	10 U
2-Hexanone	NR	NR	10 U	10 U
Tetrachloroethene	4 U	4 U	5 U	5 U
1,1,2,2-Tetrachloroethane	NR	NR	5 U	5 U
Toluene	NR	NR	5 U	5 U
Chlorobenzene	NR	NR	5 U	5 U
Ethylbenzene	NR	NR	5 U	5 U
Styrene	NR	NR	5 U	5 U
Total Xylenes	NR	NR	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

RADIONUCLIDES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0188-881-019	08-86-02-04-88	
0188-881-018	09-86-02-04-88	
0188-881-016	41-87-02-03-88	
0487-881-057	41-87-12-17-87	
0187-881-054	8-86-04-13-87	
0287-881-044	8-86-06-11-87	
0487-881-058	8-86-12-17-87	
0487-881-083	9-86-01-19-88	
0187-881-104	9-86-05-14-87	
0287-881-046	9-86-06-15-87	
0387-881-060	9-86-08-12-87	
1000-000-240	G088611860	23127-5-5
1000-000-245	G098610860	23043-5-2

LANDFILL BEDROCK WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	0188-881-019	0188-881-018	0188-881-016
Customer ID:	08-86-02-04-88	09-86-02-04-88	41-87-02-03-88
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	3 +/- 5	pci/l	1 +/- 5	pci/l	3 +/- 6	pci/l
Gross Beta	-7 +/- 12	pci/l	-4 +/- 11	pci/l	-4 +/- 13	pci/l
Uranium 233, 234	2.9 +/- 0.63	pci/l	1.1 +/- 0.24	pci/l	0.26 +/- 0.18	pci/l
Uranium 235	0.08 +/- 0.12	pci/l	0.09 +/- 0.07	pci/l	0.01 +/- 0.06	pci/l
Uranium 238	0.90 +/- 0.30	pci/l	0.24 +/- 0.12	pci/l	0.15 +/- 0.17	pci/l
Strontium 89, 90						
Plutonium 239, 240	0.0 +/- 0.31	pci/l	0.0 +/- 0.58	pci/l	0.0 +/- 2.0	pci/l
Americium 241						
Cesium 137						
Tritium	<210	pci/l	<210	pci/l	<210	pci/l

Sample Information

RFW Batch ID:	0487-881-057	0187-881-054	0287-881-044
Customer ID:	41-87-12-17-87	8-86-04-13-87	8-86-06-11-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	109 +/- 22	pci/l	8 +/- 4	pc/l	20 +/- 10	pci/l
Gross Beta	123 +/- 15	pci/l	21 +/- 12	pc/l	51 +/- 45	pci/l
Uranium 233, 234			0.0 +/- .45	pc/l	0.18 +/- 0.61	pci/l
Uranium 235			0.0 +/- .41	pc/l	0.26 +/- 0.45	pci/l
Uranium 238			0.0 +/- .75	pc/l	2.3 +/- 5.4	pci/l
Strontium 89, 90	<1.0	pci/l	<0.6	pc/l	1.3	pci/l
Plutonium 239, 240	0.00 +/- .14	pci/l	.21 +/- .85	pc/l	0.05 +/- 0.62	pci/l
Americium 241	0.00 +/- .32	pci/l	0.0 +/- 1.2	pc/l	0.0 +/- 1.2	pci/l
Cesium 137			NR		NR	
Tritium	<210	pci/l	<110	pc/l	<110	pci/l

LANDFILL BEDROCK WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 2

Sample Information

RFW Batch ID:	0487-881-058	0487-881-083	0187-881-104
Customer ID:	8-86-12-17-87	9-86-01-19-88	9-86-05-14-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	4 +/- 17	pci/l	2 +/- 5	pci/l	5 +/- 0	pc/l
Gross Beta	4 +/- 11	pci/l	-1 +/- 11	pci/l	0 +/- 9	pc/l
Uranium 233, 234	.98 +/- .21	pci/l	3.0 +/- 0.5	pci/l	1.8 +/- 1.4	pc/l
Uranium 235	.03 +/- .04	pci/l	.06 +/- .10	pci/l	.85 +/- .74	pc/l
Uranium 238	.45 +/- .14	pci/l	.98 +/- .28	pci/l	.28 +/- .97	pc/l
Strontium 89, 90	<1.0	pci/l	<1.0	pci/l	1.03	pc/l
Plutonium 239, 240	0.00 +/- .16	pci/l	0.00 +/- .14	pci/l	0.6 +/- 1.2	pc/l
Americium 241	.02 +/- .10	pci/l	0.00 +/- .12	pci/l	0.0 +/- 1.2	pc/l
Cesium 137					NR	
Tritium	<210	pci/l	<220	pci/l	<110	pc/l

Sample Information

RFW Batch ID:	0287-881-046	0387-881-060	1000-000-240
Customer ID:	9-86-06-15-87	9-86-08-12-87	G088611860
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	45 +/- 21	pci/l	12 +/- 20	pci/l	16 +/- 41	pci/l
Gross Beta	67 +/- 6	pci/l	12 +/- 39	pci/l	61 +/- 90	pci/l
Uranium 233, 234	2.2 +/- 1.0	pci/l	1.9 +/- 1.5	pci/l	-0.09 +/- 0.44	pci/l
Uranium 235	0.0 +/- 0.26	pci/l	-0.2 +/- 0.2	pci/l	NR	
Uranium 238	0.32 +/- 0.5	pci/l	5.3 +/- 2.0	pci/l	-0.3 +/- 1.8	pci/l
Strontium 89, 90	<1.0	pci/l	<1.0	pci/l	NR	
Plutonium 239, 240	0.0 +/- 0.65	pci/l	-0.3 +/- 1.4	pci/l	-1.0 +/- 1.6	pci/l
Americium 241	0.0 +/- 1.2	pci/l	.19 +/- .29	pci/l	-0.44 +/- 0.79	pci/l
Cesium 137	NR				NR	
Tritium	<110	pci/l	<492	pci/l	0.01 +/- 0.23	pci/ml

LANDFILL BEDROCK WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID: 1000-000-245
Customer ID: G098610860
Matrix: Water

Radio Chemistry

Gross Alpha.....	160 +/- 100	pci/l
Gross Beta.....	220 +/- 60	pci/l
Uranium 233, 234.....	0.04 +/- 0.25	pci/l
Uranium 235.....	NR	
Uranium 238.....	-0.18 +/- 0.35	pci/l
Strontium 89, 90.....	NR	
Plutonium 239, 240.....	0.39 +/- 0.79	pci/l
Americium 241.....	-0.17 +/- 0.34	pci/l
Cesium 137.....	NR	
Tritium.....	0.05 +/- 0.21	pci/ml

INORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0188-881-019	08-86-02-04-88	
0188-881-018	09-86-02-04-88	
0188-881-016	41-87-02-03-88	
0187-881-054	8-86-04-13-87	
0287-881-065	8-86-06-11-87	
0387-881-082	8-86-08-12-87	
0487-881-054	8-86-12-16-87	
0487-881-083	9-86-01-18-88	
0187-881-102	9-86-05-14-87	
0287-881-049	9-86-06-15-87	
0387-881-083	9-86-08-12-87	
8611-027-025	G088611860	
8611-004-008	G098610860	

LANDFILL BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	0188-881-019			0188-881-018			0188-881-016	
Customer ID:	08-86-02-04-88			09-86-02-04-88			41-87-02-03-88	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3								
HCO3- as CaCO3	80.2		mg/l	205		mg/l	114	mg/l
Chloride	8.19		mg/l	8.44		mg/l	928	mg/l
Sulfate	125		mg/l	151		mg/l	44.3	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	0.34		mg/l	0.02	U	mg/l	0.02	U mg/l
Sulfide								
Phosphate								
Cyanide, Total								
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	307		mg/l	238		mg/l	1880	mg/l
Total Suspended Solids								
% Solids								

Sample Information

RFW Batch ID:	0187-881-054			0287-881-065			0387-881-082	
Customer ID:	8-86-04-13-87			8-86-06-11-87			8-86-08-12-87	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3				12.4		mg/l		
HCO3- as CaCO3	21.4		mg/l	36.6		mg/l	61.5	mg/l
Chloride	872		mg/l	9.50		mg/l	9.7	mg/l
Sulfate	200		mg/l	225		mg/l	178	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	2.10		mg/l	0.20	U	mg/l		
Sulfide								
Phosphate								
Cyanide, Total	1.0	U	mg/l	1.0	U	mg/l	1	U mg/l
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	402		mg/l	380		mg/l	358	mg/l
Total Suspended Solids								
% Solids								

LANDFILL BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-054			0487-881-083			0187-881-102	
Customer ID:	8-86-12-16-87			9-86-01-18-88			9-86-05-14-87	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3	NR			NR				
HCO3- as CaCO3	57.7		mg/l	201		mg/l	172	mg/l
Chloride	7.93		mg/l	11.23		mg/l	13.2	mg/l
Sulfate	151		mg/l	10.3		mg/l	10.0	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	1.47		mg/l	0.02	U	mg/l	0.20	U mg/l
Sulfide								
Phosphate								
Cyanide, Total	NR			NR			1.0	U mg/l
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	330		mg/l	224		mg/l	217	mg/l
Total Suspended Solids								
% Solids								

Sample Information

RFW Batch ID:	0287-881-049			0387-881-083			8611-027-025	
Customer ID:	9-86-06-15-87			9-86-08-12-87			G088611860	
Matrix:	Water			Water			Water	
Inorganics								
CO3= as CaCO3	NR						450	mg/l
HCO3- as CaCO3	192		mg/l	187		mg/l	3	U mg/l
Chloride	10.5		mg/l	10.5		mg/l	12	mg/l
Sulfate	7.80		mg/l	8.5		mg/l	101	mg/l
pH								
Fluoride								
Nitrate-Nitrite-Nitrogen	0.20	U	mg/l	0.20	U	mg/l		
Sulfide								
Phosphate								
Cyanide, Total	1.0	U	mg/l	1	U	mg/l	0.005	U mg/l
Hexavalent Chromium (Cr+6)								
Total Dissolved Solids	255		mg/l	220		mg/l	911	mg/l
Total Suspended Solids								
% Solids								

LANDFILL BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 3

Sample Information

RFW Batch ID: 8611-004-008
Customer ID: G098610860
Matrix: Water

Inorganics

CO3= as CaCO3.....	5	U	mg/l
HCO3- as CaCO3.....	220		mg/l
Chloride.....	11		mg/l
Sulfate.....	15		mg/l
pH.....			
Fluoride.....			
Nitrate-Nitrite-Nitrogen.....			
Sulfide.....			
Phosphate.....			
Cyanide, Total.....	0.01	U	mg/l
Hexavalent Chromium (Cr+6).....			
Total Dissolved Solids.....	350		mg/l
Total Suspended Solids.....			
% Solids.....			

METALS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0188-881-019	08-86-02-04-88	
0188-881-018	09-86-02-04-88	
0188-881-016	41-87-02-03-88	
0487-881-060	41-87-12-17-87	
0187-881-053	8-86-04-13-87	
0287-881-044	8-86-06-12-87	
0387-881-086	8-86-08-13-87	
0487-881-056	8-86-12-17-87	
0487-881-124	9-86-01-19-88	
0187-881-099	9-86-05-14-87	
0287-881-046	9-86-06-16-87	
0387-881-084	9-86-08-12-87	
8611-027-024	G088611860	
8611-004-007	G098610860	

LANDFILL BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	0188-881-019	0188-881-018	0188-881-016	0487-881-060
Customer ID:	08-86-02-04-88	09-86-02-04-88	41-87-02-03-88	41-87-12-17-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver	(Ag),	total.....	0.0076	U	0.0076	U	0.0076	U	0.0076	U
Aluminum	(Al),	total.....	0.0416		0.0290	U	0.0350		0.0699	
Arsenic	(As),	total.....	0.005	U	0.005	U	0.003	J	0.002	J
Barium	(Ba),	total.....	0.0164		0.1067		0.2899		0.1813	
Beryllium	(Be),	total.....	0.005	U	0.005	U	0.005	U	0.005	U
Calcium	(Ca),	total.....	16.0180		21.8304		96.0820		96.1860	
Cadmium	(Cd),	total.....	0.001	U	0.001	U	0.001		0.001	U
Cobalt	(Co),	total.....	0.0220	U	0.0220	U	0.0220	U	0.0220	U
Chromium	(Cr),	total.....	0.0100	U	0.0137		0.0100	U	0.0100	U
Cesium	(Cs),	total.....	0.02	U	0.02	U	0.02	U	0.02	U
Copper	(Cu),	total.....	0.0092		0.0063	U	0.0063	U	0.0246	
Iron	(Fe),	total.....	0.0320		0.0825		0.0372		0.0532	
Mercury	(Hg),	total.....	0.0002	U	0.0002		0.0002	U	0.0002	U
Potassium	(K),	total.....	4.9		3.5		8.6		9.9	
Lithium	(Li),	total.....	0.06	J	0.1	U	0.13		0.10	
Magnesium	(Mg),	total.....	1.4480		5.4654		25.5941		24.1295	
Manganese	(Mn),	total.....	0.0051	U	0.0236		0.0821		0.0653	
Molybdenum	(Mo),	total.....	0.0410		0.0220	U	0.0343		0.0456	
Sodium	(Na),	total.....	71.9646		57.6813		442.8450		4447.3764	
Nickel	(Ni),	total.....	0.0370	U	0.0370	U	0.0370	U	0.0370	U
Lead	(Pb),	total.....	0.005	U	0.005	U	0.005	U	0.005	U
Antimony	(Sb),	total.....	0.02	U	0.02	U	0.02	U	0.02	U
Selenium	(Se),	total.....	0.005	U	0.005	U	0.004	J	0.005	
Strontium	(Sr),	total.....	0.1896		0.2572		1.3304		1.3371	
Thallium	(Tl),	total.....	0.01	U	0.01	U	0.01	U	0.01	U
Vanadium	(V),	total.....	0.0240	U	0.0240	U	0.0240	U	0.0240	U
Zinc	(Zn),	total.....	0.0200	U	0.0423		0.0263		0.0242	

LANDFILL BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0187-881-053	0287-881-044	0387-881-086	0487-881-056
Customer ID:	8-86-04-13-87	8-86-06-12-87	8-86-08-13-87	8-86-12-17-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0076 U	0.0076 U	0.0076 U	0.0076 U
Aluminum (Al), total.....	0.1209	0.1254	0.0730	0.0722
Arsenic (As), total.....	0.01 U	0.01 U	0.01	0.007
Barium (Ba), total.....	0.0338	0.0135	0.0478	0.0268
Beryllium (Be), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca), total.....	32.2310	26.0747	25.6007	19.3936
Cadmium (Cd), total.....	0.005 U	0.005 U	0.001 U	0.001 U
Cobalt (Co), total.....	0.0220 U	0.0220 U	0.0220 U	0.0220 U
Chromium (Cr), total.....	0.0100 U	0.0100 U	0.0103	0.0100 U
Cesium (Cs), total.....	0.2 U	0.2 U	0.02 U	0.02 U
Copper (Cu), total.....	0.0063 U	0.0079	0.0074	0.0330
Iron (Fe), total.....	0.0069 U	0.0447	0.0294	0.0384
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Potassium (K), total.....	10.0	7.6	5.9	6.2
Lithium (Li), total.....				0.1 U
Magnesium (Mg), total.....	1.2284	0.3173	1.1104	1.2793
Manganese (Mn), total.....	0.0051 U	0.0051 U	0.0051 U	0.0051 U
Molybdenum(Mo), total.....	0.1247	0.1241	0.1332	0.0732
Sodium (Na), total.....	101.4100	89.6748	88.3283	78.2412
Nickel (Ni), total.....	0.0370 U	0.0370 U	0.0370 U	0.0370 U
Lead (Pb), total.....	0.005 U	0.008	0.005 U	0.005 U
Antimony (Sb), total.....	0.0600 U	0.06 U	0.02 U	0.02 U
Selenium (Se), total.....	0.006	0.005 U	0.005 U	0.006
Strontium (Sr), total.....	0.3843	0.3013	0.2818	0.2535
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V), total.....	0.0324	0.0333	0.0240 U	0.0240 U
Zinc (Zn), total.....	0.02	0.0200 U	0.0200 U	0.0200 U

LANDFILL BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-124	0187-881-099	0287-881-046	0387-881-084
Customer ID:	9-86-01-19-88	9-86-05-14-87	9-86-06-16-87	9-86-08-12-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0076 U	0.0076 U	0.0076 U	0.0076 U
Aluminum (Al), total.....	0.0551	0.0421	0.0290 U	0.0487
Arsenic (As), total.....	0.015	0.01 U	0.01 U	0.004 J
Barium (Ba), total.....	0.1323	0.0907	0.0279	0.1303
Beryllium (Be), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca), total.....	24.6412	25.8270	25.6395	22.8456
Cadmium (Cd), total.....	0.001 U	0.005 U	0.005 U	0.0004 J
Cobalt (Co), total.....	0.0220 U	0.0220 U	0.0220 U	0.0220 U
Chromium (Cr), total.....	0.0100 U	0.0100 U	0.0100 U	0.0178
Cesium (Cs), total.....	0.02 U	0.2 U	0.2 U	0.02 U
Copper (Cu), total.....	0.0257	0.0068	0.0063 U	0.0071
Iron (Fe), total.....	0.0519	0.0207	0.0131	0.2267
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Potassium (K), total.....	3.6	5.0 U	5.0 U	3.9
Lithium (Li), total.....	0.1 U			
Magnesium (Mg), total.....	5.6543	6.1611	5.5015	5.1208
Manganese (Mn), total.....	0.0338	0.0127	0.0312	0.0212
Molybdenum(Mo), total.....	0.0220 U	0.0220 U	0.0220 U	0.0290
Sodium (Na), total.....	60.9950	61.5676	60.6963	72.1430
Nickel (Ni), total.....	0.0370 U	0.0370 U	0.0370 U	0.0370 U
Lead (Pb), total.....	0.002 J	0.005 U	0.015	0.001 J
Antimony (Sb), total.....	0.02 U	0.0600 U	0.06 U	0.02 U
Selenium (Se), total.....	0.002 J	0.0050 U	0.005 U	0.004
Strontium (Sr), total.....	0.2800	0.2726	0.2263	0.2387
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V), total.....	0.0240 U	0.0240 U	0.0295	0.0240 U
Zinc (Zn), total.....	0.0200 U	0.02 U	0.0200 U	0.2433

LANDFILL BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8611-027-024	8611-004-007
Customer ID:	G088611860	G098610860
Matrix:	Water	Water
Units:	MG/L	MG/L

Metals

Silver (Ag), total	0.009 U	0.010 U
Aluminum (Al), total	0.380	0.100 U
Arsenic (As), total	0.010 U	0.010 U
Barium (Ba), total	0.156	0.160
Beryllium (Be), total	0.005 U	0.005 U
Calcium (Ca), total	91.5	21.1
Cadmium (Cd), total	0.005 U	0.005 U
Cobalt (Co), total	0.025 U	0.025 U
Chromium (Cr), total	0.010 U	0.010 U
Cesium (Cs), total	0.150 U	0.150 U
Copper (Cu), total	0.020 U	0.020 U
Iron (Fe), total	0.094	0.075 U
Mercury (Hg), total	0.0002 U	0.0002 U
Potassium (K), total	41.1	3.62
Lithium (Li), total		
Magnesium (Mg), total	1.00 U	5.25
Manganese (Mn), total	0.016	0.028
Molybdenum(Mo), total	0.133	0.100 U
Sodium (Na), total	177	60.7
Nickel (Ni), total	0.020 U	0.020 U
Lead (Pb), total	0.005 U	0.025
Antimony (Sb), total	0.060 U	0.060 U
Selenium (Se), total	0.010	0.005 U
Strontium (Sr), total	1.310	0.175
Thallium (Tl), total	0.010 U	0.010 U
Vanadium (V), total	0.025 U	0.025 U
Zinc (Zn), total	0.029	0.020 U

APPENDIX C-3

SURFACE WATER ANALYTICAL DATA

VOLATILE ORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-044-021	SW03088600	21
8608-029-025	SWLFLP08860	25

LANDFILL SURFACE WATER SAMPLES
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	8608-044-021	8608-029-025
Customer ID:	SW03088600	SWLFLP08860
Matrix:	Water	Water
Units:	UG/L	UG/L
Dilution Factor:	1	1

Surrogate Recovery

Toluene-d8:	97 %	101 %
Bromofluorobenzene:	98 %	101 %
1,2-Dichloroethane-d4:	91 %	90 %

Analytes

Chloromethane.....	10 U	10 U
Bromomethane.....	10 U	10 U
Vinyl Chloride.....	10 U	10 U
Chloroethane.....	10 U	10 U
Methylene Chloride.....	5 U	5 U
Acetone.....	10 U	5 B
Carbon Disulfide.....	5 U	5 U
1,1-Dichloroethene.....	5 U	5 U
1,1-Dichloroethane.....	5 U	5 U
Trans-1,2-Dichloroethene.....	5 U	5 U
Chloroform.....	5 U	5 U
1,2-Dichloroethane.....	5 U	5 U
2-Butanone.....	10 U	10 U
1,1,1-Trichloroethane.....	5 U	5 U
Carbon Tetrachloride.....	5 U	5 U
Vinyl Acetate.....	10 U	10 U
Bromodichloromethane.....	5 U	5 U
1,2-Dichloropropane.....	5 U	5 U
Trans-1,3-Dichloropropene.....	5 U	5 U
Trichloroethene.....	5 U	5 U
Dibromochloromethane.....	5 U	5 U
1,1,2-Trichloroethane.....	5 U	5 U
Benzene.....	5 U	5 U
cis-1,3-Dichloropropene.....	5 U	5 U
2-Chloroethylvinylether.....	10 U	10 U
Bromoform.....	5 U	5 U
4-Methyl-2-pentanone.....	10 U	4 J
2-Hexanone.....	10 U	10 U
Tetrachloroethene.....	5 U	5 U
1,1,2,2-Tetrachloroethane.....	5 U	5 U
Toluene.....	5 U	5 U
Chlorobenzene.....	5 U	5 U
Ethylbenzene.....	5 U	5 U
Styrene.....	5 U	5 U
Total Xylenes.....	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SEMI-VOLATILES

LANDFILL SURFACE WATER SAMPLES
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-064-004	8608-055-005
Customer ID:	SW03088600	SWLFP08860
Matrix:	Water	Water
Units:	UG/L	UG/L
Dilution Factor:	1	1

Surrogate Recovery

2-Fluorophenol:	38 %	34 %
Phenol-d5:	26 %	27 %
2,4,6-Br3-Phenol:	84 %	69 %
Nitrobenzene-d5:	34 %	40 %
2-Fluorobiphenyl:	46 %	66 %
p-Terphenyl-d14:	56 %	76 %

Analytes

Phenol.....	10 U	10 U
bis(2-Chloroethyl)Ether.....	10 U	10 U
2-Chlorophenol.....	10 U	10 U
1,3-Dichlorobenzene.....	10 U	10 U
1,4-Dichlorobenzene.....	10 U	10 U
Benzyl Alcohol.....	10 U	10 U
1,2-Dichlorobenzene.....	10 U	10 U
2-Methylphenol.....	10 U	10 U
bis(2-Chloroisopropyl)Ether.....	10 U	10 U
4-Methylphenol.....	10 U	10 U
N-Nitroso-di-n-propylamine.....	10 U	10 U
Hexachloroethane.....	10 U	10 U
Nitrobenzene.....	10 U	10 U
Isophorone.....	10 U	10 U
2-Nitrophenol.....	10 U	10 U
2,4-Dimethylphenol.....	10 U	10 U
Benzoic Acid.....	50 U	10 U
bis(2-Chloroethoxy)Methane.....	10 U	10 U
2,4-Dichlorophenol.....	10 U	10 U
1,2,4-Trichlorobenzene.....	10 U	10 U
Naphthalene.....	10 U	10 U
4-Chloroaniline.....	10 U	10 U
Hexachlororbutadiene.....	10 U	10 U
4-Chloro-3-methylphenol.....	10 U	10 U
2-Methylnaphthalene.....	10 U	10 U
Hexachlorocyclopentadiene.....	10 U	10 U
2,4,6-Trichlorophenol.....	10 U	10 U
2,4,5-Trichlorophenol.....	50 U	50 U
2-Chloronaphthalene.....	10 U	10 U
2-Nitroaniline.....	50 U	50 U
Dimethyl Phthalate.....	10 U	10 U
Acenaphthylene.....	10 U	10 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

LANDFILL SURFACE WATER SAMPLES
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-064-004	8608-055-005
Customer ID:	SW03088600	SWLFP08860
Matrix:	Water	Water
Units:	UG/L	UG/L
Dilution Factor:	1	1

Analytes

3-Nitroaniline	50	U	50	U
Acenaphthene	10	U	10	U
2,4-Dinitrophenol	50	U	50	U
4-Nitrophenol	50	U	50	U
Dibenzofuran	10	U	10	U
2,4-Dinitrotoluene	10	U	10	U
2,6-Dinitrotoluene	10	U	10	U
Diethylphthalate	10	U	10	U
4-Chlorophenyl-phenylether	10	U	10	U
Fluorene	10	U	10	U
4-Nitroaniline	50	U	50	U
4,6-Dinitro-2-methylphenol	50	U	50	U
N-Nitrosodiphenylamine	7	JB	4	J
4-Bromophenyl-phenylether	10	U	10	U
Hexachlorobenzene	10	U	10	U
Pentachlorophenol	50	U	50	U
Phenanthrene	10	U	10	U
Anthracene	10	U	10	U
di-n-Butyl Phthalate	10	U	10	U
Fluoranthene	10	U	10	U
Pyrene	10	U	10	U
Butyl Benzyl Phthalate	10	U	10	U
3,3'-Dichlorobenzidine	20	U	20	U
Benzo(a)Anthracene	10	U	10	U
bis(2-Ethylhexyl)Phthalate	10	U	10	U
Chrysene	10	U	10	U
di-n-Octyl Phthalate	10	U	10	U
Benzo(b)Fluoranthene	10	U	10	U
Benzo(k)Fluoranthene	10	U	10	U
Benzo(a)Pyrene	10	U	10	U
Indeno(1,2,3-cd)Pyrene	10	U	10	U
Dibenz(a,h)Anthracene	10	U	10	U
Benzo(g,h,i)Perylene	10	U	10	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

PESTICIDE/PCBs

LANDFILL SURFACE WATER SAMPLES
PESTICIDES/PCB
CLP LIST

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	8608-064-004	8608-055-005
Customer ID:	SW03088600	SWLFP08860
Matrix:	Water	Water
Units:	UG/L	UG/L
Dilution Factor:	1	1

Surrogate Recovery

Di-n-butylchlorendate:	97 %	47 %

Analytes

Alpha-BHC	0.05 U	0.05 U
Beta-BHC	0.05 U	0.05 U
Delta-BHC	0.05 U	0.05 U
Gamma-BHC (Lindane)	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U
Heptachlor Epoxide	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U
Dieldrin	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U
Endrin	0.1 U	0.1 U
Endosulfan II	0.1 U	0.1 U
4,4'-DDD	0.1 U	0.1 U
Endosulfan Sulfate	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U
Methoxychlor	0.5 U	0.5 U
Endrin Ketone	0.1 U	0.1 U
Chlordane	0.5 U	0.5 U
Toxaphene	1.0 U	1 U
Aroclor-1016	0.5 U	0.5 U
Aroclor-1221	0.5 U	0.5 U
Aroclor-1232	0.5 U	0.5 U
Aroclor-1242	0.5 U	0.5 U
Aroclor-1248	0.5 U	0.5 U
Aroclor-1254	1.0 U	1 U
Aroclor-1260	1.0 U	1 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

RADIONUCLIDES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
1000-000-369	SW03088600	22548-8-6
1000-000-405	SWLFP08860	22511-10-9

LANDFILL SURFACE WATER SAMPLES
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	1000-000-369	1000-000-405
Customer ID:	SW03088600	SWLFP08860
Matrix:	Water	Water

Radio Chemistry

Gross Alpha	2	+/- 3	pci/l	0	+/- 7	pci/l
Gross Beta	3	+/- 3	pci/l	11	+/- 5	pci/l
Uranium 233, 234	0.63	+/- 0.22	pci/l	1.1	+/- 0.2	pci/l
Uranium 235	NR			NR		
Uranium 238	0.60	+/- 0.20	pci/l	1.0	+/- 0.2	pci/l
Strontium 89, 90	NR			NR		
Plutonium 239, 240	-0.04	+/- 0.17	pci/l	0.02	+/- 0.05	pci/l
Americium 241	0.02	+/- 0.03	pci/l	0.04	+/- 0.04	pci/l
Cesium 137	NR			NR		
Tritium	-0.09	+/- 0.24	pci/l	0.10	+/- 0.22	pci/l

INORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-044-023	SW03088600	
8608-029-028	SWLFP08860	

LANDFILL SURFACE WATER SAMPLES
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	8608-044-023	8608-029-028
Customer ID:	SW03088600	SWLFP08860
Matrix:	Water	Water

Inorganics

CO3= as CaCO3						
HCO3- as CaCO3						
Chloride	15		mg/l	91		mg/l
Sulfate	39		mg/l	52		mg/l
pH						
Fluoride						
Nitrate-Nitrite-Nitrogen	5.0	U	mg/l	5.0	U	mg/l
Sulfide						
Phosphate						
Cyanide, Total	0.005	U	mg/l	0.001	U	mg/l
Hexavalent Chromium (Cr+6)	10	U	mg/l	10	U	mg/l
Total Dissolved Solids	180		mg/l	533		mg/l
Total Suspended Solids						
% Solids						

METALS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-044-022	SW03088600	
8608-029-027	SWLFP08860	

LANDFILL SURFACE WATER SAMPLES
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-044-022	8608-029-027
Customer ID:	SW03088600	SWLFP08860
Matrix:	Water	Water
Units:	MG/L	MG/L

Metals

Silver (Ag), total	0.010 U	0.010	U
Aluminum (Al), total	0.100 U	0.120	
Arsenic (As), total	0.002 U	0.001	U
Barium (Ba), total	0.100 U	0.100	U
Beryllium (Be), total	0.090	0.005	U
Calcium (Ca), total	47.5	39.5	
Cadmium (Cd), total	0.005 U	0.005	U
Cobalt (Co), total	0.050 U	0.050	U
Chromium (Cr), total	0.010 U	0.011	
Cesium (Cs), total	0.100 U	0.100	U
Copper (Cu), total	0.030	0.020	U
Iron (Fe), total	0.075 U	0.030	U
Mercury (Hg), total	0.0002 U	0.00063	
Potassium (K), total	0.100 U	67.9	
Lithium (Li), total			
Magnesium (Mg), total	6.0	20.8	
Manganese (Mn), total	0.020	0.060	
Molybdenum(Mo), total	0.300	0.100	U
Sodium (Na), total	23.2	74.7	
Nickel (Ni), total	0.040 U	0.040	U
Lead (Pb), total	0.010 U	0.005	U
Antimony (Sb), total	0.050 U	0.020	U
Selenium (Se), total	0.002 U	0.002	U
Strontium (Sr), total	0.360	0.400	
Thallium (Tl), total	0.010 U	0.010	U
Vanadium (V), total	0.313	0.005	U
Zinc (Zn), total	0.300	0.890	

APPENDIX D-1

METALS

WEST LANDFILL

WEST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	SILVER MG/L	ALUMINUM MG/L	ARSENIC MG/L	BORON MG/L	BARIUM MG/L	BERYLLIUM MG/L	BISMUTH MG/L	CALCIUM MG/L	CADMIUM MG/L	CERIUM MG/L	COBALT MG/L	CHROMIUM MG/L	CESIUM MG/L	COPPER MG/L
12/15/75	0.0006	4	(0.03	2	0.2	(0.05	(0.003	)6	(0.01	(0.6	0.01	(0.05	(0.06	0.02
01/15/76	(.0006	1.4	.06	.4	.1	(.05	(.003	)5.6	(0.01	(.6	(.003	(0.05	(.06	.003
03/15/76	.002	2.5	(.02	.4	.2	(.004	(.002	)4.9	(.01	(.5	(.002	(.95	(.05	.05
04/15/76	(.0004	.004	(.002	.2	.08	(.05	(.0004	)4	(.01	(.4	(.002	(.05	(.04	.02
05/15/76	(.0004	)3.5	(.02	.7	.2	(.0004	(.002	)3.6	(.02	(.4	(.002	.2	(.04	.04
06/15/76	(.0007	.07	.01	.1	.07	(.0007	(.004	)7.2	(.04	(.7	.004	.02	(.007	.01
06/15/76						(0.05			(0.01			(0.05		
07/05/76						(0.05			(0.01			(0.05		
07/15/76	(.0005	2.1	(.02	.09	.2	(.05	(.002	)4.6	(.01	(.5	(.002	(.05	(.05	.05
08/15/76	(.0006	.06	(.006	.1	.01	(.0006	(.003	(.0006	(.03	(.6	(.003	.02	.06	.003
08/15/76						(0.05			(0.05					
09/15/76	.03	)2.7	(.01	.3	.08	(.05	(.001	)2.7	(.01	(.3	(.001	(.05	(.03	.03
09/15/76	.03	)27	(.01	.3	.08	(.05	(.001	)2.7	(.01	(.3	(.001	(.05	(.03	.03
10/15/76	(.0003	2	(.02	.2	.1	(.05	(.002	)3.4	(.01	(.3	.003	(.05	(.03	.003
10/15/76						(0.05			(0.01			(0.05		
11/15/76	.02	)15.3	(.08	.3	.03	(.002	(.003	)15.3	(.08	(1.5	(.008	.008	(.02	(.008
11/15/76						(0.05			(0.01			(0.05		
12/15/76						(0.05			(0.05			(0.05		
01/15/77	0.001	0.7	(0.03	0.07	0.1	(0.05	(0.003	)7	(0.01	(0.7	(0.003	(0.05	(0.07	0.01
03/15/77	0.03	1	(0.03	0.3	0.1	(0.05	(0.003	)7	(0.01	(0.7	(0.003	(0.05	(0.07	0.07
04/15/77	0.003	3	(0.01	0.3	0.3	(0.05	(0.001	)3	(0.01	(0.3	(0.001	(0.05	(0.03	0.09
06/15/77	0.001	0.1	(0.02	0.5	0.2	(0.05	(0.002	)5	(0.01	(0.5	(0.002	(0.05	(0.05	0.09
07/15/77	(0.0002	2	(0.01	0.07	0.04	(0.05	(0.001	)2	(0.01	(0.2	0.002	(0.05	0.02	0.004
08/15/77	(0.02	0.3	(0.02	3	0.3	(0.05	(0.004	)4	(0.01	(0.4	(0.002	(0.05	(0.04	0.02
09/15/77	0.01	)10	(0.05	0.8	0.3	(0.05	(0.005	)10	(0.01	(1	(0.005	(0.05	(0.1	0.01
03/15/78	(0.0002	1	(0.01	0.05	0.05	(0.05	(0.001	)2	(0.01	(0.2	(0.001	(0.05	(0.02	0.002
04/15/78	0.003	1	(0.02	0.2	0.1	(0.05	(0.002	)4	(0.01	(.4	(0.002	(0.05	0.04	0.01
05/15/78	0.001	0.4	(0.02	0.2	0.1	(0.05	(0.002	)4	(0.01	(0.4	0.002	(0.05	0.04	0.004
07/15/78	(0.001	)10	(0.05	0.5	0.2	(0.05	(0.005	)10	(0.01	(1	0.006	(0.05	0.1	0.06
10/15/78	0.0004	1	(0.02	0.1	0.04	(0.0004	(0.002	)4	(0.02	(0.4	(0.002	0.0008	(0.04	0.003

WEST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	SILVER MG/L	ALUMINUM MG/L	ARSENIC MG/L	BORON MG/L	BARIUM MG/L	BERYLLIUM MG/L	BISMUTH MG/L	CALCIUM MG/L	CADMIUM MG/L	CERIUM MG/L	COBALT MG/L	CHROMIUM MG/L	CESIUM MG/L	COPPER MG/L
11/15/78	0.006	>10	<0.06	0.9	0.6	0.006	0.6	>10	<0.01	<0.006	<0.006	0.06	<0.1	0.1
08/27/79	0.004	0.7	<0.04	0.4	0.07	0.2	<0.002	70	<0.01	<0.4	<0.002	<0.002	0.04	0.04
09/24/79	0.0004	0.4	0.1	0.2	0.03	<0.0004	<0.002	49	<0.01	<0.4	<0.002	<0.002	<0.04	<0.002
10/15/79	0.01	2	<0.02	0.3	0.1	<0.0005	<0.002	57	<0.01	<0.5	<0.002	0.009	<0.05	0.002
12/03/79	0.0004	>4	<0.02	0.3	0.04	<0.0004	<0.002	72	<0.01	<0.4	0.002	0.004	0.04	0.009
12/17/79	<0.0004	3	<0.02	0.1	0.04	<0.0004	<0.002	68	<0.01	<0.4	<0.002	0.007	0.04	0.004
01/25/80	<0.0004	0.3	<0.02	0.1	0.1	<0.0004	<0.002	74	<0.01	<0.4	0.002	<0.002	<0.04	0.004
02/25/80	<0.0003	0.6	<0.02	0.1	0.06	<0.0003	<0.002	67	<0.01	<0.3	<0.002	0.002	<0.03	0.003
03/31/80	0.0003	2	<0.01	0.2	0.09	<0.0003	<0.001	39	<0.01	<0.3	0.001	0.009	0.03	0.009
04/23/80	<0.0001	0.05	<0.001	0.005	0.002	<0.0001	<0.0001	63	<0.01	<0.02	0.0001	<0.0001	<0.002	<0.0001
05/27/80	<0.0005	0.5	<0.02	0.2	0.2	<0.0005	<0.002	93	<0.01	<0.5	0.004	<0.002	<0.05	0.004
06/30/80	<0.0005	0.5	<0.03	0.2	0.2	<0.0005	<0.003	75	<0.01	<0.5	<0.003	<0.003	0.05	0.01
07/28/80	<0.0004	>4	<0.02	0.4	0.07	<0.0004	<0.002	46	<0.01	<0.4	0.004	0.004	<0.04	0.007
08/25/80	0.0008	2	<0.02	0.1	0.08	<0.0004	<0.002	60	<0.01	<0.4	<0.002	<0.002	0.04	0.008
10/27/80	0.002	>10	<0.06	0.1	0.2	<0.001	<0.006	100	<0.01	<1	0.01	<0.006	0.1	0.05
11/24/80	<0.0005	>5	<0.02	0.4	0.2	<0.0005	<0.002	65	<0.01	<0.5	0.003	0.009	0.05	<0.002
12/22/80	<0.0005	2	<0.03	1	0.4	<0.0005	<0.003	75	<0.01	<0.5	0.004	0.003	<0.05	0.02
01/26/81	<0.0005	0.9	<0.02	0.3	0.2	<0.0005	<0.002	72	<0.01	<0.5	0.002	<0.002	<0.05	<0.002
02/23/81	0.002	2	<0.03	0.2	0.2	<0.0005	<0.003	71	<0.01	<0.5	0.005	0.003	0.05	0.004

WEST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	IRON MG/L	GERMANIUM MG/L	MERCURY MG/L	POTASSIUM MG/L	LITHIUM MG/L	MAGNESIUM MG/L	MANGANESE MG/L	MOLYBDENUM MG/L	SODIUM MG/L	NIOBIUM MG/L	NICKEL MG/L	PHOSPHOROUS MG/L	LEAD MG/L	RUBIDIUM MG/L
12/15/75	5	<0.003	<0.005	5	0.1	>6	1	<0.0006	>6	<0.03	0.01	<0.03	0.002	<0.06
01/15/76	5.6	<.003	<0.001	2.8	.2	<5.6	.8	<.0006	>5.6	<.03	.006	<.03	.003	<.06
03/15/76	2.9	.002	<.009	1.5	.05	>4.9	1	.002	>4.9	<.02	.05	<.02	.005	<.05
04/15/76	.3	<.002	<.005	.8	.1	>4		.004	>4	<.02	<.004	<.02	.002	<.04
05/15/76	>3.6	<.002	<.004	>3.6	.07	>3.6	.4	.004	>3.6	<.004	.02	.02	.04	<.04
06/15/76	.3	<.004	<.007	>7.2	.3	>7.2	.02	.007	>7.2	<.04	<.007	.7	.007	<.007
06/15/76			<0.005											
07/05/76			<0.005											
07/15/76	1.9	<.002	<.005	>4.6	2.0	4.6	.5	.0005	>4.6	<.02	.02	.05	.0005	<.05
08/15/76	.2	<.003	<.006	>6	1.2	>6	.006	.003	>6	<.03	.006	.06	<.0006	<.06
08/15/76			<0.005											
09/15/76	2.7	<.001	<.005	.8	.03	>2.7	.01	.01	>2.7	<.01	<.003	2.7	.003	<.03
09/15/76	2.7	<.001	<.005	.8	.03	>2.7	.01	.01	>2.7	<.01	<.003	2.7	.003	<.03
10/15/76	>3.4	<.002	<.005	>3.4	.1	>3.4	.7	<.0003	>3.4	<.02	.007	<.02	.002	<.03
10/15/76			<0.005											
11/15/76	>15.3	<.02	<.02	12.2	.2	>15.3	.8	.008	>15.3	<.008	<.02	15.3	.03	.8
11/15/76			<0.005											
12/15/76			<0.005											
01/15/77	0.5	<0.003	<0.005	3	0.6	>7	1	0.0007	>7	<0.03	0.03	<0.03	<0.0007	<0.07
03/15/77	>7	<0.003	<0.005	>7	0.3	>7	0.07	0.007	>7	<0.03	<0.007	5	<0.0007	<0.07
04/15/77	>3	<0.001	<0.005	<3	0.1	>3	0.09	0.01	>3	<0.01	0.01	1	<0.0003	<0.03
06/15/77	0.2	<0.002	<0.005	>5	0.2	>5	0.1	0.02	>5	<0.02	0.02	0.2	0.005	<0.05
07/15/77	2	<0.001	<0.005	1	0.02	>2	0.4	0.002	>2	<0.01	0.007	<0.01	0.004	<0.02
08/15/77	0.2	<0.002	<0.005	2	0.1	>4	0.08	0.02	>4	<0.02	0.04	0.08	<0.004	<0.04
09/15/77	10	<0.005	<0.005	5	0.4	>10	0.4	0.05	>10	<0.05	0.1	<0.05	0.01	<0.1
03/15/78	0.2	<0.001	<0.005	2	0.09	>2	0.2	0.002	>2	<0.01	0.007	<0.01	0.001	<0.02
04/15/78	0.2	<0.002	<0.005	>4	0.1	>4	0.03	0.02	>4	<0.02	0.01	<0.02	0.002	<0.04
05/15/78	0.4	<0.002	<0.005	4	0.07	>4	0.4	0.02	>4	<0.02	0.007	<0.02	<0.002	<0.04
07/15/78	>10	<0.005	<0.005	10	0.3	>10	0.9	0.01	>10	<0.05	0.05	0.1	0.02	0.4
10/15/78	2	<0.002	<0.004	>4	0.03	>4	0.04	0.008	>4	<0.02	0.008	<0.02	0.02	<0.04

WEST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	IRON MG/L	GERMANIUM MG/L	MERCURY MG/L	POTASSIUM MG/L	LITHIUM MG/L	MAGNESIUM MG/L	MANGANESE MG/L	MOLYBDENUM MG/L	SODIUM MG/L	NIOBIUM MG/L	NICKEL MG/L	PHOSPHOROUS MG/L	LEAD MG/L	RUBIDIUM MG/L
11/15/78	>10	<0.006	<0.01	0.6	0.1	>10	0.6	0.02	>10	<0.06	0.06	6	0.05	<0.1
08/27/79	0.7	<0.002	<0.005	>40	<0.002	21	0.007	0.004	51	<0.02	0.01	0.07	0.007	<0.04
09/24/79	0.1	<0.002	<0.005	4	<0.002	24	0.04	0.004	57	<0.02	0.004	0.04	<0.0004	<0.04
10/15/79	0.9	<0.002	<0.005	2	0.1	27	0.2	0.005	59	<0.02	0.01	<0.02	0.005	<0.05
12/03/79	4	<0.002	<0.005	4	0.03	22	0.4	0.004	51	<0.02	0.01	<0.02	0.01	<0.04
12/17/79	1	<0.002	<0.005	2	0.04	19	0.4	0.004	35	<0.02	0.01	<0.02	0.003	<0.04
01/28/80	0.3	0.04	<0.005	1	0.04	22	0.4	0.001	41	<0.02	0.007	0.03	0.003	<0.04
02/25/80	1	<0.002	<0.005	3	0.03	18	0.3	0.003	35	<0.02	0.006	<0.02	0.001	<0.03
03/31/80	1	<0.001	<0.005	1	0.03	12	0.2	0.001	32	<0.01	0.01	0.01	0.002	<0.03
04/23/80	0.1	<0.0001	<0.005	0.1	0.002	17	0.02	0.0001	33	<0.001	0.0005	<0.001	0.0001	<0.002
05/27/80	3	<0.002	<0.005	2	0.05	25	1	0.001	34	<0.02	0.01	<0.02	<0.0005	<0.05
06/30/80	4	<0.003	<0.005	3	0.05	22	0.5	<0.0005	40	<0.03	0.005	<0.03	0.001	<0.05
07/28/80	3	<0.002	<0.005	1	0.1	20	0.4	0.002	37	<0.02	0.01	<0.02	0.004	<0.04
08/25/80	2	<0.002	<0.005	3	0.08	21	0.3	0.002	40	<0.02	0.004	<0.02	0.003	<0.04
10/27/80	>10	<0.006	<0.005	8	0.06	26	1	0.006	47	<0.06	0.02	<0.06	0.02	0.2
11/24/80	>5	<0.002	<0.005	3	0.09	21	0.5	0.004	35	<0.02	0.02	<0.02	0.009	<0.05
12/22/80	2	<0.003	<0.005	5	0.2	29	0.5	0.003	43	<0.03	0.02	<0.03	0.004	<0.05
01/26/81	0.9	<0.002	<0.005	3	0.09	26	0.1	0.002	57	<0.02	0.01	<0.02	0.001	<0.5
02/23/81	2	<0.003	<0.005	3	0.05	26	1	0.003	56	<0.03	0.05	<0.03	0.004	<0.05

WEST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	ANTIMONY MG/L	SILICON MG/L	TIN MG/L	STRONTIUM MG/L	TANTALUM MG/L	TELLURIUM MG/L	THORIUM MG/L	TITANIUM MG/L	THALLIUM MG/L	URANIUM MG/L	VANADIUM MG/L	TUNGSTEN MG/L	ZINC MG/L	ZIRCONIUM MG/L
12/15/75	<0.006	>6	<0.006	0.6	0.06	<0.06	<0.006	0.06	<0.003	<0.3	0.02	<0.3	0.06	0.006
01/15/76	<.006	>5.6	<.006	.6	<.006	<.06	.03	.2	<.6	<.3	.03	<0.3	.2	.03
03/15/76	<.005	>4.9	.05	1	<.005	<.05	<.005	.1	<.002	<.2	<.005	<.2	.1	<.005
04/15/76	<.004	4	<.004	.2	<.004	<.004	<.004	.004	<.002	<.2	<.0004	<.2	<.02	<.004
05/15/76	<.004	>3.6	<.004	.7	<.002	<.04	<.004	.4	<.004	<.2	<.004	.2	.1	.002
06/15/76	<.007	>7.2	<.007	.1	<.007	<.07	<.007	.007	.007	<.4	<.007	<.4	<.04	<.007
06/15/76														
07/05/76														
07/15/76	<.005	>4.6	<.005	.02	<.005	<.05	<.005	.09	<.002	<.2	.02	<.2	<.02	<.005
08/15/76	<.006	.5	<.006	.1	<.006	<.06	<.006	.006	<.003	<.3	<.006	<.3	<.03	<.006
08/15/76														
09/15/76	<.003	>2.7	<.003	.03	.01	<.03	<.003	.2	<.001	<.1	.03	<.1	.1	<.003
09/15/76	<.003	>2.7	<.003	.03	.01	<.03	<.003	.2	<.001	<.1	.03	<.1	.1	<.003
10/15/76	<.003	>3.4	<.003	.07	.01	<.03	<.003	0.7	<.002	<.2	.02	<.2	.2	.01
10/15/76														
11/15/76	<.02	>15.3	.08	<.02	<.02	<.2	<.02	3.1	<.008	<.8	.08	<.8	1.5	<.02
11/15/76														
12/15/76														
01/15/77	<0.007	7	<0.007	1	<0.007	<0.07	<0.007	0.3	<0.003	<0.3	<0.007	<0.3	0.03	<0.007
03/15/77	<0.007	>7	<0.007	1	<0.007	<0.07	<0.007	0.7	<0.003	<0.3	<0.007	<0.3	<0.03	<0.007
04/15/77	<0.003	>3	<0.003	0.3	<0.003	<0.03	<0.003	0.3	<0.001	0.1	0.01	<0.1	0.1	<0.003
06/15/77	<0.005	>5	<0.005	0.9	<0.005	<0.05	<0.005	0.01	<0.002	<0.2	0.05	<0.2	<0.02	<0.005
07/15/77	<0.002	>2	<0.002	0.02	<0.002	<0.02	<0.002	0.07	<0.001	<0.1	0.01	<0.1	0.1	0.002
08/15/77	<0.004	>4	0.004	1	<0.004	<0.04	<0.004	0.02	<0.002	<0.2	<0.004	<0.2	<0.02	0.004
09/15/77	<0.01	>10	<0.01	1	<0.01	<0.1	<0.01	0.6	<0.005	<0.5	0.05	<0.5	1	0.03
03/15/78	<0.002		<0.002	0.5	0.009	<0.02	<0.002	0.02	<0.001	<0.1	0.002	<0.1	0.02	0.002
04/15/78	<0.004	2	<0.004	0.4	<0.004	<0.04	<0.004	0.085	<0.002	>0.2	0.02	<0.2	0.04	0.004
05/15/78	<0.004	>4	<0.004	0.7	0.007	<0.04	<0.004	0.03	<0.002	<0.2	0.004	<0.2	0.007	<0.004
07/15/78	<0.01	>10	<0.01	0.2	<0.01	<0.1	<0.01	4	<0.005	<0.5	0.1	<0.5	<0.05	0.1
10/15/78	<0.004	>4	<0.004	0.4	<0.004	<0.04	<0.004	0.01	<0.002	<0.2	0.01	<0.2	0.08	0.004

WEST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	ANTIMONY MG/L	SILICON MG/L	TIN MG/L	STRONTIUM MG/L	TANTALUM MG/L	TELLURIUM MG/L	THORIUM MG/L	TITANIUM MG/L	THALLIUM MG/L	URANIUM MG/L	VANADIUM MG/L	TUNGSTEN MG/L	ZINC MG/L	ZIRCONIUM MG/L
11/15/78	<0.01	>10	<0.01	0.2	<0.01	<0.1	<0.01	6	<0.006	<0.6	0.1	<0.6	1	<0.06
08/27/79	<0.004	2	0.004	0.4	0.01	<0.04	<0.004	0.07	<0.002	<0.2	<0.004	<0.2	0.04	0.004
09/24/79	<0.004	0.4	<0.004	1	<0.004	<0.04	<0.004	0.008	<0.002	<0.2	<0.004	<0.2	<0.02	<0.004
10/15/79	<0.005	>5	<0.005	0.4	0.03	<0.05	<0.005	0.2	<0.002	<0.2	0.009	<0.2	0.09	0.009
12/03/79	0.004	>4	<0.004	0.3	0.02	<0.04	<0.004	0.2	<0.002	<0.2	0.01	<0.2	0.1	0.02
12/17/79	<0.004	>4	<0.004	0.4	0.004	<0.04	<0.004	0.07	<0.002	<0.2	0.007	<0.2	0.04	0.004
01/28/80	<0.004	>4	<0.004	0.4	0.004	<0.04	<0.004	0.02	<0.002	<0.2	0.004	<0.2	0.01	0.004
02/25/80	<0.003	>3	<0.003	0.3	0.006	<0.03	<0.003	0.06	<0.002	<0.2	<0.003	<0.2	0.03	0.006
03/31/80	<0.003	>3	<0.003	0.3	0.006	<0.03	0.003	0.06	0.001	<0.1	0.006	<0.1	0.03	0.01
04/29/80	<0.0002	>0.2	<0.0002	0.02	<0.0002	<0.002	<0.0002	0.002	<0.0001	<0.01	0.0002	<0.01	0.002	<0.0002
05/27/80	<0.0005	>5	<0.005	0.5	0.01	<0.05	0.005	0.05	0.002	<0.2	<0.005	<0.2	<0.02	0.01
06/30/80	<0.005	>5	<0.005	0.5	0.005	<0.05	<0.005	0.04	<0.003	<0.3	<0.005	<0.03	<0.03	0.005
07/28/80	<0.004	>4	<0.004	0.4	0.02	<0.04	<0.004	0.07	<0.002	<0.2	0.01	<0.2	0.1	0.01
08/25/80	<0.004	>4	<0.004	0.3	0.02	<0.04	<0.004	0.1	<0.002	<0.2	0.008	<0.2	0.03	0.003
10/27/80	0.01	>100	<0.01	0.1	0.2	<0.1	0.01	2	<0.006	<0.6	0.06	<0.6	1	0.1
11/24/80	<0.005	>5	<0.005	0.5	0.05	<0.05	<0.005	0.2	0.04	<0.2	0.02	<0.2	0.1	0.02
12/22/80	<0.005	>5	<0.005	1	<0.005	<0.05	<0.005	0.1	<0.003	<0.3	0.01	<0.3	<0.03	0.005
01/26/81	<0.005	3	<0.005	0.5	<0.005	<0.05	<0.005	0.05	<0.002	<0.2	<0.005	<0.2	0.04	<0.005
02/23/81	<0.005	4	<0.005	1	<0.005	<0.05	<0.005	0.1	<0.003	<0.3	0.005	<0.3	0.05	<0.005

EAST LANDFILL

EAST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	SILVER MG/L	ALUMINUM MG/L	ARSENIC MG/L	BORON MG/L	BARIUM MG/L	BERYLLIUM MG/L	BISMUTH MG/L	CALCIUM MG/L	CADMIUM MG/L	CERIUM MG/L	COBALT MG/L	CHROMIUM MG/L	CESIUM MG/L	COPPER MG/L
08/27/79	0.003	1	<0.03	0.3	0.1	0.2	<0.002	55	<0.01	<0.3	<0.002	<0.002	<0.03	0.03
09/24/79	0.0004	0.4	0.1	0.2	0.1	<0.0004	<0.002	30	<0.01	<0.4	<0.002	<0.002	<0.04	<0.002
10/15/79	0.001	0.3	<0.02	0.1	0.1	<0.0003	<0.002	47	<0.01	<0.3	<0.002	0.002	<0.03	<0.002
12/03/79	0.001	>4	<0.02	0.3	0.07	<0.0004	<0.002	49	<0.01	<0.4	<0.002	0.02	0.04	0.003
12/17/79	<0.0003	3	<0.02	0.3	0.07	<0.0003	<0.002	49	<0.01	<0.3	<0.002	0.002	0.03	0.003
01/28/80	<0.0003	3	<0.02	0.2	0.09	<0.0003	<0.002	51	<0.01	<0.3	0.002	0.009	<0.03	0.002
02/25/80	<0.0002	0.2	<0.01	0.1	0.05	<0.0002	<0.001	45	<0.01	<0.2	<0.001	0.001	<0.02	0.007
03/31/80	0.0007	0.2	<0.02	0.3	0.1	<0.0004	<0.002	38	<0.01	<0.4	0.002	0.002	0.04	0.007
04/28/80	<0.0001	0.03	<0.0007	0.004	0.004	<0.0001	<0.0001	47	<0.01	<0.01	0.0001	<0.0001	<0.001	0.0001
05/27/80	<0.0003	0.3	<0.02	0.2	0.1	<0.0003	<0.002	60	<0.01	<0.3	<0.002	<0.002	<0.03	0.003
06/30/80	0.0007	0.3	<0.02	0.2	0.1	<0.0003	<0.002	54	<0.01	<0.3	0.002	0.002	0.03	0.02
07/23/80	<0.0003	2	<0.01	0.3	0.06	<0.0003	<0.001	48	<0.01	<0.3	0.002	<0.001	<0.03	0.009
08/25/80	<0.001	10	<0.07	0.03	0.1	<0.001	<0.007	390	<0.01	<1	<0.007	0.01	0.1	0.01
10/27/80	0.0003	3	<0.02	0.3	0.07	<0.0003	<0.002	45	<0.01	<0.3	0.002	0.002	<0.03	0.01
11/24/80	<0.0003	1	<0.02	0.3	0.07	<0.0003	<0.002	45	<0.01	<0.3	0.002	0.002	0.03	<0.002
12/22/80	<0.0003	0.7	<0.02	0.7	0.2	<0.0003	<0.002	46	<0.01	<0.3	<0.002	<0.002	<0.03	0.01
01/26/81	<0.0003	0.2	<0.02	0.2	0.1	0.0003	0.002	42	<0.01	<0.3	0.002	<0.002	<0.03	<0.002
02/23/81	0.007	0.4	<0.02	0.1	0.1	<0.0004	<0.002	40	<0.01	<0.4	<0.002	<0.002	<0.04	0.007
04/27/81	<0.0004	0.1	<0.02	0.1	0.07	<0.0004	<0.002	44	<0.01	<0.4	<0.002	<0.002	0.04	0.03
05/26/81	<0.0001	0.01	<0.002	0.03	0.01	<0.0001	<0.0002	37	<0.01	<0.03	0.0002	<0.0002	<0.003	0.002
06/29/81	<0.0003	0.09	<0.02	0.6	0.1	<0.0003	<0.002	31	<0.01	<0.3	<0.002	0.006	<0.03	0.02
07/27/81	0.0003	0.06	<0.01	0.08	0.06	<0.0003	<0.001	25	<0.01	<0.3	<0.001	<0.001	<0.03	0.006
08/31/81	<0.0003	0.06	<0.01	0.06	0.06	<0.0003	<0.001	25	<0.01	<0.3	<0.001	<0.001	<0.03	0.006
09/28/81	<0.0003	0.3	<0.01	0.2	0.06	<0.0003	<0.001	20	<0.01	<0.3	<0.001	0.001	<0.02	0.09
10/26/81	<0.0003	0.3	<0.02	0.3	0.1	<0.0003	<0.002	37	<0.01	<0.3	<0.002	<0.002	<0.03	0.007
11/30/81	0.002	0.2	<0.02	0.2	0.1	0.004	<0.02	35	<0.01	<0.4	<0.002	0.02	<0.04	<0.002
01/04/82	0.0001	0.04	<0.002	0.02	0.02	<0.0001	<0.0002	36	<0.01	<0.04	<0.0002	<0.0002	0.004	0.0004
01/25/82	<0.0003	0.3	<0.01	0.03	0.02	<0.0003	<0.001	32	<0.01	<0.3	<0.001	<0.001	<0.03	0.006
07/26/82	<0.0003	0.1	<0.02	0.2	0.03	<0.01	<0.002	23	<0.01	<0.3	<0.002	0.003	<0.03	0.02
10/04/82	<0.0005	0.1	<0.02	0.5	0.09	<0.05	<0.002	>50	<0.01	<0.5	<0.002	<0.002	<0.05	0.004

EAST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	SILVER MG/L	ALUMINUM MG/L	ARSENIC MG/L	BORON MG/L	BARIUM MG/L	BERYLLIUM MG/L	BISMUTH MG/L	CALCIUM MG/L	CADMIUM MG/L	CERIUM MG/L	COBALT MG/L	CHROMIUM MG/L	CESIUM MG/L	COPPER MG/L
12/06/82	0.0007	0.5	(0.01	0.2	0.1	(0.05	(0.001	34	(0.01	(0.2	(0.001	0.001	(0.02	0.01
01/04/83	0.0004	0.08	(0.02	0.2	0.08	(0.05	(0.002	42	(0.01	(0.4	(0.002	(0.002	(0.04	0.002
02/07/83	0.0007	0.1	(0.02	0.2	0.04	(0.01	(0.002	44	(0.01	(0.4	(0.002	(0.002	(0.04	(0.002
03/07/83	(0.0004	1	(0.02	0.1	0.1	(0.01	(0.002	68	(0.01	(0.4	(0.002	0.002	0.04	0.007
04/06/83	(0.0003	0.7	(0.02	0.1	0.07	(0.01	(0.002	59	(0.01	(0.3	(0.002	(0.002	(0.03	0.01
10/17/83	0.0006	0.3	(0.02	0.2	0.1	(0.05	(0.002	40	(0.01	(0.3	(0.002	0.003	(0.03	0.002
11/10/83	(0.0003	1	(0.02	0.2	0.1	(0.01	(0.002	52	(0.01	(0.3	(0.002	(0.002	(0.03	(0.007
03/20/84	(.004	.18	(.018	.35	.11	(.05	(.0018	45.0	(.01		(.0013	(.0013	.035	.0018
04/24/84	.0003	.34	(.017	.2	.13	(.05	(.0017	40.0	(.01		(.0017	.0027	(.034	.0034
05/29/84	(.0004	.15	(.018	.73	.11	(.05	(.0018	43.0	(.01	(.37	(.0018	.0026	(.037	.015
06/25/84	(.0004	.15	(.019	.37	.15	(.0004	(.0019	46.0	(.01	(.37	(.0019	.0074	(.037	.011
07/24/84	.0007	1.4	(.018	.21	.07	(.05	(.0018	29.0	(.01	(.35	(.0018	(.0018	(.035	.0021
08/27/84	(.003	.68	.017	.65	.068	(.05	(.0017	31.0	(.01	(.34	(.0017	.0017	(.034	(.0017
10/22/84	.0012	.12	(.02	.23	.078	(.0004	(.002	2.6	(.01	(.39	(.002	(.002	.039	.0078
12/10/84	.0007	1.8	(.018	.29	.11	(.05	(.0018	46.0	(.01	(.36	.0018	.0029	.036	.0073
02/11/85	.0004	.35	(.021	.43	.085	(.05	(.0021	48.0	(.01	(.43	(.0021	(.0021	.043	.013
03/25/85	.0027	.09	(.023	.23	.045	(.05	(.0023	61	(.01	(.45	(.0023	.0023	(.045	.0045
04/22/85	.0009	.23	(.023	.46	.093	(.05	(.0023	58.0	(.01	(.46	(.0023	(.0023	(.046	.0093
05/28/85	.0014	.45	(.023	.9	.045	(.05	(.0023	53.0	(.01	(.45	(.0023	(.0023	(.045	.009
06/24/85	(.0005	.19	(.024	.34	.097	(.05	(.0024	50.0	(.01	(.49	(.0024	(.0024	(.049	(.0024
11/22/85	(.0005	2.1	(.01	.52	(1.0	(.05	(.0026	38.0	(.01	(.52	(.0026	(.05	(.052	(.0026
02/24/86	(.0005	1.1	(.01	.53	(1.0	(.05	(.0026	61.0	(.01	(.53	(.0026	(.05	(.053	(.0026
03/10/86	(.0005	.11	(.01	.53	(1.0	(.05	(.0027	29.0	(.01	(.53	(.0027	(.05	(.053	(.0027
04/16/86	.026	.26	(.01	.26	(1.0	(.05	(.0026	71.0	(.01	(.51	(.0026	(.05	(.051	.1
05/12/86	(.005	.48	(.01	.42	(1.0	(.05	(.0026	61.0	(.01	(.53	(.0026	(.05	(.053	(.0026
07/14/86	(.0006	.11	(.01	.44	(1.0	(.05	(.0028	110.0	(.01	(.55	(.0028	(.05	(.055	(.0028

EAST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	IRON MG/L	GERMANIUM MG/L	MERCURY MG/L	POTASSIUM MG/L	LITHIUM MG/L	MAGNESIUM MG/L	MANGANESE MG/L	MOLYBDENUM MG/L	SODIUM MG/L	NIOBIUM MG/L	NICKEL MG/L	PHOSPHOROUS MG/L	LEAD MG/L	RUBIDIUM MG/L
05/27/79	0.6	<0.002	<0.005	>30	<0.002	17	0.1	0.002	47	<0.02	0.01	0.06	0.006	<0.03
09/24/79	0.1	0.002	0.005			16	0.04	0.01	52	<0.02	0.004	0.04	<0.0004	<0.04
10/15/79	0.1	<0.002	<0.005	>3	0.1	20	0.1	0.002	44	<0.02	0.007	<0.02	0.001	<0.03
12/03/79	2	<0.002	<0.005	3	0.07	19	0.1	0.004	53	<0.02	0.04	<0.02	0.01	<0.04
12/17/79	0.7	<0.002	<0.005	3	0.1	20	0.07	0.003	44	<0.02	0.01	<0.02	0.003	<0.03
01/28/80	0.9	<0.002	<0.005	3	0.06	20	0.1	0.002	44	<0.02	0.02	0.02	0.002	<0.03
02/25/80	0.2	<0.001	<0.005	2	0.05	14	0.2	0.005	36	<0.01	0.007	<0.01	0.0007	<0.02
03/31/80	0.2	<0.002	<0.005	2	0.1	13	0.1	0.002	32	<0.02	0.007	0.02	0.001	<0.04
04/26/80	0.01	<0.0001	<0.005	0.1	0.004	17	0.004	0.0001	35	<0.0007	0.0003	0.001	0.0001	<0.001
05/27/30	0.2	<0.002	<0.005	3	0.07	18	0.2	0.002	34	<0.02	0.007	<0.02	<0.0003	<0.03
06/30/80	2	<0.002	<0.005	>3	0.1	16	0.1	0.002	43	<0.02	0.007	<0.02	0.003	<0.03
07/28/80	0.3	<0.001	<0.005	3	0.1	17	0.09	0.001	44	<0.01	0.006	<0.01	0.001	<0.03
08/25/80	7	<0.007	<0.005	10	0.08	42	0.4	0.001	53	<0.07	0.01	<0.07	0.01	0.1
10/27/80	3	<0.002	<0.005	3	0.2	21	0.1	0.002	54	<0.02	0.007	<0.02	0.001	<0.03
11/24/80	0.3	<0.002	<0.005	>3	0.2	20	0.1	0.002	47	<0.02	0.01	<0.02	0.002	<0.03
12/22/80	0.2	<0.002	<0.005	>3	0.1	24	0.07	0.002	39	<0.02	0.007	<0.02	0.002	<0.03
01/26/81	0.07	<0.002	<0.005	3	0.1	19	0.07	0.001	53	<0.02	0.007	<0.02	0.0003	<0.03
02/23/81	0.1	<0.002	<0.005	>4	0.2	18	0.07	0.001	55	<0.02	0.007	<0.02	0.004	<0.04
04/27/81	0.04	<0.002	<0.005	4	0.07	22	0.1	0.001	61	<0.02	0.007	<0.02	0.0004	<0.04
05/26/81	0.003	<0.0002	<0.005	>0.3	0.02	20	0.007	0.0002	48	<0.002	0.001	<0.002	<0.0001	<0.003
06/29/81	0.09	<0.002	<0.005	3	0.2	17	0.1	0.02	52	<0.02	0.02	<0.02	<0.0003	<0.03
07/27/81	0.06	<0.001	<0.005	2	0.1	11	0.08	0.002	48	<0.01	0.008	<0.01	0.001	<0.03
08/31/81	0.05	<0.001	<0.005	>3	0.1	12	0.06	0.002	46	<0.01	0.008	<0.01	0.008	<0.03
09/28/81	0.3	<0.001	<0.005	>3	0.1	13	0.06	0.001	62	<0.01	0.009	<0.01	0.001	<0.03
10/26/81	0.3	<0.002	<0.005	2	0.1	19	0.03	0.002	63	<0.02	0.01	<0.02	0.001	<0.03
11/30/81	0.2	<0.002	<0.005	>4	0.1	17	0.03	<0.0004	47	<0.02	0.02	<0.02	<0.0004	<0.04
01/04/82	0.04	<0.0002	<0.005	0.1	0.005	17	0.004	0.0003	39	<0.002	0.001	<0.002	0.0002	<0.004
01/25/82	0.08	<0.001	<0.005	1	0.06	15	0.1	0.002	47	<0.01	0.003	<0.01	0.001	<0.03
07/26/82	0.03	<0.002	<0.005	>3	0.3	19	0.02	0.006	57	<0.02	0.006	<0.02	0.0006	<0.03
10/04/82	0.09	<0.002	<0.005	1	0.9	13	0.05	0.005	59	<0.02	0.009	<0.02	0.0009	<0.05

EAST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	IRON MG/L	GERMANIUM MG/L	MERCURY MG/L	POTASSIUM MG/L	LITHIUM MG/L	MAGNESIUM MG/L	MANGANESE MG/L	MOLYBDENUM MG/L	SODIUM MG/L	NIOBIUM MG/L	NICKEL MG/L	PHOSPHOROUS MG/L	LEAD MG/L	RUBIDIUM MG/L
12/06/82	0.1	<0.001	<0.002	4.0	0.2	13	0.05	0.002	42	<0.01	0.01	<0.01	0.001	<0.02
01/04/83	0.04	<0.002	<0.002	6.6	0.2	17	0.08	0.003	56	<0.02	0.008	<0.02	<0.0004	<0.04
02/07/83	0.03	<0.002	<0.002	>4	0.7	16	0.03	0.004	49	<0.02	0.004	<0.02	<0.0004	<0.04
03/07/83	0.4	<0.002	<0.002	>4	0.1	17	0.1	0.003	69	<0.02	0.007	<0.02	0.003	<0.04
04/06/83	0.3	<0.002	<0.002	>3	0.2	19	0.1	0.002	46	<0.02	0.007	<0.02	0.003	<0.03
10/17/83	0.1	<0.002	<0.002	>3	0.2	15	0.06	0.001	35	<0.02	0.006	<0.02	<0.0003	<0.03
11/10/83	0.7	<0.002	<0.002	>3	0.1	14	0.03	0.001	33	<0.02	0.007	<0.02	0.0007	<0.03
03/20/84	.071	<.0018	<.002			15.0	.071	.0011	35.0	<.018	.0035	<.013	<.0004	
04/24/84	.24	<.0017	<.002			10.0	.1	.0027	25.0	<.017	.013	<.017	.001	
05/29/84	.15	<.0013	<.002	>3.7	.11	17.0	.037	.0026	36.0	<.018	.011	<.018	.0011	<.037
06/25/84	.15	<.0019	<.002	>3.7	.19	18.0	.037	.003	42.0	<.019	.019	<.019	<.0004	<.037
07/24/84	.35	<.0013	<.002	2.5	.14	17.0	.035	.0025	58.0	<.018	.014	<.018	.0004	<.035
08/27/84	.14	<.0017	<.002	>3.4	.14	19.0	.031	.0034	60.0	<.017	.01	<.017	<.0003	<.034
10/22/84	.039	<.002	<.002	3.9	.12	19.0	.12	.0031	51.0	<.02	.012	<.02	.0004	<.039
12/10/84	.73	<.0018	<.002	1.1	.073	21.0	.036	.0018	57.0	<.018	.011	<.018	.0022	<.036
02/11/85	.3	<.0021	<.002	1.7	.03	25.0	.38	.021	62.0	<.021	.0085	<.021	.0026	<.043
03/25/85	.23	<.0023	<.002	3.6	.32	29.0	.36	.0014	72.0	<.023	.009	<.023	<.0005	<.045
04/22/85	.093	<.0023	<.002	1.4	.037	29.0	.14	.0019	72.0	<.023	.014	<.023	<.0005	<.046
05/28/85	.18	<.0023	<.002	>4.5	.18	31.0	.045	.0015	82.0	<.023	.0045	<.023	.0009	<.045
06/24/85	.097	<.0024	<.002	2.4	.34	31.0	.24	.0034	77.0	<.024	.015	<.024	<.0005	<.049
11/22/85	.52	<.0026	<.002	6.2	.26	35.0	.15	.0026	100.0	<.026	.015	<.026	.001	<.052
02/24/86	1.1	<.0026	<.002	8.1	.37	43.0	.11	.0053	110.0	<.026	.042	<.026	<.0005	.053
03/10/86	.11	<.0027	<.002	7.2	.32	35.0	.037	.0016	92.0	<.027	.011	<.027	<.0005	<.053
04/16/86	.1	<.0026	<.002	6.0	.26	31.0	.046	.015	78.0	<.026	.015	<.026	.0015	<.051
05/12/86	.21	<.0026	<.002	6.9	.27	34.0	.026	.0053	81.0	<.026	.0053	<.026	<.0005	<.053
07/14/86	.055	<.0028	<.002	5.9	.55	32.0	.022	.0044	54.0	<.028	.0055	<.028	<.0006	<.055

EAST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	ANTIMONY MG/L	SILICON MG/L	TIN MG/L	STRONTIUM MG/L	TANTALUM MG/L	TELLURIUM MG/L	THORIUM MG/L	TITANIUM MG/L	THALLIUM MG/L	URANIUM MG/L	VANADIUM MG/L	TUNGSTEN MG/L	ZINC MG/L	ZIRCONIUM MG/L
08/27/79	<0.003	>3	0.003	0.2	0.01	<0.03	<0.003	0.1	<0.002	<0.2	<0.003	<0.2	0.1	0.003
09/24/79	<0.004	0.7	<0.004	1	<0.004	<0.04	<0.004	0.007	<0.002	<0.2	<0.004		<0.02	<0.004
10/15/79	<0.003	>3	<0.003	0.3	0.002	<0.03	<0.003	0.01	<0.002	<0.2	<0.003	<0.2	<0.02	<0.003
12/03/79	<0.004	>4	<0.004	0.4	0.01	<0.04	<0.004	0.1	<0.002	<0.2	<0.004	<0.2	0.07	0.004
12/17/79	<0.003	>3	<0.003	0.07	0.003	<0.03	<0.003	0.07	<0.002	<0.2	0.01	<0.2	0.03	0.003
01/28/80	<0.003	>3	<0.003	0.6	0.006	<0.03	<0.003	0.03	<0.002	<0.2	0.003	<0.2	0.03	0.006
02/25/80	<0.002	>2	<0.002	0.2	0.002	<0.02	<0.002	0.02	<0.001	<0.1	<0.002	<0.1	<0.01	0.002
03/31/80	<0.004	>4	<0.004	0.4	0.01	<0.04	0.004	0.01	<0.002	<0.2	<0.004	<0.2	<0.02	0.004
04/28/80	<0.0001	>0.1	<0.0001	0.01	0.0004	<0.001	<0.0001	0.001	<0.0001	<0.007	0.0003	<0.007	0.0009	0.0001
05/27/80	<0.003	>3	<0.003	0.3	0.007	<0.03	0.003	0.03	0.002	<0.2	<0.003	<0.2	<0.02	0.003
06/30/80	<0.003	>3	<0.003	0.3	0.007	<0.03	<0.003	0.02	<0.002	<0.2	<0.003	<0.2	<0.02	0.003
07/28/80	<0.003	>3	<0.003	0.3	0.006	<0.03	<0.003	0.03	<0.001	<0.1	0.003	<0.1	0.02	0.003
08/25/80	<0.01	>10	<0.01	0.1	0.07	<0.1	<0.01	0.6	<0.007	<0.7	0.03	<0.7	0.6	0.04
10/27/80	<0.003	30	<0.003	0.7	0.03	<0.03	0.003	0.07	<0.002	<0.2	0.007	<0.2	0.1	0.03
11/24/80	<0.003	>3	<0.003	0.3	0.01	<0.03	<0.003	0.03	0.03	<0.2	0.007	<0.2	0.03	0.007
12/22/80	<0.003	>3	<0.003	0.3	<0.003	<0.03	<0.003	0.03	<0.002	<0.2	<0.003	<0.2	0.03	<0.003
01/26/81	<0.003	1	<0.003	0.3	<0.003	<0.03	<0.003	0.01	<0.002	<0.2	<0.003	<0.2	0.01	<0.003
02/23/81	<0.004	20	<0.004	0.7	0.01	<0.04	<0.004	0.02	<0.002	<0.2	<0.004	<0.2	<0.02	<0.004
04/27/81	<0.004	0.2	<0.004	0.3	<0.004	<0.04	<0.004	0.004	<0.002	<0.2	<0.004	<0.2	<0.02	<0.004
05/26/81	<0.0003	0.2	<0.0003	0.07	<0.0003	<0.003	<0.0003	0.001	<0.0002	<0.02	<0.0003	<0.02	<0.002	<0.0003
06/29/81	<0.003	2	<0.003	0.3	<0.003	<0.03	<0.003	0.009	<0.002	<0.2	<0.003	<0.2	<0.02	<0.003
07/27/81	<0.003	0.8	<0.003	0.6	0.006	<0.03	<0.003	0.02	<0.001	<0.1	<0.003	<0.1	0.02	<0.003
08/31/81	<0.003	0.8	<0.003	0.6	<0.003	<0.03	<0.003	0.01	<0.001	<0.1	<0.003	<0.1	<0.01	<0.003
09/23/81	<0.003	>3	<0.003	0.3	0.009	<0.03	<0.003	0.06	<0.001	<0.1	0.003	<0.1	0.03	<0.003
10/26/81	<0.003	>3	<0.003	0.3	<0.003	<0.03	<0.003	0.03	<0.002	<0.2	0.003	<0.2	0.03	0.003
11/30/81	<0.004	0.6	<0.004	0.6	<0.004	<0.04	<0.004	0.02	<0.002	<0.2	<0.004	<0.2	<0.02	<0.004
01/04/82	<0.0004	0.2	<0.0004	0.04	<0.0004	<0.004	<0.0004	0.008	<0.0002	<0.02	0.0005	<0.02	0.004	<0.0004
01/25/82	<0.003	0.8	<0.003	0.3	<0.003	<0.03	<0.003	0.02	<0.001	<0.1	0.01	<0.1	<0.01	<0.003
07/26/82	<0.003	1	<0.003	0.6	<0.003	<0.03	<0.003	0.009	<0.002	<0.2	<0.003	<0.2	<0.02	<0.003
10/04/82	<0.005	3	<0.005	0.5	<0.005	<0.05	<0.005	0.02	<0.002	<0.2	<0.005	<0.2	<0.02	<0.005

EAST LANDFILL POND
METALS
HISTORICAL DATA

SAMPLE DATE	ANTIMONY MG/L	SILICON MG/L	TIN MG/L	STRONTIUM MG/L	TANTALUM MG/L	TELLURIUM MG/L	THORIUM MG/L	TITANIUM MG/L	THALLIUM MG/L	URANIUM MG/L	VANADIUM MG/L	TUNGSTEN MG/L	ZINC MG/L	ZIRCONIUM MG/L
12/06/82	<0.002	0.2	<0.002	0.2	<0.002	<0.02	<0.002	0.05	<0.001	<0.1	<0.002	<0.1	0.02	<0.002
01/04/83	<0.004	2	<0.004	0.4	<0.004	<0.04	<0.004	0.008	<0.002	<0.2	<0.004	<0.2	<0.02	<0.004
02/07/83	<0.004	3	<0.004	0.2	<0.004	<0.04	<0.004	0.007	<0.002	<0.2	<0.004	<0.2	<0.02	<0.004
03/07/83	<0.004	4	<0.004	0.1	<0.004	<0.04	<0.004	0.07	<0.002	<0.2	0.004	<0.2	0.07	0.004
04/06/83	<0.003	3	<0.003	0.3	<0.003	<0.03	<0.003	0.03	<0.002	<0.2	<0.003	<0.2	0.02	<0.003
10/17/83	<0.003	>3	<0.003	0.2	0.01	<0.03	<0.003	0.003	<0.002	<0.2	<0.003	<0.2	0.02	<0.003
11/10/83	<0.003	>3	<0.003	0.3	0.01	<0.03	<0.003	0.1	<0.002	<0.2	0.003	<0.2	0.07	0.01
03/20/84	<.0035	2.3	<.0035	.35	<.0035	<.035	<.0035	.021	<.0018		<.0035	<.18	<.018	<.0035
04/24/84	<.0034	2.4	<.0034	.34	<.0034	<.034	<.0034	.027	<.0017		<.0034	<.17	<.017	<.0034
05/29/84	<.0037	>3.7	<.0037	.29	<.0037	<.037	<.0037	.022	<.0013	<.18	.0037	<.18	<.018	<.0037
06/25/84	<.0037	>3.7	<.0037	.37	<.0037	<.037	<.0037	.011	<.0019	<.19	<.0037	<.19	<.019	<.0037
07/24/84	<.0035	>3.5	<.0035	.28	<.0035	<.035	<.0035	.035	<.0018	<.18	<.0035	<.18	.035	<.0035
08/27/84	<.0034	>3.4	<.0034	.68	<.0034	<.034	<.0034	.024	<.0017	<.17	<.0034	<.17	.024	<.0034
10/22/84	<.0039	>3.9	<.0039	.39	<.0039	<.039	<.0039	.016	<.002	<.2	<.0039	<.2	<.02	<.0039
12/10/84	<.0036	>3.6	<.0036	.25	<.0036	<.036	<.0036	.073	<.0018	<.18	<.0036	<.18	.073	.011
02/11/85	<.0043	>4.3	<.0043	.21	<.0043	<.043	<.0043	.038	<.0021	<.21	<.0043	<.21	.021	<.0043
03/25/85	<.0045	2.3	<.0045	.41	<.0045	<.045	<.0045	.009	<.0023	<.23	<.0045	<.23	<.023	<.0045
04/22/85	<.0046	>4.6	<.0046	.93	<.0046	<.046	<.0046	.0093	<.0023	<.23	<.0046	<.23	<.023	<.0046
05/28/85	<.0045	>4.5	<.0045	.45	.009	<.045	<.0045	.027	<.0023	<.23	<.0045	<.23	.023	<.0045
06/24/85	<.0049	3.9	<.0049	.24	<.0049	<.049	<.0049	.0049	<.0024	<.24	<.0049	<.24	<.024	<.0049
11/22/85	<.0052	3.2	<.0052	.41	.01	<.052	<.0052	.052	<.0026	<.26	.0052	<.26	.046	.0052
02/24/86	<.0053	2.7	<.0053	.32	<.0053	<.053	<.0053	.11	<.0026	<.26	.021	<.26	.053	<.0053
03/10/86	<.0053	2.1	<.0053	.21	.011	<.053	<.0053	.021	<.0027	<.27	<.0053	<.27	<.027	<.0053
04/16/86	<.0051	1.3	<.0051	.15	<.0051	<.051	<.0051	.021	<.0026	<.26	<.0051	<.26	<.026	<.0051
05/12/86	<.0053	1.4	<.0053	.11	.0053	<.053	<.0053	.021	<.0026	<.26	<.0053	<.26	<.026	<.0053
07/14/86	<.0055	2.6	<.0055	.11	<.0055	<.055	<.0055	.011	<.0028	<.28	<.0055	<.28	<.028	<.0055

NARRATIVE
ROCKY FLATS HISTORICAL DATA BASE

The Rocky Flats Historical Database has been established using data obtained from Rockwell files and binders located at Rocky Flats. It includes data on landfill sites and solar ponds and covers the period from 1974 to 1986. To prepare for the possibility of combining this historical data with current data, the ADMS database structure has been used.

Key elements to the reports generated from this database include sample dates, reporting units, and analyte values. These are discussed in the following paragraphs.

SAMPLE DATES

When available, exact sample dates provided on analytical reports have been used. Monthly grab samples for which only a month and year were indicated have been assigned a date of the 15th or 16th of the month. In situations where sample dates were not provided on analytical reports but dates could be approximated from report dates and report batch numbers, the approximate date was used. Data for which sample dates could not be approximated have not been included.

UNITS

With the exception of specific conductivity which has been reported in umhos/cm, analytical values have been reported in milligrams per liter (MG/L;PPM). Reporting units on phenols and pcb's are questionable and values included in the historical appendices for those substances should not be used for evaluation purposes

until those have been verified and corrected. In many cases, an attempt was made to convert phenol/pcb values to micrograms per liter (UG/L;ppb).

ANALYTE VALUES

Values for analytical data reported in scientific notation have been converted to standard notation. With the exception of the phenol/pcb values mentioned in the paragraph on units, all other values have been entered as they appeared on Rockwell analytical reports. No attempt has been made to adjust values for signficant figures, etc.

This appendix contains historical analytical data for the Present Landfill area. The enclosed data are presented in the following order:

Appendix D-1:	Metals	
		West Landfill
		East Landfill
Appendix D-2:	Radiochemistry	
		West Landfill
		East Landfill
		North Landfill Bypass
		South Landfill Bypass
Appendix D-3:	Inorganics	
		West Landfill
		East Landfill
		North Landfill Bypass
		South Landfill Bypass

APPENDIX D-2

RADIOCHEMISTRY

WEST LANDFILL

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
01/28/74	19											
01/29/74	8											
01/30/74	15											
01/31/74	14											
02/01/74	8											
02/02/74	7											
02/03/74	<5											
02/04/74	3											
02/05/74	13											
02/06/74	12											
02/07/74	13											
02/08/74	11											
02/09/74	14											
02/10/74	5											
02/11/74	12											
02/12/74	<5											
02/13/74	18											
02/14/74	12											
02/15/74	9											
02/16/74	14											
02/17/74	64											
02/25/74	17											
02/26/74	21											
02/27/74	25											
02/28/74	25											
03/01/74	11											
03/02/74	11											
03/03/74	13											
03/04/74	10											
03/05/74	<5											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
03/06/74	13											
03/07/74	12											
03/08/74	45											
03/09/74	22											
03/10/74	10											
03/11/74	25											
03/12/74	19											
03/13/74	22											
03/14/74	15											
03/15/74	24											
03/16/74	17											
03/17/74	13				6949				0.3			
03/18/74	24				8717				0.2			
03/19/74	25				7445				(MDA			
03/20/74	26				8218				(MDA			
03/21/74	15				3305				1.2			
03/22/74	6				7660				0.5			
03/23/74	14				3161				0.3			
03/24/74	(5											
03/25/74	15											
03/26/74	24											
03/27/74	9											
03/28/74	17											
03/29/74	9											
03/30/74	13											
03/31/74	26											
04/01/74	7											
04/02/74	9											
04/03/74	34											
04/04/74	20											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
04/05/74	13											
04/06/74	14											
04/07/74	34											
04/08/74	25											
04/09/74	34											
04/10/74	17											
04/11/74	33											
04/12/74	27											
04/15/74	16											
04/16/74	18											
04/17/74	6											
04/18/74	18											
04/19/74	17											
04/20/74	17											
04/21/74	11											
04/22/74	38											
04/23/74	40											
04/24/74	17											
04/25/74	32											
04/26/74	30											
04/27/74	30											
04/28/74	25											
04/29/74	45											
04/30/74	5											
05/01/74	14											
05/02/74	23											
05/03/74	7											
05/04/74	16											
05/05/74	17											
05/06/74	5											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
05/07/74	16											
05/08/74	25											
05/09/74	9											
05/10/74	20											
05/11/74	27											
05/12/74	19											
05/13/74	27											
05/14/74	11											
05/15/74	15											
05/16/74	22											
05/17/74	24											
05/18/74	24											
05/19/74	3											
05/20/74	22											
05/21/74	9											
05/22/74	22											
05/23/74	31											
05/24/74	12											
05/25/74	17											
05/26/74	18				6431	1123			<MDA			
05/27/74	12				8545	1105			<MDA			
05/28/74	11				3362	1103			<MDA			
05/29/74	<5				9894	1366			<MDA			
05/30/74	12				7779	714			<MDA			
05/31/74	12				8083	430			<MDA			
06/01/74	9				12378	1302			3.3	0.5		
06/02/74	27				34250	1966			1.1	0.3		
06/03/74	40				3737	1083			<MDA			
06/04/74	<5				7976	743			<MDA			
06/05/74	5				6245	682			0.3	0.3		

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
06/06/74	6				5004	616			(MDA			
06/07/74	11				4616	226			3.0	0.3		
06/08/74	(5				3994	593			0.6	0.3		
06/09/74	17				1613	687			0.1	0.2		
06/10/74	10				1120	672			0.1	0.2		
06/11/74	9				1412	370			0.5	0.4		
06/12/74	8				1176	686			(MDA			
06/13/74	(5				2115	568			(MDA			
06/14/74	17				3957	889			(MDA			
06/15/74	22				3739	365			0.6	0.3		
06/16/74	14				4374	958			(MDA			
06/17/74	20				3863	916			(MDA			
06/18/74	12				4413	923			(MDA			
06/19/74	23				5650	974			0.4	0.3		
06/20/74	23				5651	760			1.7	0.2		
06/21/74	9				4989	404			1.7	0.3		
06/22/74	19				6709	772			1.3	0.3		
06/23/74	39				5857	752			1.3	0.3		
06/24/74	26				5063	723			1.2	0.3		
06/25/74	23				5874	1025			1.3	0.3		
06/26/74	18				5796	1016			1.4	0.3		
06/27/74	17				5970	732			1.7	0.2		
06/28/74	19				4301	537			2.1	0.3		
06/29/74	6				5435	982			2.8	0.3		
06/30/74	6				5217	943			1.9	0.4		
07/01/74	(5				5493	960	5.7		1.2	0.3		
07/02/74	17				5873	976			1.5	0.2		
07/03/74	29				4167	511			0.8	0.4		
07/04/74	45				5291	404			0.7	0.4		
07/05/74	15				5151	404			0.9	0.4		

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
07/06/74	9				3301	881						
07/07/74	26				4727	947			1.0	0.4		
07/08/74	10				4697	946	5.1		0.7	0.3		
07/09/74	21				4979	654			1.2	0.3		
07/10/74	75				5211	661			1.0	0.3		
07/11/74	9				4862	698			1.2	0.2		
07/12/74	24				9125	381			1.2	0.3		
07/13/74	27				3673	882			5.6	0.6		
07/14/74	14				4842	925			1.0	0.4		
07/15/74	15				5396	971	6.9		0.9	0.3		
07/16/74	20				3714	842			1.1	0.3		
07/17/74	60				5373	924			0.9	0.3		
07/18/74	66				4226	854			1.1	0.2		
07/19/74	9				5302	335			0.9	0.3		
07/20/74	19				4811	682			106.8	1.5		
07/21/74	16				4371	630			0.8	0.4		
07/22/74	2				5037	668	5.7		0.6	0.3		
07/23/74	6				4575	647			1.0	0.2		
07/24/74	14				5400	857			0.7	0.3		
07/25/74	9				4505	849			0.6	0.1		
07/26/74	15				4650	365			1.3	0.3		
07/27/74	7				4749	880			1.5	0.3		
07/28/74	5				4281	570			1.2	0.4		
07/29/74	14				3807	790	6		0.9	0.2		
07/30/74	16				3972	604			0.7	0.4		
07/31/74	60				3341	351			1.3	0.3		
08/02/74	12				3985	372			1.0	0.3		
08/03/74	10				3773	682			1.3	0.3		
08/04/74	7				3328	824			1.1	0.4		
08/05/74	13				3749	942	7		0.7	0.2		

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALFHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
08/06/74	14				3760	619			0.9	0.2		
08/07/74	47				2989	926			0.9	0.3		
08/08/74	9				4193	621			0.7	0.2		
08/09/74	7				4129	377			0.7	0.3		
08/10/74	9				4387	621			0.7	0.3		
08/11/74	59				3616	204			0.8	0.4		
08/12/74	14				4386	860	10		0.9	0.3		
08/13/74	21				3210	830			0.3	0.3		
08/14/74	10				4230	631			1.3	0.3		
08/15/74	11				4679	638			0.8	0.1		
08/16/74	8				2246	422			0.8	0.3		
08/17/74	7				4990	106			1.3	0.4		
08/18/74	<5				2876				0.6	0.4		
08/19/74	27				3388		11		1.0	0.2		
08/20/74	<5				3203				<MDA			
08/21/74	9				3400				1.1			
08/22/74	10				4000				<MDA			
08/23/74	37								2.0			
08/24/74	18								1.1			
08/25/74	15								1.54			
08/26/74	5						11		1.68			
08/27/74	15				3000				1.2	0.3		
08/28/74	9				4804	701			1.0	0.3		
08/29/74	23				5325	678			1.4	0.1		
08/30/74	12				3763	361			1.6	0.3		
08/31/74	15								1.7	0.4		
09/01/74	28				4280	847						
09/01/74	5				4450	907			0.9	0.4		
09/02/74	19				4781	899	8.9		1.2	0.4		
09/03/74	10				4629	391			0.7	0.3		

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
09/04/74	22				11935	1051			0.9	0.3		
09/05/74	20				4207	1560			1.9	0.2		
09/06/74	12				5626	1784			0.5	0.3		
09/07/74	14				3844	1830			1.0	0.3		
09/08/74	5				(/=1732)MDA)				1.3	0.4		
09/09/74	9				3728	1824	9		0.9	0.3		
09/10/74	7				5260	682			1.4	0.3		
09/11/74	15				4917	641			0.8	0.3		
09/12/74	35				5876	650			0.8	0.1		
09/13/74	23				5900	372			1.3	0.3		
09/14/74	26				5405	873			0.9	0.4		
09/15/74	26				4545	848			1.3	0.4		
09/16/74	34				4907	875	13		1.1	0.3		
09/17/74	40				5846	374			0.9	0.2		
09/18/74	75				4967	652			1.4	0.3		
09/19/74	18				4411	349			0.9	0.2		
09/20/74	24				5356	459			1.9	0.3		
09/21/74	3				5435	913			0.9	0.4		
09/22/74	26				5513	895			1.8	0.5		
09/23/74	40				4601	890	12		0.9	0.2		
09/24/74	71				4333	1746			0.6	0.3		
09/25/74	31				6110	1745			1.4	0.4		
09/26/74	28				7545	1744			0.8	0.2		
09/27/74	23				5230	477			1.2	0.3		
09/28/74	19				(/=1723)MDA)				0.9	0.3		
09/29/74	25				4146	1694			0.9	0.3		
09/30/74	28				4706	1699	12		0.6	0.4		
10/01/74	22				5591	534			0.6	0.3		
10/02/74	28				5805	888			0.5	0.3		
10/03/74	16				5581	659			1.0	0.2		

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
10/04/74	60				5231	473			0.1	0.3		
10/07/74	28				5129	613	9		1.2	0.3		
10/08/74	28				5975	511			1.1	0.3		
10/09/74	46				5113	623			0.7	0.3		
10/10/74	18				6277	1012			1.3	0.2		
10/15/74	14				(/=340(MDA)		4		1.23			
10/16/74	32				1424	717			1.51			
10/17/74	31				2355	768			1.36			
10/18/74	16				2487	523			3.13			
10/21/74	15				2551	731	7		0.71			
10/22/74	25				2235	767			1.19			
10/23/74	10				1056	691			0.8	0.2		
10/24/74	19				2252	429			2.2	0.2		
10/25/74	26				2174	437			0.8	0.3		
10/28/74	45				2709	727			0.6	0.3		
10/29/74	16				2057	561			0.9	0.3		
10/30/74	74				2073	784			0.7	0.3		
10/31/74	19				836	741			0.4	0.4		
11/01/74	31				2057	374			1.9	0.5		
11/04/74	11				837	451	8		0.8	0.3		
11/05/74	29				1596	712			0.5	0.3		
11/06/74	37				815	643			0.5	0.3		
11/07/74	16				1717	683			0.7	0.2		
11/08/74	6				1855	447			0.6	0.3		
11/11/74	5				1335	638	11		1.3	0.3		
11/12/74	12				1699	725			1.1	0.3		
11/13/74	6				1928	527			0.4	0.3		
11/14/74	62				1439	699			0.3	0.2		
11/15/74	19				1764	447			1.4	0.3		
11/18/74	24				1352	542	7		1.20			

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
11/19/74	14				2762	743			0.91			
11/20/74	52				2040	730			0.65			
11/21/74	7				2484	775			0.39			
11/22/74	13				2415	477			0.41			
11/25/74	25				1683	477	5		1.54			
11/26/74	20				2653	784			0.07			
11/27/74	<5				1727	327			0.82			
11/29/74	26				958	716			1.03			
12/03/74	13						<3					
12/04/74	24											
12/05/74	6											
12/06/74	<5											
12/09/74	32											
12/10/74	27											
12/11/74	21											
12/12/74	19											
12/13/74	32											
12/16/74	14											
12/17/74	11											
12/18/74	<5											
12/19/74	12											
12/20/74	62											
12/23/74	34											
12/24/74	34											
12/25/74	70											
12/27/74	50											
12/03/75							3					
12/15/75							<3					
12/22/75							3					
12/29/75	<5						<3					

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
12/30/75	<5											
12/31/75	<25											
01/02/76	<5						5					
01/05/76	15											
01/06/76	<5											
01/07/76	11											
01/08/76	10											
01/09/76	25											
01/12/76	3											
01/13/76	15											
01/14/76	11											
01/15/76	22											
01/16/76	10											
01/19/76	13						<3					
01/20/76	<5											
01/21/76	<5											
01/23/76	5						3					
01/26/76	23											
01/27/76	29											
01/28/76	15						3					
01/29/76	<5											
01/30/76	30											
02/02/76	12						<3					
02/03/76	15											
02/04/76	17											
02/05/76	7											
02/06/76	16											
02/09/76	14						<3					
02/10/76	16											
02/11/76	3											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
02/12/76	11											
02/13/76	6											
02/16/76	15						<3					
02/17/76	11											
02/18/76	7											
02/19/76	<5											
02/20/76	14											
02/22/76	9											
02/23/76	11						<3					
02/24/76	6											
02/25/76	8											
02/26/76	21											
02/27/76	<5											
03/01/76	37						3					
03/02/76	14											
03/03/76	38											
03/04/76	17											
03/05/76	18											
03/08/76	<5						5					
03/09/76	8											
03/10/76	<5											
03/11/76	12											
03/12/76	<5											
03/15/76	12						<3					
03/16/76	13											
03/17/76	19											
03/18/76	11											
03/19/76	10											
03/22/76							<3					
03/22/76	5											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
03/23/76	9											
03/24/76	7											
03/25/76	24											
03/26/76	13											
03/29/76							<3					
03/29/76	20											
03/30/76	9											
03/31/76	5											
04/01/76	11											
04/02/76	9											
04/05/76							<3					
04/05/76	<5											
04/06/76	19											
04/07/76	6											
04/08/76	7											
04/09/76	<5											
04/12/76	7						<3					
04/13/76	<5											
04/14/76	9											
04/15/76	5											
04/19/76	27						<3					
04/20/76	<5											
04/21/76	16											
04/22/76	<5											
04/23/76	<5											
04/26/76	20						<3					
04/27/76	15											
04/28/76	16											
04/29/76	7											
04/30/76	<5											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
05/03/76	12						4					
05/04/76	15											
05/05/76	<5											
05/06/76	13											
05/07/76	5											
05/10/76	19						<3					
05/11/76	<5											
05/12/76	9											
05/13/76	15											
05/14/76	<5											
05/17/76	<5						4					
05/18/76	6											
05/19/76	9											
05/20/76	<5											
05/21/76	<5											
05/24/76	12						3					
05/25/76	9											
05/26/76	6											
05/27/76	10											
05/28/76	7											
06/01/76	11						4					
06/02/76	<5											
06/03/76	<5											
06/04/76	<5											
06/07/76	9						3					
06/08/76	<5											
06/09/76	14											
06/10/76	<5											
06/11/76	9											
06/14/76	5											

WEST LANDFILL FUND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
06/14/76							5					
06/15/76	7											
06/16/76	13											
06/17/76	11											
06/18/76	7											
06/21/76	11											
06/21/76							5					
06/22/76	<5											
06/23/76	16											
06/24/76	20											
06/25/76	<5											
06/28/76	<5						4					
06/29/76	26											
06/30/76	10											
07/01/76	7											
07/02/76	14											
07/06/76	6						5					
07/07/76	5											
07/08/76	3											
07/09/76	<5											
07/12/76							5					
07/12/76	7											
07/13/76	13											
07/14/76	11											
07/15/76	6											
07/16/76	<5											
07/19/76	<5						3					
07/20/76	5											
07/21/76	19											
07/22/76	9											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALFHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
07/23/76	5											
07/26/76	<5						<3					
07/27/76	<5											
07/28/76	17											
07/29/76	7											
07/30/76	6											
08/02/76	6						<3					
08/03/76	7											
08/04/76	10											
08/05/76	13											
08/06/76	<5											
08/09/76	6						<3					
08/10/76	8											
08/11/76	19											
08/12/76	14											
08/13/76	13											
08/16/76	<5						<3					
08/17/76	5											
08/18/76	12											
08/19/76	17											
08/20/76	3											
08/23/76	1.3						9					
08/24/76	<5											
08/25/76	<5											
08/26/76	11											
08/27/76	6											
08/30/76	9											
08/30/76							3					
08/31/76	5											
09/01/76	11											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
09/02/76	11											
09/03/76	6											
09/07/76	8						<3					
09/08/76	15											
09/09/76	9											
09/10/76	<5											
09/13/76	11						4					
09/14/76	<5											
09/15/76	8											
09/16/76	19											
09/17/76	10											
09/20/76							<3					
09/20/76	24											
09/21/76	7											
09/22/76	13											
09/23/76	19											
09/24/76	5											
09/27/76	12						<3					
09/28/76	14											
09/29/76	5											
09/30/76	14											
10/01/76	15											
10/04/76	<5						<3					
10/05/76	11											
10/06/76	5											
10/07/76	7											
10/08/76	21											
10/11/76	9						<3					
10/12/76	<5											
10/13/76	15											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
10/14/76	9											
10/15/76	14											
10/18/76	17						<3					
10/19/76	12											
10/20/76	17											
10/21/76	11											
10/22/76	6											
10/25/76	20						<3					
10/26/76	16											
10/27/76	10											
10/28/76	12											
10/29/76	9											
11/01/76	7						<10					
11/02/76	19											
11/03/76	<5											
11/04/76	7											
11/05/76	7											
11/08/76	12											
11/09/76	<5											
11/10/76	15											
11/11/76	27											
11/12/76	<5											
11/15/76	9											
11/16/76	11											
11/17/76	9											
11/18/76	5											
11/19/76	10											
11/22/76	9											
11/23/76	10											
11/24/76	<5											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
11/29/76	23											
11/30/76	5											
12/01/76	11											
12/02/76	18											
12/03/76	5											
12/06/76	<5											
12/07/76	14											
12/08/76	11											
12/09/76	14											
12/10/76	<5											
12/13/76	8											
12/14/76	<5											
12/15/76	<5											
12/16/76	15											
12/17/76	<5											
12/20/76	11						<3					
12/21/76	17											
12/22/76	22											
12/23/76	<5						<3					
12/27/76	5						<3					
12/28/76	9											
12/29/76	12											
12/30/76	5						<3					
01/03/77	25						< 3					
01/04/77	29											
01/05/77	24											
01/06/77	28											
01/07/77	15						< 3					
01/10/77	15						<3					
01/11/77	<5											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
01/12/77	33											
01/13/77	19											
01/14/77	<5											
01/17/77	6						<3					
01/18/77	12											
01/19/77	23						<10					
01/20/77	<5											
01/21/77	<5											
01/24/77	15						<3					
01/25/77	5											
01/26/77	3											
01/27/77	35											
01/28/77	9						<3					
01/31/77	6						<3					
02/01/77	13											
02/02/77	35											
02/03/77	10											
02/04/77	23											
02/07/77	<5						<3					
02/08/77	<5											
02/09/77	28											
02/10/77	11											
02/11/77	<5						<3					
02/14/77							<3					
02/18/77							<3					
02/23/77	5						<3					
03/01/77	13						<3					
03/02/77	14											
03/03/77	11											
03/04/77	12											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
03/07/77	18						<3					
03/08/77	20											
03/09/77	26											
03/10/77	26											
03/11/77	14											
03/14/77	21						<3					
03/15/77	17											
03/16/77	13											
03/17/77	7											
03/18/77	11											
03/21/77	19						3					
03/22/77	20											
03/23/77	6											
03/24/77	27											
03/25/77	26											
03/28/77	<5						<3					
03/29/77	15											
03/30/77	17											
03/31/77	12											
04/01/77	17											
04/04/77	3						<3					
04/05/77	6											
04/06/77	31											
04/07/77	13											
04/11/77	17						<3					
04/12/77	16											
04/13/77	10											
04/14/77	12											
04/15/77	16											
04/13/77	32						<3					

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
04/19/77	18											
04/20/77	17											
04/21/77	14											
04/22/77	3											
04/25/77	23											
04/26/77	10											
04/27/77	15											
04/28/77	22											
04/29/77	23											
05/02/77	12						<3					
05/03/77	11											
05/04/77	7											
05/05/77	13											
05/06/77	20											
05/09/77	14						<3					
05/10/77	5											
05/11/77	16											
05/12/77	5											
05/13/77	21											
05/16/77	15						<3					
05/17/77	34											
05/18/77	3											
05/19/77	12											
05/20/77	7											
05/23/77	3						<3					
05/24/77	21											
05/25/77	14											
05/26/77	11											
05/27/77	3											
05/31/77	11						<3					

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
06/01/77	26											
06/02/77	13											
06/03/77	13											
06/06/77	<3						<3					
06/13/77	12						<3					
06/14/77	27											
06/15/77	10											
06/16/77	13											
06/17/77	15											
06/20/77	12						<3					
06/21/77	9											
06/22/77	<5											
06/23/77	16											
06/24/77	5											
06/27/77	9						<3					
06/28/77	33											
06/29/77	19											
06/30/77	13											
07/01/77	22											
07/05/77	15						<3					
07/06/77	39											
07/07/77	16											
07/08/77	17						<3					
07/11/77	15						<3					
07/12/77	3											
07/13/77	16											
07/14/77	3											
07/15/77	18											
07/18/77	18											
07/19/77	10											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
07/20/77	9											
07/21/77	18											
07/22/77	6											
07/25/77	15						<3					
07/26/77	9											
07/27/77	13											
07/28/77	13											
07/29/77	27											
08/01/77	34						<3					
08/02/77	30											
08/03/77	21											
08/04/77	22											
08/05/77	26											
08/08/77	15											
08/09/77	19											
08/10/77	22											
08/11/77	39											
08/12/77	24											
08/15/77	33						<3					
08/16/77	13											
08/17/77	20											
08/18/77	25											
08/19/77	17						<3					
08/22/77	17						<3					
08/23/77	16											
08/24/77	23											
08/25/77	20											
08/26/77	17											
08/29/77	31											
08/30/77	20											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
05/31/77	27											
09/01/77	15											
09/02/77	23											
09/06/77	24											
09/07/77	18											
09/08/77	36											
09/09/77	15											
09/12/77	35											
09/13/77	36											
09/14/77	15											
09/15/77	19											
09/16/77	21											
09/19/77	15											
09/20/77	39											
09/21/77	18											
09/22/77	34											
09/23/77	14											
09/26/77	48											
09/27/77	30											
09/28/77	50											
09/29/77	37											
09/30/77	43											
03/13/78	23						3.9					
03/14/78	19											
03/15/78	35											
03/16/78	22											
03/17/78	20											
03/20/78	24						12.4					
03/21/78	31											
03/22/78	29											

WEST LANDFILL FUND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
03/23/78	22											
03/27/78	13						5.2					
03/28/78	30											
03/29/78	25											
03/30/78	37											
03/31/78	43											
04/03/78	39						10.9					
04/04/78	20											
04/05/78	19											
04/06/78	19											
04/07/78	52											
04/10/78	32						<3					
04/11/78	18											
04/12/78	25											
04/13/78	16											
04/14/78	25											
04/17/78	24						5.1					
04/18/78	45											
04/19/78	31											
04/20/78	23											
04/21/78	33											
04/24/78	16						3.8					
04/25/78	21											
04/26/78	28											
04/27/78	26											
04/28/78	24											
05/01/78	18						<3					
05/02/78	17											
05/03/78	6											
05/04/78	20											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
05/05/78	23											
05/08/78	11						<3					
05/09/78	30											
05/10/78	11											
05/11/78	15											
05/12/78	21											
05/15/78	11						<3					
05/16/78	19											
05/17/78	8											
05/18/78	29											
05/19/78	6											
05/22/78	26						<3					
05/23/78	21											
05/24/78	10											
05/25/78	14											
05/26/78	14											
05/30/78	21						<3					
05/31/78	17											
06/01/78	26											
06/02/78	23											
06/05/78	12						<3					
06/06/78	30											
06/07/78	15											
06/08/78	<5											
06/09/78	21											
06/12/78	15						<3					
06/13/78	16											
06/14/78	12											
06/15/78	31											
06/16/78	27											

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
06/19/78	13											
07/17/78	7						<3					
07/20/78	29											
07/24/78	23						3.6					
07/31/78	14						<3					
08/03/78	22											
08/07/78	21						<3					
08/10/78	25											
10/26/78	17											
10/30/78	30						<3					
11/06/78	24											
11/09/78	36											
11/13/78	5											
11/20/78	14											
11/27/78	29						3.6					
11/30/78	24											
12/05/78	10											
03/26/79	22											
04/02/79	11											
04/09/79	11				1435	872					<16	
04/16/79	15				952	665					<11	
04/23/79	9				<MDA						<23	
04/30/79	14				850	802					<15	
05/07/79	16				1284	766					<10	
05/14/79	<5				830	709					<12	
05/21/79	37				757	611					<10	
05/28/79	13				<MDA						<16	
06/04/79	7				703	666					<20	
06/11/79	5				<MDA						<15	
06/18/79	11				<MDA						<19	

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
06/25/79	19				(MDA						(13	
07/02/79	38				322	633					(17	
07/09/79	38				(MDA						(22	
07/16/79	14				356	735					(18	
07/23/79	12				915	696					(12	
07/30/79	13				891	687					(20	
08/06/79	15						3.0					
08/13/79	9						(3					
08/20/79	15						4					
08/27/79	29						(3					
09/04/79	35				612	605	(3					
09/10/79	14				663	517	(3					
09/17/79					(/=510		(3					
09/24/79	23				326	485						
10/01/79	33						(3					
10/03/79	26						4					
10/15/79	16						(3.0					
10/15/79	15											
10/22/79	14						(3					
10/29/79							(3					
11/05/79	(5						(3					
11/12/79	10						(3					
11/19/79	38						(3					
12/03/79					(/=503		3					
12/10/79	43				(/=509		(3					
12/17/79	15				1463	423						
01/07/80	39				(/=641							
01/14/80	15				703	667						
01/21/80	26				(/=661							
01/28/80	24				583	524	(3					

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
02/04/80	24				671	601						
02/11/80	26				736	519						
02/18/80	31				642	519	3.0					
02/25/80	15	26			<=480		<3					
03/03/80	15	16			<=533		<3					
03/10/80	16	22			<=625		<3					
03/17/80	8	12			<=486		<3					
03/24/80	18	19			<=477		<3					
03/31/80	11	13			<=498		<3					
04/07/80	17	15			<=585							
04/14/80	16	15			<=548		<3					
04/21/80					946	546	<3					
04/28/80	8	9			<=520		<3					
05/05/80	0	10			<=547		<3					
05/12/80	11	14			<=505		<3					
05/19/80	10	20			<=519		<3					
05/27/80	26	23			996	523	<3					
06/02/80	15	16			<=553		<3					
06/09/80	31	20			<=551		<3					
06/16/80	12	14			699	528	<3					
06/23/80	6	12	17	39	<= 525		3.1					
06/30/80	17	16	17	39	<= 507		3.4					
07/07/80	10	12	37	31	636	560	<3					
07/14/80	6	11	13	32	<= 616		2.0					
07/21/80	26	16	10	34	< 466		<3					
07/28/80	4	14	3	11	643	431	<3					
08/04/80	12		24		629	536	2.1					
08/11/80	3	11	5	33	683	539	1.5					
08/18/80	8	13	19	35	<= 537		2.9					
08/25/80	14	22	3	76	<= 507		1.8					

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
09/02/80	11	13	43	38	<= 543		<3.0					
09/03/80	16	13	3	32	<= 474							
09/15/80	3	5	35	39	706	435						
09/22/80	23	17	40	41	<= 566		7.0					
09/29/80	27	20	8	33	<= 517							
10/06/80	8	18	26	49	698	563	3.8					
10/13/80	24	21	31	53	<= 496		<3.0					
10/20/80	11	17	53	41	<= 415							
10/27/80	36	23	38	36	569	561						
11/03/80	23	20	27	36	816	524						
11/10/80	39	21	41	38	<= 483							
11/17/80	29	17	13	43	<= 561		3.7					
11/24/80	26	23	16	32	619	588						
12/01/80	52	29	43	37	<= 551		3.4					
12/08/80	11	16	13	30	<=583		<3.0					
12/15/80	40	27	-2	31	<=535		3.4					
12/22/80	29	19	35	44	746	559	<3.0					
01/05/81	34	23	-20	36	<=527		3.0					
01/12/81	14	20	NR		702	557	<3.0					
01/19/81	13	15	NR		<= 578		<3.0					
01/26/81	38	22	-13	47	1100	600	7.5					
02/02/81	30	20	13	39	826	597	<3.0					
02/09/81	27	22	-4	34	<= 638		<3.0					
02/16/81	13	13	10	23	832	540						
02/23/81	35	23	3	31	<= 589		<3.0					
03/02/81	13	18	12	35	657	602	<3.0					
03/09/81	28	52	35	40	238	626	<3.0					
03/16/81	30	23	17	31	651	588	<3.0					
03/23/81	36	32	3	30	33	530	4.3					
03/30/81	30	21	15	32	139	561	<3.0					

WEST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
04/06/81	1	15	10	30	-481	534	3.0					
04/13/81	11	16	15	29	-112	488	<3.0					
04/20/81	7	12	27	32	364	537	<3.0					
04/27/81	3	14	29	33	1432	521						
05/04/81	8	20	0	31	1205	556	3.0					
05/11/81	-2	12	10	33	142	537	<3.0					

EAST LANDFILL

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
03/29/76	12											
04/05/76	<5											
04/12/76	<5											
04/19/76	5											
04/26/76	6											
05/03/76	20											
05/10/76	<5											
05/17/76	7											
05/24/76	15											
06/01/76	<5											
06/07/76	20											
06/13/76	8											
06/14/76	22											
06/21/76	3											
06/28/76	<5											
07/06/76	10											
07/12/76	<5											
07/19/76	17											
07/26/76	21											
08/02/76	<5											
08/09/76	<5											
08/16/76	15											
08/23/76	<5											
08/30/76	23											
09/07/76	24											
09/20/76	37											
09/27/76	27											
10/04/76	23											
10/11/76	18											
10/11/76	13											

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
10/25/76	6											
11/08/76	5											
11/15/76	11											
11/22/76	12											
11/29/76	7											
12/06/76	2											
12/13/76	<5											
12/27/76	<5											
01/03/77	<5											
01/10/77	11											
01/17/77	16											
02/07/77	31											
02/14/77	15											
02/21/77	14											
02/28/77	24											
03/07/77	16											
03/14/77	6											
03/30/77	<5											
04/04/77	14											
04/11/77	39											
04/18/77	21											
04/25/77	6											
05/03/77	32											
05/10/77	39											
05/16/77	20											
05/23/77	21											
05/31/77	15											
06/06/77	10											
06/13/77	31											
06/20/77	30											

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
06/27/77	15											
07/05/77	17											
07/11/77	10											
07/19/77	13											
07/25/77	25											
08/01/77	17											
08/08/77	<5											
08/15/77	<5											
08/22/77	8											
09/06/77	<5											
09/12/77	7											
09/19/77	15											
09/26/77	5											
10/03/77	23											
10/10/77	25											
10/17/77	11											
10/25/77	24											
10/31/77	12											
11/14/77	46											
11/21/77	3											
11/28/77	19											
12/05/77	24											
12/12/77	34											
12/19/77	22											
12/27/77	25											
01/04/78	17											
01/09/78	18											
01/16/78	17											
01/23/78	15											
01/30/78	<5											

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
02/13/78	12											
02/20/78	30											
02/27/78	23											
03/06/78	22											
03/13/78	30											
03/20/78	15											
03/27/78	16											
04/03/78	9											
04/10/78	35											
04/17/78	13											
04/24/78	15											
05/01/78	18											
05/08/78	17											
05/15/78	21											
05/22/78	11											
05/30/78	20											
06/05/78	21											
06/11/78	9											
06/19/78	23											
06/26/78	15											
07/03/78	33											
07/10/78	6											
07/24/78	23											
07/31/78	16											
08/07/78	7											
08/14/78	6											
08/21/78	6											
08/28/78	11											
09/05/78	14											
09/11/78	14											

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
09/18/78	<5											
09/25/78	11											
10/02/78	6											
10/09/78	17											
10/16/78	36											
10/23/78	28											
10/30/78	15											
11/06/78	22											
11/13/78	19											
11/20/78	21											
11/27/78	30											
12/04/78	5											
12/11/78	36											
12/18/78	13											
01/08/79	13											
01/15/79	13											
01/22/79	<5											
01/29/79	40											
02/05/79	<5											
02/12/79	13											
02/19/79	30											
02/26/79	16											
03/05/79	37				(/=609(MDA)							
03/12/79	20				1052	675						
03/19/79	38				1025	635						
03/26/79	<5				(/=641(MDA)							
03/29/79	11											
04/02/79	<5				1508	648						
04/09/79	11				1011	627						
04/16/79	<5				820	635						

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
04/23/79	13				731	707						
04/30/79	25				1546	785						
05/07/79	21				1307	739						
05/14/79	<5				<=683(MDA)							
05/21/79	<5				<=569(MDA)							
05/22/79	9				<=660(MDA)							
06/04/79	7				794	620						
06/11/79	<5				<=611(MDA)							
06/18/79	8				610	541						
06/25/79	20				1338	639						
07/02/79	15				<=626(MDA)							
07/09/79	<5				<=644(MDA)							
07/16/79	15				770	748						
07/23/79	7				738	709						
07/30/79	14				1155	688						
08/06/79	32						4.3					
08/13/79	7						4					
08/20/79	14						<3					
08/27/79	15						3.2					
09/04/79	21				<=622		3.0					
09/10/79	8				575	511	<3					
09/17/79	10				598	514						
09/17/79	16				<=463		5.5					
09/24/79	14											
10/01/79	12						<3					
10/08/79	24						<3					
10/15/79	14						5.5					
10/15/79	21											
10/22/79	<5						<3					
10/29/79							4.1					

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
11/05/79	6						3.2					
11/12/79	5						4.0					
11/19/79	5						5.6					
12/03/79					<=470		45					
12/10/79	<5				473	407	<3					
12/17/79	12				<=400							
01/07/80	11				<=622							
01/14/80	25				1181	738						
01/21/80	25				<=679							
01/28/80	40				560	515	3.6					
02/04/80	21											
02/11/80	13				<=690							
02/18/80	13				670	564	3.0					
02/24/80					915	594						
02/25/80	21	15			<=497		<3					
03/03/80	9	21			<=539		3.9					
03/10/80	0	10			<=623		6.9					
03/17/80	2	19			<=481		<3					
03/24/80	19	19			<=482		3.2					
03/31/80	26	21			<=497		<3					
04/07/80	24	19			<=743							
04/14/80	26	23			1362	571	3.6					
04/21/80					897	530	<3					
04/28/80	32	26			<=544		<3					
05/05/80	-8	12			670	557	<3					
05/12/80	17	20			<=490		4.0					
05/19/80	5	14			<=519		<3					
05/27/80	18	23			337	508	<3					
06/02/80	5	16			<=521		4.9					
06/09/80	37	21			<=536		4.1					

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
06/16/80	16	13			541	508	3.2					
06/23/80	15	12	34	34	(/= 521		5.2					
06/30/80	10	11	2	34	565	497	3.0					
07/07/80	16	14	5	35	550	548	4.6					
07/14/80	9	10	12	36	(/= 612		3.3					
07/21/80	12	14	37	40	(455		4.0					
07/28/80	15	37	10	34	534	405	3.9					
08/04/80	25		30		(/= 501		3.3					
08/11/80	7	10	11	35	(/= 523		3.9					
08/18/80	3	10	36	43	(/= 510		3.6					
08/25/80	27	35	30	38	(/= 505		3.1					
09/02/80	13	11	15	33	(/= 537		3.4					
09/08/80	7	13	28	37	(/= 479							
09/15/80	-3	15	9	34	(/= 408							
09/22/80	25	19	-4	38	915	557	3.2					
09/29/80	39	25	25	35	(/= 502							
10/06/80	0	20	12	30	(/= 508		4.4					
10/13/80	8	17	39	46	(/= 522		4.5					
10/20/80	5	17	34	40	(/= 418							
10/27/80	3	10	27	32	(/= 529							
11/03/80	12	17	15	34	(/= 478							
11/10/80	57	26	7	23	(/= 470							
11/17/80	33	19	55	37	(/= 517		3.1					
11/24/80	26	35	16	32	(/= 525							
12/01/80	13	18	20	44	(/= 531		3.7					
12/08/80					(/=557		7.1					
12/15/80	39	22	12	34	(/=503		3.2					
12/22/80	26	21	37	44	(/=523		3.7					
01/05/81	26	21	-25	38	(/=503		3.3					
01/12/81	13	14	NR		(/= 523		3.2					

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
01/19/81	38	22	NR		(/= 530		3.8					
01/26/81	40	23	-2	41	(/= 531		3.5					
02/02/81	33	23	35	50	(/= 539		3.8					
02/09/81	20	21	-7	32	(/= 604		(3.0					
02/16/81	27	15	4	29	670	514						
02/23/81	14	20	16	36	(/= 560		(3.0					
03/02/81	30	25	32	30	(/= 557		(3.0					
03/09/81	14	17	23	38	297	556	3.3					
03/16/81	37	24	18	29	147	552	12					
03/23/81	12	26	12	34	115	519	3.9					
03/30/81	31	25	10	29	811	536	3.2					
04/06/81	3	10	3	27	-467	532	(3.0					
04/13/81	16	21	7	29	127	488	(3.0					
04/20/81	12	13	3	29	379	523	(3.0					
04/27/81	8	14	25	31	650	493						
05/04/81	34	27	26	31	360	523	3.0					
05/11/81	1	12	19	36	36	527	(3.0					
05/15/81	11	18	10	40	264	713	(3.0					
05/26/81	7	11	14	32	24	533	(3.0					
06/01/81	16	17	15	33	283	522	(3.0					
06/08/81	8	16	17	34	95	507	(3.0					
06/15/81	5	16	39	35	366	527	(3.0					
06/22/81	11	9	31	33	215	547	(3.0					
06/29/81	3	16	2	32	102	553	4.2					
07/06/81	14	14	16	36	1322	559	(3.0					
07/13/81	10	14	-3	28	247	526	(3.0					
07/20/81	3	8	27	36	623	528	(3.0					
07/27/81	8	14	16	37	364	477	(3.0					
08/03/81	26	32	17	35	508	560						
08/10/81	4	16	21	37	417	411						

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
08/17/81	5	15	15	32	224	492						
08/24/81	13	12	44	38	146	495						
08/31/81	15	15	0	29	777	567	<3.0					
09/08/81	7	14	3	33	-463	520	<3.0					
09/14/81	15	10	-7	25	360	484						
09/21/81	4	15	26	35	235	569						
09/28/81	17	16	22	13	63	554	<3.0					
10/05/81	25	18	-7	72	154	493						
10/12/81	23	21	17	16	-784	515						
10/19/81	-2	15	1	13	539	627	<3.0					
10/26/81	11	18	10	15	550	526	<3.0					
11/02/81	0	13	7	16	177	513	<3.0					
11/09/81	15	14	10	15	717	466						
11/16/81	21	15	20	21	705	460	<3.0					
11/23/81	0	10	0	14	395	531						
11/30/81	35	20	17	14	-257	610	<3.0					
12/07/81	5	23	28	21	448	603	<3.0					
12/14/81	25	17	29	20	951	573	<3.0					
12/21/81	15	16	9	14	868	420						
01/04/82	4	15	12	13	520	495						
01/11/82	8	14	6	12	389	556	<3.0					
01/18/82	19	14	9	14	-172	628	<3.0					
01/25/82	14	16	8	14	354	592	<3.0					
02/01/82	19	14	21	16	-216	593	<3.0					
02/08/82	16	13	21	14	222	595	<3.0					
02/15/82	0	19	6	19	-182	681	<3.0					
02/22/82	22	15	1	6	-27	519	<3.0					
03/01/82	10	14	10	7	-28	418	<3.0					
03/08/82	4	5	7	6	-210	585						
03/15/82	13	13	1	5	370	582						

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
03/22/82	3	6	4	5	545	487						
03/29/82	3	10	8	10	422	546						
04/05/82	2	12	7	6	112	550						
04/12/82	3	15	4	5	112	760						
04/19/82	5	9	6	6	445	559						
04/26/82	16	13	0	7	581	595	<3.0					
05/03/82	7	12	-16	32	174	507	<3.0					
05/10/82	24	17	5	31	58	639	<3.0					
05/17/82	11	11	8	27	599	542	<3.0					
05/24/82	13	13	3	23	994	524	<3.0					
06/01/82	39	23	20	28	209	594	<3.0					
06/07/82	3	11	-2	27	196	579						
06/14/82	12	16	-11	24	235	512	<3.0					
06/21/82	0	16	19	25	534	541						
06/28/82	9	10	13	39	695	644	<3.0					
07/06/82	73	33	-5	22	588	760	<3.0					
07/12/82	13	13	5	25	-23	502	<3					
07/19/82	9	13	10	20	-540	592	<3					
07/26/82	16	17	9	13	2000	900	<3					
08/02/82	2	17	NR		337	603	<3					
08/09/82	12	14	12	20	-97	430	<3					
08/16/82	5	11	3	21	-40	571	<3					
08/23/82	5	12	9	23	-147	597	<3					
08/30/82	4	11	-4	27	632	592	<3					
09/07/82	NR		NR		-25	549						
09/13/82	14	13	11	27	740	585	<3					
09/20/82	6	9	6	26	112	612	<3					
09/27/82	11	11	9	21	184	593	<3					
10/04/82	5	16	3	18	759	594	<3					
10/11/82	1	13	2	22	NR		<3					

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
10/18/82	11	14	8	21	28	842	<3.0					
10/25/82	10	17	0	19	285	544	<3					
11/01/82	11	13	5	21	699	609	<3					
11/08/82	2	14	4	22	152	562	<3					
11/15/82	5	16	1	20	1039	553	<3					
11/22/82	7	11	9	19	517	519	<3					
11/29/82	4	8	5	16	454	549	0.4					
12/06/82	3	10	3	16	561	577	0.6					
12/13/82	17	11	-1	18	111	554						
12/20/82	17	15	21	19	NR							
01/04/83	24	16	0	19	500	512	0.5					
01/10/83	0	14	13	23	528	523	0.7					
01/17/83	NR		NR		707	521						
01/24/83	NR		NR		328	604						
01/31/83	2	12	0	22	-58	505						
02/07/83	6	12	7	21	115	477	<3					
02/14/83	6	10	9	23	595	450						
02/21/83	NR		NR		57	456						
02/28/83	5	12	10	17	11	473						
03/07/83	2	14	10	16	665	512	<3					
04/06/83	2	16	41	47			0.3					
04/11/83	11	18	10	20	NR		6.98					
04/18/83	13	15	19	21			2.23					
04/25/83	3	14	9	23			0.23					
05/16/83	10	17	15	23								
05/23/83	41	25	14	26	99	794						
05/31/83	3	25	1	19	-326	463						
06/06/83	2	13	36	37	-86	485						
06/13/83	4	13	0	20	-12	456						
06/20/83	28	20	26	24	154	412						

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
06/27/83	0	11	20	25	128	488						
07/06/83	12	14	0	20	645	500						
07/11/83	8	14	16	27	147	481						
07/16/83	21	17	6	20	-325	503						
07/25/83	2	22	10	24	226	476						
08/01/83	8	16	3	23	724	485						
08/08/83	10	12	14	24	194	505						
08/15/83	10	20	11	38								
08/22/83	2	23	20	34	184	489						
08/29/83	2	14	30	27								
09/06/83	3	15	9	28								
09/12/83	2	24	19	17	0.65	0.78						
09/19/83	10	16	5	24	-0.14	0.72						
09/26/83	9	12	17	25	0.37	0.45						
10/03/83	23	21	4	21	-0.27	0.95						
10/10/83	10	15	2	31	450	790						
10/17/83	22	21	12	34	180	740	7.9					
10/17/83	30	21	14	35	-220	650						
10/24/83	13	19	8	25								
11/07/83	14	14	5	22								
11/14/83	7	14	8	24	-20	600						
11/21/83	1	13	3	24	-20	650						
11/28/83					-250	590						
12/08/83					270	350						
12/12/83	17	16	16	25	370	620						
12/19/83	53	23	5	22								
01/03/84	10	17	20	24	30	390						
01/09/84	15	19	4	21	-20	380						
01/16/84	9	13	9	25								
01/23/84	1	10	3	22	120	660						

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
09/10/84	15	21	-8	23								
09/17/84	30	21	0	27								
09/24/84	23	15	-2	25								
10/01/84	20	18	12	28								
10/08/84	7	12	16	29								
10/15/84	8	12	18	26								
10/22/84	6	14	-5	25			1.4					
10/29/84	12	14	-2	25								
11/05/84	-4	15	-3	21								
11/12/84	30	18	14	26								
11/19/84	21	15	-2	24								
11/26/84	11	12	8	26								
12/03/84	11	11	3	25								
12/10/84	13	15	-2	23			1.4					
12/17/84	10	14	3	22								
12/24/84	8	12	-17	26								
01/07/85	16	13	3	25								
01/14/85	5	13	6	23	200	810						
01/21/85	6	11	5	25								
01/28/85	25	17	5	25								
02/04/85	24	16	6	22								
02/11/85	13	15	7	26	430	650	0.4					
02/18/85	5	27	36	36								
02/25/85	9	1	7	1								
03/04/85	6	3	22	26								
03/11/85	3	12	27	20								
03/18/85	17	0	30	9								
03/25/85	26	10	19	17								
04/01/85	8	4	10	7								
04/08/85	24	7	28	25								

EAST LANDFILL POND
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		STRONTIUM 90		PLUTONIUM 239		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
04/15/85	18	2	0	20								
04/22/85	0	9	4	5								
04/29/85	22	4	-5	2								
05/06/85	38	7	26	3								
05/13/85	25	2	36	8								
05/20/85	-5	2	54	0								
05/29/85	6	14	9	6			1.0					
06/03/85	15	4	0	16								
06/10/85	13	4	9	20								
06/17/85	13	4	-5	7								
06/24/85	0	4	11	7			0.0					
07/01/85	13	4	40	14								
07/08/85	26	4	-6	8								
07/15/85	8	8	4	18								
07/22/85	1	2	0	21								
08/12/85	26	2	10	7								
11/22/85							1.2					
02/24/86							0.1					
03/10/86							0.2					
04/16/86							2.9					
05/12/86							2.1					
07/14/86							0.3					

NORTH LANDFILL BYPASS

NORTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALFHA		BETA		TRITIUM		PLUTONIUM 239		STRONTIUM 90		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
03/29/76	<5											
04/05/76	<5											
04/12/76	13											
04/19/76	5											
04/26/76	7											
05/03/76	13											
05/10/76	<5											
05/17/76	14											
05/24/76	9											
06/01/76	7											
06/07/76	8											
06/14/76	<5											
06/21/76	<5											
06/28/76	11											
07/06/76	15											
07/12/76	<5											
07/19/76	17											
07/26/76	15											
08/02/76	19											
08/09/76	20											
08/16/76	<5											
08/23/76	11											
08/30/76	6											
09/07/76	14											
09/13/76	32											
09/20/76	16											
09/27/76	17											
10/04/76	27											
10/11/76	9											
10/11/76	9											

NORTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		PLUTONIUM 239		STRONTIUM 90		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
10/25/76	12											
11/08/76	6											
11/15/76	<5											
11/22/76	21											
11/29/76	5											
12/06/76	11											
12/13/76	20											
12/27/76	9											
01/03/77	<5											
01/10/77	<5											
01/17/77	5											
02/07/77	16											
02/14/77	16											
02/21/77	24											
02/25/77	<5											
03/07/77	8											
03/14/77	13											
03/30/77	16											
04/04/77	9											
04/11/77	20											
04/15/77	12											
04/25/77	17											
05/03/77	8											
05/10/77	66						2.9	0.4				
05/16/77	5											
05/23/77	6											
05/31/77	5											
06/06/77	7											
06/13/77	63						1.4	0.3				
06/20/77	45						1.6	0.4				

NORTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
06/27/77	12											
07/05/77	15											
07/11/77	26											
07/19/77	18											
07/25/77	38											
08/01/77	16											
08/08/77	22											
08/15/77	17											
08/22/77	12											
09/06/77	26											
09/12/77	8											
09/19/77	22											
09/26/77	20											
10/03/77	13											
10/10/77	13											
10/17/77	17											
10/25/77	35											
10/31/77	27											
11/14/77	26											
11/21/77	8											
11/28/77	18											
12/05/77	18											
12/12/77	12											
12/19/77	17											
12/27/77	25											
12/27/77	25											
12/27/77	25											
12/27/77	25											
01/04/78	29											
01/09/78	23											

NORTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
01/16/78	15											
01/23/78	11											
01/30/78	12											
02/13/78	25											
02/20/78	12											
02/27/78	9											
03/06/78	12											
03/13/78	14											
03/20/78	13											
03/27/78	7											
04/03/78	13											
04/10/78	13											
04/17/78	2											
04/24/78	7											
05/01/78	2											
05/08/78	12											
05/15/78	22											
05/22/78	6											
05/30/78	27											
06/05/78	23											
06/11/78	30											
06/19/78	13											
06/26/78	7											
07/03/78	6											
07/10/78	10											
07/24/78	19											
07/31/78	47											
08/07/78	6											
08/14/78	6											
08/14/78	6											

NORTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
03/21/78	30											
03/21/78	30											
08/28/78	10											
08/28/78	10											
09/05/78	12											
09/05/78	12											
09/11/78	16											
09/11/78	16											
09/18/78	7											
09/18/78	7											
09/25/78	5											
10/02/78	13											
10/09/78	8											
10/16/78	30											
10/23/78	21											
10/30/78	7											
11/06/78	26											
11/13/78	10											
11/20/78	5											
11/27/78	25											
12/06/78	6											
12/11/78	13											
12/18/78	11											
01/02/79	22											
01/08/79	15											
01/15/79	9											
01/22/79	7											
01/29/79	30											
02/05/79	7											
02/12/79	38											

NORTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
02/19/79	14											
02/26/79	37											
03/05/79	32				<666(MDA)							
03/12/79	19				<664(MDA)							
03/19/79	22				<609(MDA)							
03/26/79	<5				<613(MDA)							
04/02/79	8				1006	730						
04/09/79	23				<954(MDA)							
04/16/79	16				<615(MDA)							
04/23/79	15				1142	713						
04/30/79	20				<747(MDA)							
05/07/79	20				966	712						
05/14/79	23				<689(MDA)							
05/21/79	<5				<648(MDA)							
05/28/79	19				<639(MDA)							
06/04/79	<5				1092	621						
06/11/79	10				<587(MDA)							
06/18/79	74				<483(MDA)							
06/25/79	33				<737(MDA)							
07/02/79	17				<682(MDA)							
07/09/79	19				1077	437						
07/16/79	<5				<823(MDA)							
07/23/79	6				<666(MDA)							
07/30/79	24				857	654						
08/06/79	13											
08/13/79	9											
08/20/79	14											
08/27/79	23											
09/04/79	24				<590							
09/10/79	18				1545	533						

NORTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
09/17/79	<5				<=503							
09/24/79	9				563	456						
10/01/79	14											
10/08/79	5											
10/15/79	<5											
10/22/79	17											
10/29/79	17											
11/05/79	13											
11/12/79	20											
11/19/79	21											
12/03/79	<5				<=468							
12/10/79	13				965	517						
12/17/79	15				543	390						
01/07/80	6				<=627							
01/14/80	23				321	651						
01/21/80	23				<=645							
01/28/80	50				746	508						
02/04/80	30				713	587						
02/11/80	38				<=517							
02/18/80	16				1121	555						
02/25/80	23				<=494							
03/03/80	22	19			1268	552						
03/10/80	26	21			<=482							
03/17/80	12	14			<=503							
03/24/80	11	16			587	499						
03/31/80	28	26			<=493							
04/07/80	74	35			<=573							
04/14/80	14	22			<=549							
04/21/80	23	20			997	547						
04/28/80	47	25			602	496						

NORTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
05/05/80	23	15			1306	577						
05/12/80	16	15			(/=476							
05/19/80	40	24			(/=515							
05/27/80	25	13			1095	503						
06/02/80	31	18			(/=521							
06/09/80	0	13			(/=516							
06/16/80	1	10			(/=520							
06/23/80	1	9			(/=645							
06/30/80	0	7			(/=531							
07/07/80	14	12			(/=692							
07/14/80	10	12			1065	902						
03/30/81	30	20			757	539						
04/06/81	2	8			-398	531						
04/13/81					-81	507						
04/20/81	5	16			122	534						
04/27/81	4	12			597	505						
05/04/81	14	14			691	555						
05/11/81	-10	39			13	549						
05/15/81					359	714						
05/18/81	10	14										
05/26/81					-26	534						
06/01/81	9	17			322	576						
06/08/81	31	13			424	511						
06/15/81	17	19										
04/11/83					-139	472						
05/23/83	56	35	18	28	-164	495						
05/31/83	10	18	19	25	-264	479						
06/06/83	12	18	17	24	98	481						
06/13/83	22	18	8	23	-200	490						
10/31/83					20	650						

SOUTH LANDFILL BYPASS

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
03/29/76	13											
04/05/76	<5											
04/12/76	8											
04/19/76	<5											
04/26/76	5											
05/03/76	8											
05/10/76	<5											
05/17/76	34											
05/24/76	8											
06/01/76	17											
06/07/76	<5											
06/14/76	9											
06/21/76	<5											
06/28/76	<5											
07/06/76	6											
07/12/76	11											
07/19/76	13											
07/26/76	15											
08/02/76	25											
08/09/76	7											
08/16/76	<5											
08/23/76	14											
08/30/76	<5											
09/07/76	10											
09/13/76	9											
09/20/76	16											
09/27/76	20											
10/04/76	12											
10/11/76	12											
10/11/76	12											

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
10/25/76	10											
11/02/76	<5											
11/15/76	<5											
11/22/76	11											
11/29/76	16											
12/06/76	14											
12/13/76	5											
12/27/76	<5											
01/03/77	6											
01/10/77	19											
01/17/77	16											
02/07/77	24											
02/14/77	29											
02/21/77	7											
02/28/77	7											
03/07/77	27											
03/14/77	9											
03/30/77	6											
04/04/77	12											
04/11/77	<5											
04/15/77	5											
04/25/77	19											
05/03/77	20											
05/10/77	42						1.3	0.3				
05/16/77	6											
05/23/77	14											
05/31/77	26											
06/06/77	13											
06/13/77	61						2.0	0.4				
06/20/77	34											

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		PLUTONIUM 239		STRONTIUM 90		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
06/27/77	28											
07/05/77	17											
07/11/77	10											
07/19/77	7											
07/25/77	35											
08/01/77	22											
08/08/77	16											
08/15/77	21											
08/22/77	5											
09/06/77	16											
09/12/77	7											
09/19/77	7											
09/26/77	6											
10/03/77	12											
10/10/77	17											
10/17/77	14											
10/25/77	21											
10/31/77	25											
11/14/77	34											
11/21/77	12											
11/28/77	19											
12/05/77	13											
12/12/77	34											
12/19/77	8											
12/27/77	25											
12/27/77	25											
01/04/78	9											
01/09/78	10											
01/16/78	19											
01/23/78	9											

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		PLUTONIUM 239		STRONTIUM 90		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
01/30/78	16											
02/13/78	25											
02/20/78	19											
02/27/78	<5											
03/06/78	15											
03/13/78	11											
03/20/78	31											
03/27/78	22											
04/03/78	25											
04/10/78	30											
04/17/78	26											
04/24/78	9											
05/01/78	29											
05/08/78	21											
05/15/78	9											
05/22/78	16											
05/30/78	6											
06/05/78	28											
06/11/78	22											
06/19/78	21											
06/26/78	20											
07/03/78	12											
07/10/78	7											
07/24/78	23											
07/31/78	29											
08/07/78	<5											
08/14/78	43											
08/21/78	14											
08/28/78	12											
09/05/78	7											

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
09/11/78	26											
09/18/78	5											
09/25/78	12											
10/02/78	8											
10/09/78	23											
10/16/78	14											
10/23/78	7											
10/30/78	<5											
11/06/78	22											
11/13/78	9											
11/20/78	20											
11/27/78	15											
12/04/78	28											
12/11/78	12											
12/18/78	9											
01/02/79	<5											
01/08/79	17											
01/15/79	<5											
01/22/79	20											
01/29/79	10											
02/05/79	14											
02/12/79	25											
02/19/79	5											
02/26/79	23											
03/05/79	11				(/=6681MDA)							
03/12/79	<5				794	669						
03/19/79	27				925	620						
03/26/79	9				857	641						
04/02/79	<1				1304	615						
04/09/79	5				1163	1034						

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		PLUTONIUM 239		STRONTIUM 90		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
04/16/79	23				871	632						
04/23/79	17				<6321MDA1							
04/30/79	35				947	735						
05/07/79	27				<6831MDA1							
05/14/79	36				1173	683						
05/21/79	35				<6431MDA1							
05/28/79	37				<6551MDA1							
06/04/79	35				339	607						
06/11/79	20				<5211MDA1							
06/18/79	53				1050	507						
06/25/79	16				<3741MDA1							
07/02/79	23				<6101MDA1							
07/09/79	10				<6241MDA1							
07/16/79	<5				366	721						
07/23/79	<5				1910	709						
07/30/79	35				300	654						
08/06/79	21											
08/13/79	<5											
08/20/79	11											
08/27/79	11											
09/04/79	27				970	597						
09/10/79	5				1554	541						
09/17/79	25				953	523						
09/24/79	7				575	466						
10/01/79	<5											
10/08/79	9											
10/15/79	17											
10/22/79	6											
10/29/79	13											
11/05/79	15											

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RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		PLUTONIUM 239		STRONTIUM 90		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
11/12/79	9											
11/19/79	3											
12/03/79	<5				<=468							
12/10/79	<5				<=384							
12/17/79	10				432	395						
01/07/80	32				<=646							
01/14/80	6				1009	655						
01/21/80	11				<=651							
01/28/80	11				660	513						
02/04/80	<5				<=552							
02/11/80	33				<=498							
02/19/80	21				737	552						
02/25/80	3				<=437							
03/03/80	-2	19			835	732						
03/10/80	29	23			<=593							
03/17/80	19	19			<=467							
03/24/80	0	18			<=432							
03/31/80	24	23			<=485							
04/07/80	11	15			328	388						
04/14/80	12	15			790	545						
04/21/80	21	16			1151	550						
04/28/80	17	24			1288	541						
05/05/80	10	21			895	555						
05/12/80	4	15			<=452							
05/19/80	20	23			633	517						
05/27/80	6	13			1261	507						
06/02/80	33	20			698	521						
06/09/80	8	24			<=548							
06/16/80	13	16			601	489						
06/23/80	15	16			<=509							

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA PCI/L	ALPHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
06/30/80	21	19			<1=475							
07/04/80	12	14										
07/07/80	6	14			817	537						
07/14/80	22	23			<1=572							
07/21/80	9	16			<1=444							
07/28/80	29	17			459	407						
08/04/80					780	505						
08/11/80	6	9			<1=509							
08/18/80	7	13			<1=493							
08/25/80	3	11			<1=467							
09/02/80	14	12			<1=503							
09/09/80	14	12			<1=463							
09/15/80	32	21			<1=401							
09/22/80	29	22			<1=539							
09/29/80	3	11			<1=481							
10/06/80	9	17			<1=524							
10/13/80	28	30			674	523						
10/20/80	25	21			367	339						
10/27/80	6	12			<1=519							
11/03/80	10	17			<1=474							
11/10/80	20	17			<1=463							
11/17/80	17	19			<1=500							
11/24/80	6	15			<1=536							
12/01/80	16	15			<1=535							
12/08/80	4	20			<1=574							
12/15/80	9	9			<1=503							
12/22/80	20	22			<1=508							
01/05/81	25	19			<1=502							
01/12/81	11	14			<1=560							
01/19/81	37	26			640	545						

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALFHA PCI/L	ALFHA ERROR	BETA PCI/L	BETA ERROR	TRITIUM PCI/L	TRITIUM ERROR	PLUTONIUM 239 PCI/L	PLUTONIUM 239 ERROR	STRONTIUM 90 PCI/L	STRONTIUM 90 ERROR	AMERICIUM 241 PCI/L	AMERICIUM 241 ERROR
01/26/81	32	22			(/=477							
02/02/81	37	23			(/=526							
02/09/81	12	14			(/=597							
02/16/81	11	16			560	496						
02/23/81	32	26			(/=556							
03/02/81	34	29			972	560						
03/16/81	33	22			49	548						
03/23/81	14	25			350	526						
03/30/81	16	19			729	535						
04/06/81	9	10			-270	529						
04/13/81					34	496						
04/20/81	12	17			366	522						
04/27/81	11	15			772	502						
05/04/81	37	20			574	523						
05/11/81	3	35			228	527						
05/15/81					305	742						
05/18/81	-11	13										
05/26/81					145	531						
06/01/81	5	15			340	522						
06/03/81	-9	16			336	500						
06/15/81	7	11										
06/22/81	12	17			137	538						
06/29/81	10	14			472	549						
07/13/81					532	537						
07/20/81					686	527						
07/27/81	3	9			546	479						
08/03/81					598	562						
08/03/81	2	11										
08/10/81	8	12										
08/17/81					232	459						

SOUTH LANDFILL BYPASS
RADIOCHEMISTRY
HISTORICAL DATA

SAMPLE DATE	ALPHA		BETA		TRITIUM		PLUTONIUM 239		STRONTIUM 90		AMERICIUM 241	
	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR	PCI/L	ERROR
08/17/81	23	15										
08/24/81	13	16			455	521						
08/31/81	12	17			615	538						
09/08/81					-93	519						
09/11/81	2	15										
09/14/81					466	432						
09/14/81	14	14										
09/21/81					465	554						
09/21/81	11	16										
09/28/81					-226	449						
09/28/81	19	25										
10/05/81					642	497						
10/05/81	3	10										
10/12/81					-693	536						
10/19/81					365	594						
10/19/81	7	12										
10/26/81					662	558						
04/11/83					-140	474						
05/23/83					-310	435						
05/31/83					-458	482						
06/06/83	3	23	17	42	163	493						
07/05/83					254	493						
03/19/84					-330	610						
04/02/84	-190	320										
05/07/84	5	14	2	23	20	400						
06/04/84					40	410						

APPENDIX D-3

INORGANICS

WEST LANDFILL

WEST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
01/25/74										30
01/29/74										120
01/30/74										210
01/31/74										120
02/01/74										48
02/04/74										70
02/05/74										72
02/06/74										60
02/07/74										94
02/08/74										200
02/11/74										330
02/12/74										50
02/13/74										16
02/14/74										56
02/15/74										76
02/25/74										250
02/26/74										100
02/27/74										290
02/28/74										180
03/01/74										110
03/04/74										330
03/05/74										230
03/06/74										360
03/07/74										210
03/08/74										180
03/11/74										310
03/12/74										390
03/13/74										400
03/14/74										490
03/15/74										500

WEST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
03/18/74										550
03/25/74										230
04/01/74										1400
04/08/74										7
04/15/74										30
04/25/74										110
04/30/74										26
05/06/74										120
05/13/74										310
05/21/74										210
05/30/74										260
06/05/74										400
06/14/74										25
06/17/74										140
06/25/74										69
07/01/74										23
07/08/74										15
07/17/74										9
07/23/74										14
08/09/74										3
08/12/74										6
08/19/74										2
08/30/74										10
09/02/74										0.36
09/09/74										6.6
09/16/74										4
09/23/74										3
09/30/74										6
10/09/74										3
10/24/74										4

WEST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY UMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	FCB FPM/FPB	PHENOL FPM/FPB
10/29/74										6
11/06/74										4
11/14/74										5
11/18/74										2
11/26/74										16
12/04/74										3
12/13/74										2
12/16/74										2
12/27/74										9
01/15/76						42	558		<1 UNITS?	5 UG/L
02/15/76						36	490		<1 UG/L	2 UG/L
03/15/76						33	491		<1 UG/L	3 UG/L
04/15/76						39	403		<1 UG/L	4 UG/L
05/15/76						77	356		<1 UG/L	35 UG/L
06/15/76						64	724		<1 UG/L	7 UG/L
07/05/76						27	464		<1 UG/L	24 UG/L
08/15/76						70	603		<1 UG/L	<1 UNITS?
09/15/76						22	269		<1 UG/L	<1 UG/L
10/15/76						12	339		0.001 UNITS?	0.006 UNITS?
11/15/76						66	1526		<1 UG/L	<1 UG/L
12/15/76						39	586		<1 UNITS?	5 UG/L
01/15/77						46	699		<1.0	2.0
02/15/77						23	431		<1.0	4.0
03/15/77						34	650		<1.0	<1.0
04/15/77						29	291		<1.0	2.0
05/15/77						53	526		<1.0	4.0
06/15/77						38	471		<1.0	4.0
07/15/77						55	219		<100	<2
08/15/77						47	408		<1.0	<2.0
09/15/77						146	987		<1.0	3.0

WEST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	FCB FFM/PPB	PHENOL FFM/PPB
03/15/78						35	226		<1.0	<2.0
04/15/78						26	383		.4	<2.0
05/15/78						28	357		0.2	2.0
07/15/78						105	955		0.2	10.0
10/15/78						44	422			11.0
11/15/78						52	1125		<1.0	<1.0
04/23/79	<1.0									
04/30/79	<1.0									
05/07/79	<1									
05/14/79	<1									
05/21/79	<1									
05/23/79	<1									
06/04/79	<1									
06/11/79	<1									
06/18/79	<1.0									
06/25/79	<1									
07/02/79	<1					57		520	<1	
07/09/79	<1									
07/16/79	<1									
07/23/79	<1									
08/27/79		7.9	34	625		44		436	<0.001	7
09/24/79		7.9	34	588		54		375	8	8
10/15/79		8.1	42	587		54	460	399	2	2
12/03/79		8.1	35	588		65		420	9	25
12/17/79		7.5	34	555		70		362	5	23
01/28/80		7.5	41	625		47	370	352	4	50
02/25/80		7.3	33	460.33		30.32	317	307	2	31
03/31/80		8.4	28	381.7		27.94	289	273	<2	10
04/23/80		7.5	38	530		0	24	16	<2	6
05/27/80		8.0	81	526		24.0	480	464	<2	150

WEST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
06/23/80	1	7.3								
06/30/80	<1	8.3	60	620		109	501	374	<2	150
07/07/80	<0.2	7.5								110
07/14/80	0.5	7.7								18
07/21/80	0.2	8.1								6
07/28/80	<1	7.8	63	475		55	352	316	<2	5
08/04/80	<1	7.4								
08/11/80	<1	7.4								
08/18/80	<1	7.4								
08/25/80	<1	7.4	15	500		35	373	332		5
09/02/80	1.0	7.3								
09/08/80	0.7	7.5								
09/15/80	0.7	7.7								
09/22/80	<1	7.5								
09/29/80	<1	7.5								
10/06/80	<1	7.4								
10/13/80	<1	7.4								
10/20/80	<1	7.9								
10/27/80	<1	7.6	6	500		53.9	1203	317	<2	<2
11/03/80	<1	8								
11/10/80	<1	8.2								
11/17/80	<1	7.9								
11/24/80	<1	7.7		625		72	454	410		22
12/01/80	<1	8.0								
12/08/80	<1	8.0								
12/15/80	<1	7.8								
12/22/80	28.4	7.9		555		31	500	438		
01/05/81	1	7.9								
01/12/81	4.0	7.9								
01/19/81	<1	8.2								

WEST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
01/26/81	<1	7.6	8.3	625		65.10	463	444	0.07	16
02/02/81	<1	7.4								
02/09/81	<1	7.2								
02/16/81	<1	7.7								
02/23/81	<1	7.8		714		33	530	439		<2
03/02/81	<1	7.3								
03/09/81	<1	8.0								
03/16/81	<1	7.9								
03/23/81	<1	7.7								
03/30/81	<1	8.1	17	690		44.7	455	400	0.06	4
04/06/81	1.6	8.0								
04/13/81	1.1	8.0								
04/20/81	1.5	7.8								
04/27/81	<1	7.5	34	667		29.7	422	410	0.05	5
05/04/81	1.0	7.9								
05/11/81	<1	8.2								

EAST LANDFILL

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
03/29/76	0.3				1					
04/05/76	0.1				0.6					
04/12/76	0.1				0.6					
04/19/76	0.1				0.6					
04/26/76	0.1				0.5					
05/03/76	0.2				1					
05/10/76	0.2				0.9					
05/17/76	0.3				1.4					
05/24/76	0.2				1					
06/01/76	0.2				1					
06/07/76	<0.3				<1					
06/13/76	1				6					
06/14/76	0.2				1.1					
06/21/76	0.3				1.5					
06/28/76	0.2				1					
07/06/76	<0.1				0.3					
07/12/76	<0.1				0.3					
07/19/76	0.2				0.9					
07/26/76	<0.1				<0.3					
08/02/76	0.2				1					
08/09/76	0.2				1					
08/16/76	0.4				1.7					
08/23/76	0.2				0.9					
08/30/76	1				4.9					
09/07/76	0.4				2					
09/20/76	<0.3				1.3					
09/27/76	6				26					
10/04/76	0.5				2.1					
10/11/76	0.6				2.5					
10/25/76	0.1				0.6					

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
11/08/76	0.1				0.6					
11/15/76	2				9					
11/22/76	2				10					
11/29/76	0.4				2					
12/06/76	0.3				1.4					
12/13/76	0.1				0.6					
12/27/76	0.3				1.3					
01/03/77	<0.3				<1					
01/10/77	0.7				3					
01/17/77	0.3				1.2					
01/24/77	0.4				1.9					
01/31/77	0.1				0.6					
02/07/77	0.4				1.9					
02/14/77	0.1				0.6					
02/21/77	0.1				0.6					
02/28/77	0.1				0.6					
03/07/77	0.1				0.6					
03/14/77	1				5					
03/21/77	0.1				0.6					
03/30/77	0.3				1.2					
04/04/77	0.3				1.2					
04/11/77	0.1				0.6					
04/18/77	0.1				0.6					
04/25/77	0.3				1.3					
05/03/77	0.3				1.2					
05/10/77	0.2				1.1					
05/16/77	0.3				1.2					
05/23/77	0.3				1.2					
05/31/77	0.3				1.2					
06/06/77	0.1				0.6					

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
06/13/77	0.2				1.1					
06/20/77	0.2				1.1					
06/27/77	0.3				1.3					
07/05/77	0.4				1.9					
07/11/77	0.4				1.8					
07/19/77	<0.3				<1					
07/25/77	0.9				4					
08/01/77	0.3				1.2					
08/08/77	<0.3				1					
08/15/77	0.3				1.2					
08/22/77	<0.3				<1					
09/06/77	<0.3				1					
09/12/77	<0.3				1.2					
09/19/77	<0.3				<1					
09/26/77	<0.3				<1					
10/03/77	0.3				1.4					
10/10/77	<0.3				<1					
10/17/77	<0.3				<1					
10/25/77	<0.3				<1					
10/31/77	<0.3				<1					
11/14/77	<0.3				0.9					
11/21/77	<0.3				1					
11/28/77	<0.3				<1					
12/05/77	0.3				1.4					
12/12/77	<0.3				<1					
12/19/77	<0.3				<1					
12/27/77	<0.3				<1					
01/04/78	0.4				1.9					
01/09/78	<0.3				<1					
01/16/78	0.3				1.3					

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
01/23/78	<0.2				<1					
01/30/78	0.6				2.5					
02/13/78	<0.2				<1					
02/20/78	<0.2				<1					
02/27/78	<0.2				<1					
03/06/78	0.2				1					
03/13/78	<0.2				0.8					
03/20/78	<0.2				<1					
03/27/78	<0.2				<1					
04/03/78	<0.2				<1					
04/10/78	<0.2				<1					
04/17/78	<0.2				<1					
04/24/78	0.5				2					
05/01/78	<0.2				<1					
05/08/78	0.6				2.5					
05/15/78	0.7				3.0					
05/22/78	<1				1.5					
05/30/78	<1				<1					
06/05/78	0.2				1					
06/11/78	0.3				1.2					
06/19/78	3				13.5					
06/26/78	<0.2				<1					
07/03/78	<0.2				<1					
07/10/78	<0.2				<1					
07/17/78	<0.2				<1					
07/24/78	<0.2				<1					
07/31/78	<0.2				<1					
08/07/78	<1				1.3					
08/14/78	<1									
08/28/78	<1									

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
09/05/78	<1									
09/11/78	<1									
09/18/78	<1									
09/25/78	<1				1.3					
10/02/78	<1				1.3					
10/09/78	<1				1.3					
10/16/78	<1				1.5					
10/23/78	<1				<1					
10/30/78	<1				1.3					
11/06/78	<1				2.2					
11/13/78	<0.2				<1					
11/20/78	<0.2				<1					
11/27/78	0.8				3.5					
12/04/78	<0.2				<1					
12/11/78	<1				<5					
12/18/78	<1				<5					
01/08/79	<1				<5					
01/15/79	<1				<5					
01/22/79	<1				<5					
01/29/79	<1				<5					
02/05/79	<1				<5					
02/12/79	1				6					
02/19/79	<1				<5					
02/26/79	<1				<5					
03/05/79	<1				<5					
03/12/79	<1				<5					
03/19/79	<1									
03/26/79	<1									
03/29/79	<1				<5					
04/02/79	<1									

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
04/09/79	<1				<5					
04/16/79	<1									
04/23/79	<1.0									
04/30/79	<1.0									
05/07/79	<1									
05/14/79	<1									
05/21/79	<1									
05/28/79	<1									
06/04/79	<1									
06/11/79	<1									
06/18/79	<1.0									
06/25/79	1.5									
07/02/79	<1					47		366	<0.001	
07/09/79	<1									
07/16/79	<1									
07/23/79	<1									
07/30/79	<1									
08/27/79		8.2	32	540		46		367	<0.001	2 PPB
09/24/79		8.4	33	513		4		325	0.004	6 PPB
10/15/79		3.3	25	526		43	340	325	0.003	2 PPM
12/03/79		8.4	39	500		49		344	0.000007	3 PPM
12/17/79		8.0	30	513		38		315	0.007	10 PPM
01/28/80		8.0	37	525		68	315	307	0.003	<0.002
02/25/80		8.1	28	330.03		8.56	239	227	0.001	0.006
03/31/80		8.3	36	440.5		40.35	352	338	<0.002	4
04/28/80		7.8	38	450		6.4	13	2	<0.002	0.052
05/27/80		7.8	46	444		35.2	333	315	<0.002	8
06/23/80	<1	7.4								
06/30/80	<1	8.5	42	430		44	344	328	<0.002	.006
07/07/80	<0.5	7.8								0.005

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
07/14/80	0.5	7.9								<0.002
07/21/80	<0.2	8.0								0.002
07/28/80	<1	6.8	83	400		16	285	242	<0.002	0.002
08/04/80	<1	7.8								
08/11/80	<1	7.6								
08/13/80	<1	7.6								
08/25/80	<1	7.1	305	445		190	1379	304		<0.002
09/02/80	<1	6.9								
09/08/80	1.4	7.2								
09/15/80	1.0	7.6								
09/22/80	<1	7.6								
09/29/80	<1	7.6								
10/06/80	<1	7.7								
10/13/80	<1	7.5								
10/20/80	<1	8.0								
10/27/80	<1	7.9	9	500		38.5	333	236	<0.002	<0.002
11/03/80	<1	5								
11/10/80	<1	8.1								
11/17/80	<1	7.9								
11/24/80	<1	7.9		503		33	336	328		2 PPB
12/01/80	<1	8.1								
12/15/80	<1	8.3								
12/22/80	1.5	8.1		425		37	337	318		
01/05/81	<1	8.2								
01/12/81	4.2	8.5								
01/19/81	<1	7.5								
01/26/81	<1	8.2	11.7	444		32.40	339	328	0.05 PPB	0.002
02/02/81	<1	8.0								
02/09/81	<1	7.9								
02/16/81	<1	8.3								

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
02/23/81	<1	8.1		526		41	355	345		<0.002
03/02/81	<1	8.0								
03/09/81	<1	7.7								
03/16/81	<1	8.0								
03/23/81	<1	7.8								
03/30/81	<1	8.1	22	559		44.1	356	345	0.02 PPB	0.002
04/06/81	<1	8.3								
04/13/81	<1	8.0								
04/20/81	<1	8.0								
04/27/81	<1	7.9	39	556		36.5	351	351	0.02 PPB	0.005
05/04/81	<1	8.2								
05/11/81	<1	8.5								
05/15/81	<1	8.2								
05/26/81	1.6	8.4	17.0	42		45.2	34	31	0.03 PPB	0.002
06/01/81	<1	8.2								
06/08/81	2.6	8.4								
06/15/81	<1	8.4								
06/22/81	<1	8.7								
06/29/81	<1	8.6	16.0	474		44.6	307	295	<0.024 PPB	22 PPB
07/06/81	<1	9.1								
07/13/81	<1	9.3								
07/20/81	<1	9.2								
07/27/81	<1	8.9	17.3	291		292.6	278	277		2 PPB
08/03/81	<1	8.9								
08/10/81	<1	8.6								
08/17/81	1.3	8.7								
08/24/81	<1	9.0								
08/31/81	<1	9.1	21.0	482		21.5	280	277		10 PPB
09/08/81	<1	9.0								
09/14/81	3.1	8.9								

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
09/21/81	<1	7.8								
09/28/81	<1	8.2	31.5	515		56.4	293	287		<1 PPB
10/05/81	<1	9.6								
10/12/81	<1	8.3								
10/19/81	1.1	7.9								
10/26/81	<1	8.2	27.9	559		47.8	331	330	<0.044	2 PPB
11/02/81	<1	8.2								
11/09/81	<1	8.1								
11/16/81	<1	8.3								
11/23/81	<1	8.3								
11/30/81	<1	8.3	33.6	590		45.5	360	349	<0.023 PPB	<2 PPB
12/07/81	<1	8.2								
12/14/81	<1	8.3								
12/21/81	<1	8.2								
01/04/82	1.3	7.5	28.1	649		129.0	38	37	<0.02 PPB	<2 PPB
01/11/82	<1	8.1								
01/18/82	<1	7.9								
01/25/82	<1	8.1	27.8	468		53.0	278	256	0.039 PPB	1.8 PPB
02/01/82	<1	8.6								
02/08/82	<1	8.5								
02/15/82	1.5	8.5								
02/22/82	<1	8.2	32.7	524		46.6	359	357	0.125 PPB	<2 PPB
03/01/82	<1	8.0								
03/08/82	1.9	8.3								
03/15/82	2.5	7.8								
03/22/82	<1	8.2								
03/29/82	1.3	8.1								
04/05/82	2.2	8.8								
04/12/82	<1	8.2								
04/19/82	1.5	8.2								

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
04/26/82	1.5	8.1	46.1	633		51.2	390	388	0.11 PPB	6.1 PPB
05/03/82	<1	8.1								
05/10/82	<1	8.2								
05/17/82	<1	7.7								
05/24/82	1.2	8.4								
06/01/82	<1	8.6								
06/07/82	<1	8.5								
06/14/82	<1	8.5								
06/21/82	1.5	8.6								
06/23/82	<1	8.6								
07/06/82	1.5	9.0								
07/12/82	<1	8.4								
07/19/82	<1	9.3								
07/26/82	<1	9.5	25.4	483		65.7		316		21.3 PPB
08/02/82	4.2	9.5	24.7	481		56.6		326	0.52 PPB	19.1 PPB
08/09/82	<1	9.4								
08/16/82	<1	8.2								
08/23/82	2.6	8.5								
08/30/82	<1	7.3								
09/07/82	<1	8.1								
09/13/82	<1	7.7								
09/20/82	<1	7.6								
09/27/82	<1	7.8								
10/04/82	<1	7.7	10.6	669		49.6		458	<1.0 PPB	10 PPB
10/11/82	<1	7.5								
10/18/82	<1	8.0								
10/25/82	<1	7.9								
11/01/82	<1	8.0	9.2	573		52.3	347	344	<1.0 PPB	6 PPB
11/08/82	<1	7.9								
11/15/82	1.9	8.2								

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
11/22/82	<1	8.1								
11/29/82	<1	8.2								
12/06/82	<1	8.0	12.9	480		29.2	247	233		6.4 PPB
12/13/82	<1	9.4								
12/20/82	<1	7.8								
01/04/83	2.7	8.1	19.3	602		41.4		390		0.006
01/10/83	<1	7.7								
01/17/83	<1	7.3								
01/24/83	<1	8.3								
01/31/83	<1	8.5								
02/07/83	<1	8.6	30.5	590		43.5		366		9 PPM
02/14/83	<1	8.1								
02/28/83	<1	8.3								
03/07/83	<1	8.1	26.3	555		43.4	360	339		11 PPB
04/06/83	0.2	7.9	28.2	510		33.0		343		8 PPM
04/11/83	<1	7.9								
04/18/83	<1.0	7.9								
04/25/83	0.2	8.2								
10/17/83	<0.2	8.0	26.0	518		33.5		321	<0.1 PPB	2 PPB
11/10/83										
11/21/83	<0.2	8.1	26	514		32.8		320	<0.1 PPB	<2.0 PPB
03/20/84	<0.2	8.2	8.0	538		25.5		350		0.50
04/24/84	<0.2	8.3	29.0	510		24.1		336		3.0
05/29/84	<1.0	8.3	42.0	603		42.5	365	360	<1	4.5
06/25/84	<1.0	8.3	38.0	656		42.3	370	365	<1.0	6.00
07/24/84	<1.0	8.8	30.5	604		48.0	351	340	<1.0	5.45
08/27/84	<1.0	8.2	24.0	603		29.2	340	332	<1.0	1.5
10/22/84	<0.20	8.2	31.0	629		50.4	390	372	<1.0	2.0
12/10/84	<0.2	8.1	11.0	576		44.1	363	340	<1.0 PPM?	2.0
02/11/85	<0.2	7.7	3.0	709		82.5	427	423	<10.0	3.0

EAST LANDFILL POND
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
03/25/85			4.0	764		50.0	451	449	<50.0	<1
04/22/85	<0.2	8.2	14.0	46.2		46.2	463	461	<50.0	<2
05/28/85			30.0	779		52.7	450	447	<50.0	6.0
06/24/85			45.0	749		48.5	436	416	<50.0	<2.0
11/22/85	<1.0	7.9	7.0	776		60.0	515	479	<0.4	<1.0
02/24/86	<0.20	8.3	34.0	844		51.0	526	501	<1	10.0
03/10/86	<0.20	8.2	42	811		111	533	502	<1	4.0
04/16/86	<0.20	8.1	19.0	809		57.6	513	506	<1.0	20.0
05/12/86	<0.20	8.3	20.0	702		75.4		529	<1.0	13.0
07/14/86	<0.20	8.7	31	856		30.4	554	246	<1.0	8

NORTH LANDFILL BYPASS

NORTH LANDFILL BYPASS
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
03/29/76	3				13					
04/05/76	2				10					
04/12/76	3				13					
04/19/76	3				13					
04/26/76	2				11					
05/03/76	4				17					
05/10/76	4				17					
05/17/76	3				15					
05/24/76	3				15					
06/01/76	3				15					
06/07/76	3				15					
06/14/76	4				13					
06/21/76	4				18					
06/28/76	3				14					
07/06/76	3				13					
07/12/76	3				15					
07/19/76	3				12					
07/26/76	3				13					
08/02/76	3				13					
08/09/76	3				13					
08/16/76	3				15					
08/23/76	3				13					
08/30/76	2				11					
09/07/76	3				13					
09/13/76	3				14					
09/20/76	2				10					
09/27/76	1				6					
10/04/76	3.9				17					
10/11/76	3				15					
10/11/76	3				15					

NORTH LANDFILL BYPASS
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
10/25/76	4				17					
11/08/76	3				14					
11/15/76	3				14					
11/22/76	4				17					
11/29/76	4				18					
12/06/76	4				19					
12/13/76	3				14					
12/27/76	3				14					
01/03/77	2.7				12					
01/10/77	4				18					
01/17/77	3				15					
01/24/77	4				17					
01/31/77	3				14					
02/07/77	3				11					
02/14/77	3				14					
02/21/77	3				13					
02/28/77	3				14					
03/07/77	3				13					
03/14/77	3				15					
03/21/77	3				14					
03/30/77	3				14					
04/04/77	3				13					
04/11/77	3				11					
04/18/77	3				14					
04/25/77	4				19					
05/03/77	4				19					
05/10/77	3.8				17					
05/16/77	4				17					
05/23/77	4				18					
05/31/77	3				15					

NORTH LANDFILL BYPASS
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
06/06/77	3				15					
06/13/77	3.4				15					
06/20/77	3.4				15					
06/27/77	3				13					
07/05/77	4				17					
07/11/77	4				17					
07/19/77	3				12					
07/25/77	3				12					
08/01/77	3				15					
08/08/77	3				14					
08/15/77	3				14					
08/22/77	2				9					
09/06/77	2.5				11					
09/12/77	2.7				12					
09/19/77	1.8				8					
09/26/77	3				13					
10/03/77	2.9				12.8					
10/10/77	2.8				12					
10/17/77	3				12					
10/25/77	2.2				10					
10/31/77	3				14					
11/14/77	2.8				12					
11/21/77	6				28					
11/28/77	3				14					
12/05/77	3.2				14					
12/12/77	2.9				13					
12/19/77	3				13					
12/27/77	5.3				25.3					
12/27/77	5.5				25.8					
01/04/78	3.6				16					

NORTH LANDFILL BYPASS
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
01/09/78	3.6				16					
01/16/78	3.1				14					
01/23/78	2.8				13					
01/30/78	4.0				19					
02/13/78	3				15					
02/20/78	3.2				14.2					
02/27/78	4				16					
03/06/78	2.8				12					
03/13/78	1.9				8.6					
03/20/78	2.6				11.4					
03/27/78	4.2				18					
04/03/78	3				15					
04/10/78	5				23					
04/17/78	3				14					
04/24/78	3				15					
05/01/78	4				16					
05/08/78	6				26					
05/15/78	6				28					
05/22/78	6				25					
05/30/78	6				28					
06/05/78	6				26					
06/11/78	6				28					
06/19/78	2				10					
06/26/78	2				9					
07/03/78	5				20					
07/10/78	3				15					
07/17/78	4				16					
07/24/78	4				16					
07/31/78	3				14					
08/07/78	4				18					

NORTH LANDFILL BYPASS
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
06/14/78	3				15					
08/28/78	4				17					
09/05/78	4				17					
09/11/78	3				14					
09/18/78	3				12					
09/25/78	4				17					
10/02/78	4				18					
10/09/78	4				19					
10/16/78	4				16					
10/23/78	2.8				12.2					
10/30/78	4				19					
11/06/78	4				19					
11/13/78	9				38					
11/20/78	4				16					
11/27/78	3.1				13.8					
12/04/78	3				12					
12/11/78	6				28					
12/18/78	5				22					
01/02/79	4				16					
01/03/79	4.1				18					
01/15/79	2.7				11.8					
01/22/79	3.5				15.6					
01/29/79	3.5				15.4					
02/05/79	3.8				17					
02/12/79	3				12					
02/19/79	7				32					
02/26/79	3				14					
03/05/79	3.3				14.4					
03/12/79	4				16					
03/19/79	6									

NORTH LANDFILL BYPASS
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
03/26/79	5				22					
04/02/79	7									
04/09/79	4				18					
04/16/79	6									
04/23/79	6.4									
04/30/79	7.0									
05/07/79	6									
05/14/79	6									
05/21/79	3									
05/29/79	4									
06/04/79	3									
06/11/79	7.0									
06/13/79	5									
06/25/79	<1									
07/02/79	<1									
07/09/79	4.9									
07/16/79	<1									
07/23/79	4									
07/30/79	5									
08/06/79	4									
08/13/79	4									
08/20/79	5									
08/27/79	5									
09/04/79	4									
09/10/79	4									
09/17/79	5									
09/24/79	3									
10/01/79	4									
10/03/79	4									
10/15/79	4									

NORTH LANDFILL BYPASS
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
10/22/79	3.0									
10/29/79	4									
11/05/79	4									
11/12/79	3.0									
11/19/79	3									
12/03/79	9									
12/10/79	4									
12/17/79	4									
01/07/80	4									
01/14/80	4									
01/21/80	4									
01/28/80	11.1									
02/04/80	3									
02/11/80	4.0									
02/18/80	2									
02/25/80	2									
03/03/80	<1									
03/10/80	<1									
03/17/80	1.2									
03/24/80	4									
03/31/80	<1									
04/07/80	1.0									
04/14/80	1.3									
04/21/80	4									
04/28/80	4									
05/05/80	4									
05/12/80	1.0									
05/19/80	4									
05/27/80	4									
06/02/80	4									

NORTH LANDFILL BYPASS
INORGANICS
HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
06/09/80	4									
06/16/80	4									
06/23/80	4									
06/30/80	4									
07/07/80	4									
07/14/80	4									
03/30/81	1.4									
04/06/81	<1									
04/20/81	<1									
04/27/81	<1									
05/04/81	<1									
05/11/81	<1									
05/18/81	<1									
06/01/81	<1									
06/08/81	<1									
06/15/81	<1									

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SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	FCB PPM/PPB	PHENOL PPM/PPB
03/29/76	5				23					
04/05/76	5				20					
04/12/76	6				26					
04/19/76	6				26					
04/26/76	5				22					
05/03/76	6				29					
05/10/76	7				30					
05/17/76	7				30					
05/24/76	7				31					
06/01/76	7				31					
06/07/76	7				30					
06/14/76	7				33					
06/21/76	6				26					
06/23/76	7				31					
07/06/76	7				31					
07/12/76	7				31					
07/19/76	6				25					
07/26/76	6				27					
08/02/76	6				28					
08/09/76	7				32					
08/16/76	7				31					
08/23/76	6				23					
08/30/76	7				31					
09/07/76	6				29					
09/13/76	6				25					
09/20/76	6				27					
09/27/76	3				15					
10/04/76	7.2				32					
10/11/76	6				25					
10/11/76	6				23					

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SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
10/25/76	7				29					
11/08/76	7				29					
11/15/76	7				29					
11/22/76	7				32					
11/29/76	8				34					
12/06/76	8				34					
12/13/76	7				29					
12/27/76	6				28					
01/03/77	6.5				29					
01/10/77	6				29					
01/17/77	6				28					
01/24/77	7				32					
01/31/77	6				27					
02/07/77	6				27					
02/14/77	5				24					
02/21/77	6				26					
02/28/77	6				26					
03/07/77	6				26					
03/14/77	7				30					
03/21/77	7				30					
03/30/77	7				29					
04/04/77	6				28					
04/11/77	6				25					
04/18/77	7				32					
04/25/77	5				24					
05/03/77	7				32					
05/10/77	7.5				33					
05/16/77	7				33					
05/23/77	7				32					
05/31/77	7				33					

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SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
06/06/77	7				30					
06/13/77	8				34					
06/20/77	7				30					
06/27/77	6				26					
07/05/77	8				34					
07/11/77	7				31					
07/19/77	4				19					
07/25/77	7				30					
08/01/77	7				32					
08/08/77	7				31					
08/15/77	6				26					
08/22/77	5				22					
09/06/77	5				23					
09/12/77	6.8				30					
09/19/77	5				21					
09/26/77	7				28					
10/03/77	6.6				29					
10/10/77	6.8				30					
10/17/77	6				28					
10/25/77	6				29					
10/31/77	6				26					
11/14/77	5.7				25					
11/21/77	3				12					
11/28/77	7				32					
12/05/77	5.5				24					
12/12/77	5.2				23					
12/19/77	6				28					
12/27/77	2.2				9.8					
12/27/77	2.2				9.5					
01/04/78	5.2				23					

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SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
01/09/78	1.9				8.6					
01/16/78	4.5				20					
01/23/78	6.2				28					
01/30/78	8.0				35					
02/13/78	7				33					
02/20/78	6.1				27					
02/27/78	8				34					
03/06/78	5.7				25					
03/13/78	5.1				22.6					
03/20/78	4.5				20					
03/27/78	7.9				35					
04/03/78	7				30					
04/10/78	4				15					
04/17/78	5				21					
04/24/78	7				30					
05/01/78	2				10					
05/08/78	8				38					
05/15/78	8				35					
05/22/78	6				35					
05/30/78	8				36					
06/05/78	7				31					
06/11/78	8				38					
06/19/78	7				32					
06/26/78	3				13					
07/03/78	5				23					
07/10/78	6				25					
07/17/78	7				33					
07/24/78	8				34					
07/31/78	7				30					
08/07/78	8				34					

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SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
05/14/78	8				34					
03/28/78	8				34					
09/05/78	8				34					
09/11/78	8				34					
09/18/78	7				30					
09/25/78	5				24					
10/02/78	8				34					
10/09/78	8				36					
10/16/78	8				35					
10/23/78	7.2				32					
10/30/78	8				35					
11/06/78	12				53					
11/13/78	4				17					
11/20/78	9				38					
11/27/78	7.5				33					
12/04/78	10				44					
12/11/78	8				33					
12/18/78	8				34					
01/02/79	8				36					
01/08/79	6.8				30					
01/15/79	6.8				30					
01/22/79	6.1				27					
01/29/79	6.8				30					
02/05/79	8.4				37					
02/12/79	6				27					
02/19/79	3.6				16					
02/26/79	7				31					
03/05/79	6.8				30					
03/12/79	5				22					
03/19/79	4									

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SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
03/26/79	5				23					
04/02/79	11									
04/09/79	7				32					
04/16/79	9									
04/23/79	8.4									
04/30/79	8.0									
05/07/79	8									
05/14/79	7									
05/21/79	5									
05/28/79	7									
06/04/79	6									
06/11/79	9.0									
06/18/79	5									
06/25/79	7									
07/02/79	6.6									
07/09/79	6.8									
07/16/79	3.4									
07/23/79	5									
07/30/79	9									
05/06/79	8									
08/13/79	8									
08/20/79	9									
08/27/79	9									
09/04/79	5									
09/10/79	9									
09/17/79	10									
09/24/79	3									
10/01/79	9									
10/08/79	8									
10/15/79	10									

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HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
10/22/79	5.0									
10/29/79	4									
11/05/79	10									
11/12/79	10.0									
11/19/79	10									
12/03/79	3									
12/10/79	9									
12/17/79	9									
01/07/80	8									
01/14/80	10									
01/21/80	4									
01/28/80	9.7									
02/04/80	5									
02/11/80	9.4									
02/18/80	5									
02/25/80	8									
03/03/80	7.5									
03/10/80	9.9									
03/17/80	8.1									
03/24/80	5.9									
03/31/80	9.9									
04/07/80	3.1									
04/14/80	8.1									
04/21/80	11.1									
04/28/80	7.2									
05/05/80	6.1									
05/12/80	7.9									
05/19/80	7.5									
05/27/80	7.0									
06/02/80	4.7									

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SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
06/09/80	8.4									
06/16/80	8.1									
06/23/80	5.0									
06/30/80	8									
07/04/80	8.4									
07/07/80	8.1									
07/14/80	5									
07/21/80	3									
07/28/80	9.0									
08/11/80	8.7									
08/18/80	9.0									
08/25/80	9.5									
09/02/80	8.9									
09/08/80	8.9									
09/15/80	9.5									
09/22/80	8.8									
09/29/80	10									
10/06/80	9.9									
10/13/80	9.7									
10/20/80	7.9									
10/27/80	9.9									
11/03/80	3.7									
11/10/80	9.3									
11/17/80	10.3									
11/24/80	9.9									
12/01/80	8.8									
12/08/80	10.5									
12/15/80	10.1									
12/22/80	9.4									
01/05/81	10.4									

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HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
01/12/81	11.2									
01/19/81	10.2									
01/26/81	11.1									
02/02/81	10.9									
02/09/81	10.1									
02/16/81	10									
02/23/81	9									
03/02/81	9.2									
03/09/81	9.7									
03/16/81	9.0									
03/23/81	8.1									
03/30/81	7.2									
04/06/81	9.4									
04/20/81	7.7									
04/27/81	9.0									
05/04/81	7.3									
05/11/81	9.7									
05/18/81	7.0									
06/01/81	7.2									
06/08/81	9.5									
06/15/81	9.3									
06/22/81	8.3									
06/29/81	9.0									
07/27/81	<1	8.9								
08/03/81	9.7									
08/10/81	8.3									
08/17/81	9.7									
08/24/81	9.1									
08/31/81	<1									
09/11/81	9.2									

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HISTORICAL DATA

SAMPLE DATE	NITRATE AS N MG/L	PH	TOC MG/L	CONDUCTIVITY uMHOS/CM	NITRATE MG/L	COD MG/L	TS MG/L	TDS MG/L	PCB PPM/PPB	PHENOL PPM/PPB
09/14/81	10.0									
09/21/81	10.0									
09/28/81	8.4									
10/05/81	5.8									
10/19/81	8.7									